CCNP ROUTING AND SWITCHING

Configuring EIGRP

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Purpose

The purpose of this lab is to configure EIGRP on six routers. Students will learn how to configure EIGRP for IPv4 and IPv6 on routers as well as load balancing across unequal cost-links and modifying metrics.

Background:

Enhanced Interior Gateway Routing Protocol (EIGRP) is an open standard protocol, however is not as supported by third party vendors as OSPF is. This protocol is an interior gateway protocol (IGP) which means it is used within a single autonomous system. EIGRP uses distance vector instead of "hop" count to calculate the best path, using the bandwidth, delay, load and reliability to create a formula that produces a metric for each link. These metrics are used to calculate the advertised distances as well as the feasible distances. The advertised distances is how far the neighbor router says the destination is and the feasible distances is how far it actually is factoring in the distances to the neighboring router as well.

Diffusing update algorithm (DUAL) uses these distances to ensure that route recaulculations do not result in loops. When DUAL recieves data from other routers, it calculates the primary and secondary routes (successor and feasible successor). The successor route usually has the lowest metric and the fesaibly successor has the second lowest. There can be multiple successor and feasible successors like in the case of load balancing. EIGRP is unique in that it can perform both equal and unequal cost load balancing. During equal cost load-balancing, two routes have the same metric and are both successors, causing EIGRP to send one packet across each link as it load-balances. However, during unequal cost load-balancing, because of DUAL, the link with the higher metric will be considered a feasible successor and not be entered into the routing table, leaving only the lower metric link as a successor. By using the variance command, paths with higher or lower metrics can be unequally load-balanced. Variance is a multiplier between 1 and 128. By default, that multiplier is 1 and only equal cost load-balancing will be possible. Variance tells the router to load-balance across routes with a metric less than the minimum metric multiplied by the variance number. To become a successor, the feasible successor must have a feasible distance less than the feasible distance of the current successor route times the variance. For example, if the successor's feasible distance was 2621440, if you had a variance of 2, that distance would become 5242880. If the feasible successor (or the unequal cost link) had an advertised distance of less than 5242880 like 5200000, it would count as a successor route and EIGRP would unequally load-balance it proportionally.

Neighbor discovery/advertisement in EIGRP is started with a hello message which are sent every 5 seconds by default with a hold timer 3 times the hello interval. When a router recieves a hello message, certain requirements must be met. These requirements are that they must have the same Autonomous System number, be in the same subnet and have the same K values.The K values are an important part of determining the EIGRP metrics on routes. K values are numbers from 0-128 and influence the overall EIGRP cost metric. By default only delay and bandwidth metrics are used, with a K value of 1. In this lab, I enabled the use of reliability and load by setting the K values of those to 1 instead of 0. The metric weights can be seen in the `show ip protocols` section of the configs below.

Lab Summary

When configuring EIGRP for IPv4 and IPv6 I set up six 4321 Cisco Routers with two routers installed with a NIM-2T WAN Interface Card for serial connection. I used copper crossover cables to connect the routers to each other and two serial DCE connections to connect R3 with R4. Routers used the IPv4 network of 10.0.0.0 with a /30 subnet from 10.0.0.0-10.0.0.19. They also used the IPv6 network of 2001:db8:acad:0::1/64. Loopback addresses are used in the place of LANs. Loopbacks

have IPv4 addresses in the 192.168.0.0/16 network and are subnetted into /30s. They use IPv6 addresses in the 2001:db8:acad:0::1/64 network. I configured EIGRP on all six routers using the commands listed below and set all loopback interfaces as passive-interfaces to ensure network security and efficiency. To enable unequal cost load-balancing, I set the Serial 0/1/1 links connecting S3 and S4 to a delay of 200 and bandwidth of 500. To allow for EIGRP to perform unequal cost load-balancing, I also changed the variance to 4 for IPv4 and 5 for IPv6. I then set the metric weights to enable the use of load and reliability in the metric calculations. Finally I pinged all addresses in the network and checked the ip route tables to make sure that unequal cost load-balancing was occuring and all destinations were reachable.

Lab Commands:

`Router#`**`show ip eigrp neighbors`**
Definition: Lists known neighbor and does not list neighbors for which some mismatched parameter is preventing a valid EIGRP neighbor relationship

`Router#`**`show ip eigrp topology`**
Definition: Lists all successor and feasible successor routes known to the router. It does not list all known topology details.

`Router(config)#`**`router eigrp #`**
Defintion: Used with network commands to enable EIGRP globally and on interfaces.

`Router(config-router)#`**`eigrp router-id`** `#`
Definition: This command sets the unique identifier identifying the router in the EIGRP domain.

`Router(config)#`**`ipv6 router eigrp asn`**
Defintion: Used with network commands to set EIGRP ASN number.

`Router(config-router)#`**`no shutdown`**
Definition: Prevents IPv6 EIGRP process from going offline.

`Router(config-router)#`**`ipv6 eigrp router-id #`**
Definition:Definition: This command sets the unique identifier identifying the router in the EIGRP domain.

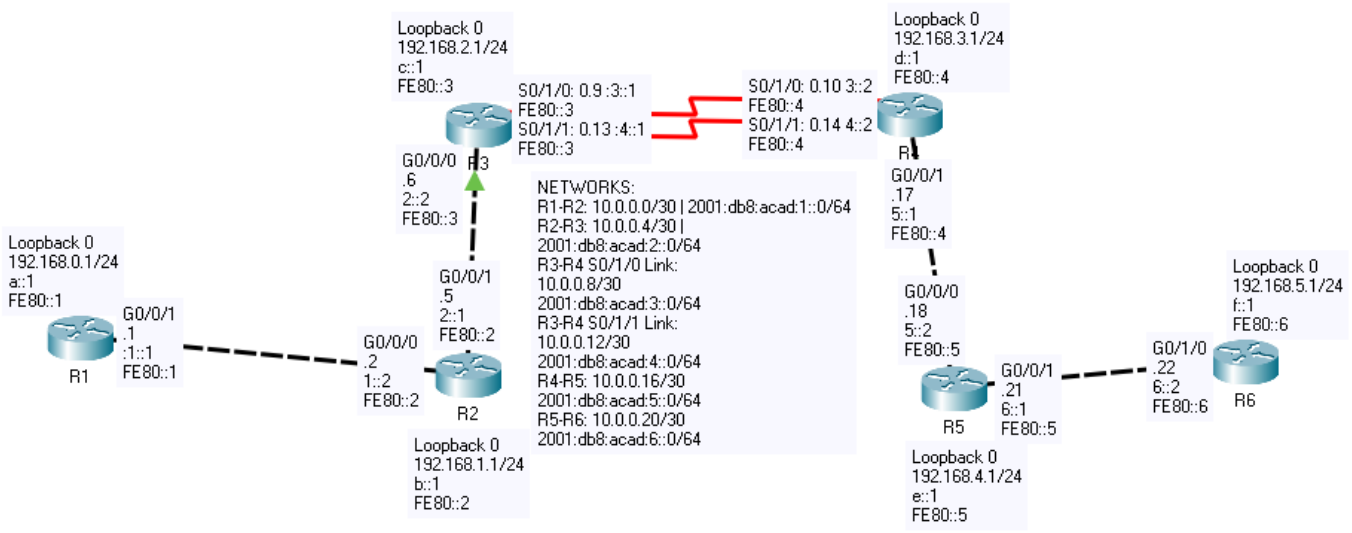
`Router(config)#`**`ipv6 eigrp #`**
Defintion: Used to activate IPv6 EIGRP on interfaces and assigns it to an ASN

`Router(config-if)#`**`bandwidth #`**
Defintion: Used to increase or lower minimum bandwith on a link

`Router(config-if)#`**`delay #`**
Definition: Used to increase or lower the delay on a link (in tens of micoseconds).

`Router(config-if)#`**`metric weight # # # # # #`**
Definition: Changes the weights of the K value multipliers.

Topology Diagram



Addressing Table

Device	Interface	IP Address	IPv6 Address	Link-Local Addresses
R1	G 0/0/1	10.0.0.1/30	2001:db8:acad:1::1/64	fe80::1
	Loopback 0	192.168.0.1/24	2001:db8:acad:a::1/64	fe80::1
R2	G 0/0/0	10.0.0.2/30	2001:db8:acad:1::2/64	fe80::2
	G 0/0/1	10.0.0.5/30	2001:db8:acad:2::1/64	fe80::2
	Loopback 0	192.168.1.1/24	2001:db8:acad:b::1/64	fe80::2
R3	G 0/0/0	10.0.0.6/30	2001:db8:acad:2::264	fe80::3
	S 0/1/0	10.0.0.9/30	2001:db8:acad:3::1/64	fe80::3
	S 0/1/1	10.0.0.13/30	2001:db8:acad:4::1/64	fe80::3
	Loopback 0	192.168.2.1/32	2001:db8:acad:c::1/64	fe80::3
R4	G 0/0/1	10.0.0.17/30	2001:db8:acad:5::1/64	fe80::4
	S 0/1/0	10.0.0.10/30	2001:db8:acad:3::2/64	fe80::4
	S 0/1/1	10.0.0.14/30	2001:db8:acad:4::2/64	fe80::4
	Loopback 0	192.168.3.1/32	2001:db8:acad:d::1/64	fe80::4
R5	G 0/0/0	10.0.0.18/30	2001:db8:acad:5::2/64	fe80::5
	G 0/0/1	10.0.0.21/30	2001:db8:acad:6::1/64	fe80::5
	Loopback 0	192.168.4.1/32	2001:db8:acad:e::1/64	fe80::5
R6	G 0/0/0	10.0.0.22/32	2001:db8:acad:6::2/64	fe80::6
	Loopback 0	192.168.5.1/32	2001:db8:acad:f::1/64	fe80::6

PINGS:

```
R1#ping 2001:db8:acad:a::1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:db8:acad:a::1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/4/9 ms

R1#ping 2001:db8:acad:b::1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:db8:acad:b::1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms

R1#ping 2001:db8:acad:c::1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:db8:acad:c::1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms

R1#ping 2001:db8:acad:d::1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:db8:acad:d::1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/3/11 ms

R1#ping 2001:db8:acad:e::1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:db8:acad:e::1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/4/12 ms

R1#ping 2001:db8:acad:f::1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:db8:acad:f::1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/8/18 ms
```

```
R1#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 = 7/12/33 ms

R1#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 = 0/0/3 ms

R1#ping 192.168.2.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.2.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms

R1#ping 192.168.3.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.3.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/5/11 ms

R1#ping 192.168.4.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.4.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/5/12 ms

R1#ping 192.168.5.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.5.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/4/9 ms
```

Router 1 Config:

```
R1#show run
Building configuration...

Current configuration : 1061 bytes
!
version 15.4
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname R1
!
ip cef
ipv6 unicast-routing
!
no ipv6 cef
!
spanning-tree mode pvst
interface Loopback0
ip address 192.168.0.1 255.255.255.0
ipv6 address FE80::1 link-local
ipv6 address 2001:DB8:ACAD:A::1/64
ipv6 eigrp 10
!
interface GigabitEthernet0/0/0
no ip address
duplex auto
speed auto
shutdown
!
interface GigabitEthernet0/0/1
ip address 10.0.0.1 255.255.255.252
duplex auto
speed auto
ipv6 address FE80::1 link-local
ipv6 address 2001:DB8:ACAD:1::1/64
ipv6 eigrp 10
!
interface Vlan1
no ip address
shutdown
!
router eigrp 1
eigrp router-id 1.1.1.1
passive-interface Loopback0
network 10.0.0.0 0.0.0.3
network 192.168.0.0
```

```
metric weights 0 1 1 1 1 0
!
ipv6 router eigrp 10
eigrp router-id 1.1.1.1
no shutdown
passive-interface Loopback0
!
ip classless
!
ip flow-export version 9
!
line con 0
!
line aux 0
!
line vty 0 4
login
end
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, E - EGP
i - IS-IS, 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

Gateway of last resort is not set

10.0.0.0/8 is variably subnetted, 7 subnets, 2 masks
C 10.0.0.0/30 is directly connected, GigabitEthernet0/0/1
L 10.0.0.1/32 is directly connected, GigabitEthernet0/0/1
D 10.0.0.4/30 [90/3072] via 10.0.0.2, 01:28:27, GigabitEthernet0/0/1
D 10.0.0.8/30 [90/1665024] via 10.0.0.2, 01:28:25, GigabitEthernet0/0/1
D 10.0.0.12/30 [90/5191680] via 10.0.0.2, 01:28:25, GigabitEthernet0/0/1
D 10.0.0.16/30 [90/1665280] via 10.0.0.2, 01:28:25, GigabitEthernet0/0/1
D 10.0.0.20/30 [90/1665536] via 10.0.0.2, 01:28:25, GigabitEthernet0/0/1
192.168.0.0/24 is variably subnetted, 2 subnets, 2 masks
C 192.168.0.0/24 is directly connected, Loopback0
L 192.168.0.1/32 is directly connected, Loopback0
D 192.168.1.0/24 [90/130816] via 10.0.0.2, 01:28:27, GigabitEthernet0/0/1

R1#show ipv6 route
IPv6 Routing Table - 15 entries
Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
U - Per-user Static route, M - MIPv6
I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary
ND - ND Default, NDp - ND Prefix, DCE - Destination, NDr - Redirect
O - OSPF intra, OI - OSPF inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
D - EIGRP, EX - EIGRP external
C 2001:DB8:ACAD:1::/64 [0/0]
via GigabitEthernet0/0/1, directly connected
L 2001:DB8:ACAD:1::1/128 [0/0]
via GigabitEthernet0/0/1, receive
D 2001:DB8:ACAD:2::/64 [90/3072]
via FE80::2, GigabitEthernet0/0/1
D 2001:DB8:ACAD:3::/64 [90/1658624]
via FE80::2, GigabitEthernet0/0/1
D 2001:DB8:ACAD:4::/64 [90/5171712]
via FE80::2, GigabitEthernet0/0/1
D 2001:DB8:ACAD:5::/64 [90/1658880]
via FE80::2, GigabitEthernet0/0/1
D 2001:DB8:ACAD:6::/64 [90/1659136]
via FE80::2, GigabitEthernet0/0/1

R1#show ip protocols

Routing Protocol is "eigrp 1 "
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Default networks flagged in outgoing updates
Default networks accepted from incoming updates
EIGRP metric weight K1=1, K2=1, K3=1, K4=1, K5=0
EIGRP maximum hopcount 100
EIGRP maximum metric variance 1
Redistributing: eigrp 1
```

```
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
10.0.0.0/30
192.168.0.0
Passive Interface(s):
Loopback0
Routing Information Sources:
Gateway Distance Last Update
10.0.0.2 90 6654857
Distance: internal 90 external 170

R1#
R1#show ipv6 protocols
IPv6 Routing Protocol is "connected"
IPv6 Routing Protocol is "ND"
IPv6 Routing Protocol is "eigrp 10"
EIGRP metric weight K1=1, K2=0, K3=1, K4=0, K5=0
EIGRP maximum hopcount 100
EIGRP maximum metric variance 1
Interfaces:
Loopback0 (passive)
GigabitEthernet0/0/1
Redistributing: eigrp 10
Maximum path: 16
Distance: internal 90 external 170

R1#
R1#show ip eigrp neighbors
IP-EIGRP neighbors for process 1
H Address Interface Hold Uptime SRTT RTO Q Seq
(sec) (ms) Cnt Num
0 10.0.0.2 Gig0/0/1 11 01:28:26 40 1000 0 83

R1#
R1#show ipv6 eigrp neighbors
IPv6-EIGRP neighbors for process 10
H Address Interface Hold Uptime SRTT RTO Q Seq
(sec) (ms) Cnt Num
0 Link-local address: Gig0/0/1 12 01:28:26 40 1000 0 91
FE80::2

R1#
R1#show ip eigrp topology
IP-EIGRP Topology Table for AS 1/ID(1.1.1.1)

Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
r - Reply status

P 10.0.0.0/30, 1 successors, FD is 2816
via Connected, GigabitEthernet0/0/1
P 10.0.0.4/30, 1 successors, FD is 3072
via 10.0.0.2 (3072/2816), GigabitEthernet0/0/1
P 10.0.0.8/30, 1 successors, FD is 1665024
via 10.0.0.2 (1665024/1664768), GigabitEthernet0/0/1
P 10.0.0.12/30, 1 successors, FD is 5191680
via 10.0.0.2 (5191680/5191424), GigabitEthernet0/0/1
P 10.0.0.16/30, 1 successors, FD is 1665280
via 10.0.0.2 (1665280/1665024), GigabitEthernet0/0/1
P 10.0.0.20/30, 1 successors, FD is 1665536
via 10.0.0.2 (1665536/1665280), GigabitEthernet0/0/1
P 192.168.0.0/24, 1 successors, FD is 128256
via Connected, Loopback0
P 192.168.1.0/24, 1 successors, FD is 130816
via 10.0.0.2 (130816/128256), GigabitEthernet0/0/1
P 192.168.2.0/24, 1 successors, FD is 131072

R1#show ipv6 eigrp topology
IPv6-EIGRP Topology Table for AS 10/ID(1.1.1.1)

Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
r - Reply status

P 2001:DB8:ACAD:1::/64, 1 successors, FD is 2816
via Connected, GigabitEthernet0/0/1
P 2001:DB8:ACAD:2::/64, 1 successors, FD is 3072
via FE80::2 (3072/2816), GigabitEthernet0/0/1
```

```
P 2001:DB8:ACAD:3::/64, 1 successors, FD is 1658624
via FE80::2 (1658624/1658368), GigabitEthernet0/0/1
P 2001:DB8:ACAD:4::/64, 1 successors, FD is 5171712
via FE80::2 (5171712/5171456), GigabitEthernet0/0/1
P 2001:DB8:ACAD:5::/64, 1 successors, FD is 1658880
via FE80::2 (1658880/1658624), GigabitEthernet0/0/1
P 2001:DB8:ACAD:6::/64, 1 successors, FD is 1659136
via FE80::2 (1659136/1658880), GigabitEthernet0/0/1
P 2001:DB8:ACAD:A::/64, 1 successors, FD is 128256
via Connected, Loopback0
P 2001:DB8:ACAD:B::/64, 1 successors, FD is 130816
via FE80::2 (130816/128256), GigabitEthernet0/0/1
P 2001:DB8:ACAD:C::/64, 1 successors, FD is 131072
via FE80::2 (131072/130816), GigabitEthernet0/0/1
P 2001:DB8:ACAD:D::/64, 1 successors, FD is 1786624
via FE80::2 (1786624/1786368), GigabitEthernet0/0/1
P 2001:DB8:ACAD:E::/64, 1 successors, FD is 1786880
via FE80::2 (1786880/1786624), GigabitEthernet0/0/1
P 2001:DB8:ACAD:F::/64, 1 successors, FD is 1787136
via FE80::2 (1787136/1786880), GigabitEthernet0/0/1
```

Router 2 Config

```
R2#show run
Building configuration...

Current configuration : 1150 bytes
!
version 15.4
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname R2
!
ip cef
ipv6 unicast-routing
!
no ipv6 cef
!
spanning-tree mode pvst
interface Loopback0
ip address 192.168.1.1 255.255.255.0
ipv6 address 2001:DB8:ACAD:B::1/64
ipv6 eigrp 10
!
interface GigabitEthernet0/0/0
ip address 10.0.0.2 255.255.255.252
duplex auto
speed auto
ipv6 address FE80::2 link-local
ipv6 address 2001:DB8:ACAD:1::2/64
ipv6 eigrp 10
!
interface GigabitEthernet0/0/1
ip address 10.0.0.5 255.255.255.252
duplex auto
speed auto
ipv6 address FE80::2 link-local
ipv6 address 2001:DB8:ACAD:2::1/64
ipv6 eigrp 10
!
interface Vlan1
no ip address
shutdown
!
router eigrp 1
eigrp router-id 2.2.2.2
passive-interface Loopback0
network 10.0.0.0 0.0.0.3
network 192.168.1.0
network 10.0.0.4 0.0.0.3
metric weights 0 1 1 1 1 0
!
ipv6 router eigrp 10
eigrp router-id 2.2.2.2
no shutdown
passive-interface Loopback0
```

```
!
ip classless
!
ip flow-export version 9
line con 0
!
line aux 0
!
line vty 0 4
login
!
end
R2#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, E - EGP
i - IS-IS, 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

Gateway of last resort is not set

10.0.0.0/8 is variably subnetted, 8 subnets, 2 masks
C 10.0.0.0/30 is directly connected, GigabitEthernet0/0/0
L 10.0.0.2/32 is directly connected, GigabitEthernet0/0/0
C 10.0.0.4/30 is directly connected, GigabitEthernet0/0/1
L 10.0.0.5/32 is directly connected, GigabitEthernet0/0/1
D 10.0.0.8/30 [90/1664768] via 10.0.0.6, 01:35:35, GigabitEthernet0/0/1
D 10.0.0.12/30 [90/5191424] via 10.0.0.6, 01:35:35, GigabitEthernet0/0/1
D 10.0.0.16/30 [90/1665024] via 10.0.0.6, 01:35:34, GigabitEthernet0/0/1
D 10.0.0.20/30 [90/1665280] via 10.0.0.6, 01:35:34, GigabitEthernet0/0/1
D 192.168.0.0/24 [90/130816] via 10.0.0.1, 01:35:36, GigabitEthernet0/0/0
192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C 192.168.1.0/24 is directly connected, Loopback0

R2#show ipv6 route
IPv6 Routing Table - 16 entries
Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
U - Per-user Static route, M - MIPv6
I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary
ND - ND Default, NDp - ND Prefix, DCE - Destination, NDr - Redirect
O - OSPF intra, OI - OSPF inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
D - EIGRP, EX - EIGRP external
C 2001:DB8:ACAD:1::/64 [0/0]
via GigabitEthernet0/0/0, directly connected
L 2001:DB8:ACAD:1::2/128 [0/0]
via GigabitEthernet0/0/0, receive
C 2001:DB8:ACAD:2::/64 [0/0]
via GigabitEthernet0/0/1, directly connected
L 2001:DB8:ACAD:2::1/128 [0/0]
via GigabitEthernet0/0/1, receive
D 2001:DB8:ACAD:3::/64 [90/1658368]
via FE80::3, GigabitEthernet0/0/1
D 2001:DB8:ACAD:4::/64 [90/5171456]
via FE80::3, GigabitEthernet0/0/1
D 2001:DB8:ACAD:5::/64 [90/1658624]
via FE80::3, GigabitEthernet0/0/1

R2#show ip protocols

Routing Protocol is "eigrp 1 "
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Default networks flagged in outgoing updates
Default networks accepted from incoming updates
EIGRP metric weight K1=1, K2=1, K3=1, K4=1, K5=0
EIGRP maximum hopcount 100
EIGRP maximum metric variance 1
Redistributing: eigrp 1
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
10.0.0.0/30
192.168.1.0
10.0.0.4/30
```

```
Passive Interface(s):
Loopback0
Routing Information Sources:
Gateway Distance Last Update
10.0.0.1 90 6654761
10.0.0.6 90 6655050

R2#show ipv6 protocols
IPv6 Routing Protocol is "connected"
IPv6 Routing Protocol is "ND"
IPv6 Routing Protocol is "eigrp 10"
EIGRP metric weight K1=1, K2=0, K3=1, K4=0, K5=0
EIGRP maximum hopcount 100
EIGRP maximum metric variance 1
Interfaces:
Loopback0 (passive)
GigabitEthernet0/0/0
GigabitEthernet0/0/1
Redistributing: eigrp 10
Maximum path: 16
Distance: internal 90 external 170

R2#
R2#show ip eigrp neighbors
IP-EIGRP neighbors for process 1
H Address Interface Hold Uptime SRTT RTO Q Seq
(sec) (ms) Cnt Num
0 10.0.0.1 Gig0/0/0 10 01:35:35 40 1000 0 76
1 10.0.0.6 Gig0/0/1 10 01:35:35 40 1000 0 83

R2#
R2#show ipv6 eigrp neighbors
IPv6-EIGRP neighbors for process 10
H Address Interface Hold Uptime SRTT RTO Q Seq
(sec) (ms) Cnt Num
0 Link-local address: Gig0/0/1 12 01:35:35 40 1000 0 103
FE80::3
1 Link-local address: Gig0/0/0 13 01:35:35 40 1000 0 77
FE80::1

R2#
R2#show ip eigrp topology
IP-EIGRP Topology Table for AS 1/ID(2.2.2.2)

Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
r - Reply status

P 10.0.0.0/30, 1 successors, FD is 2816
via Connected, GigabitEthernet0/0/0
P 10.0.0.4/30, 1 successors, FD is 2816
via Connected, GigabitEthernet0/0/1
P 10.0.0.8/30, 1 successors, FD is 1664768
via 10.0.0.6 (1664768/1664512), GigabitEthernet0/0/1
P 10.0.0.12/30, 1 successors, FD is 5191424
via 10.0.0.6 (5191424/5191168), GigabitEthernet0/0/1
P 10.0.0.16/30, 1 successors, FD is 1665024
via 10.0.0.6 (1665024/1664768), GigabitEthernet0/0/1
P 10.0.0.20/30, 1 successors, FD is 1665280
via 10.0.0.6 (1665280/1665024), GigabitEthernet0/0/1
P 192.168.0.0/24, 1 successors, FD is 130816
via 10.0.0.1 (130816/128256), GigabitEthernet0/0/0
P 192.168.1.0/24, 1 successors, FD is 128256
via Connected, Loopback0
P 192.168.2.0/24, 1 successors, FD is 130816

R2#show ipv6 eigrp topology
IPv6-EIGRP Topology Table for AS 10/ID(2.2.2.2)

Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
r - Reply status

P 2001:DB8:ACAD:1::/64, 1 successors, FD is 2816
via Connected, GigabitEthernet0/0/0
P 2001:DB8:ACAD:2::/64, 1 successors, FD is 2816
via Connected, GigabitEthernet0/0/1
P 2001:DB8:ACAD:3::/64, 1 successors, FD is 1658368
via FE80::3 (1658368/1658112), GigabitEthernet0/0/1
```

```
P 2001:DB8:ACAD:4::/64, 1 successors, FD is 5171456
via FE80::3 (5171456/5171200), GigabitEthernet0/0/1
P 2001:DB8:ACAD:5::/64, 1 successors, FD is 1658624
via FE80::3 (1658624/1658368), GigabitEthernet0/0/1
P 2001:DB8:ACAD:6::/64, 1 successors, FD is 1658880
via FE80::3 (1658880/1658624), GigabitEthernet0/0/1
P 2001:DB8:ACAD:A::/64, 1 successors, FD is 130816
via FE80::1 (130816/128256), GigabitEthernet0/0/0
P 2001:DB8:ACAD:B::/64, 1 successors, FD is 128256
via Connected, Loopback0
P 2001:DB8:ACAD:C::/64, 1 successors, FD is 130816
via FE80::3 (130816/128256), GigabitEthernet0/0/1
P 2001:DB8:ACAD:D::/64, 1 successors, FD is 1786368
via FE80::3 (1786368/1786112), GigabitEthernet0/0/1
P 2001:DB8:ACAD:E::/64, 1 successors, FD is 1786624
via FE80::3 (1786624/1786368), GigabitEthernet0/0/1
P 2001:DB8:ACAD:F::/64, 1 successors, FD is 1786880
via FE80::3 (1786880/1786624), GigabitEthernet0/0/1
```

Router 3 Config:

Proof of unequal cost load-balancing shown in red:

```
R3#show ip route 10.0.0.20
Routing entry for 10.0.0.20/30
Known via "eigrp 1", distance 90, metric 1285787, type internal
Redistributing via eigrp 1
Last update from 10.0.0.14 on Serial0/1/1, 00:00:40 ago
Routing Descriptor Blocks:
10.0.0.14, from 10.0.0.14, 00:00:40 ago, via Serial0/1/1
Route metric is 5191790, traffic share count is 59
Total delay is 2020 microseconds, minimum bandwidth is 500 Kbit
Reliability 255/255, minimum MTU 1500 bytes
Loading 1/255, Hops 2
* 10.0.0.10, from 10.0.0.10, 00:00:40 ago, via Serial0/1/0
Route metric is 1285787, traffic share count is 240
Total delay is 30 microseconds, minimum bandwidth is 2000 Kbit
Reliability 255/255, minimum MTU 1500 bytes
Loading 1/255, Hops 2
R3#show ip protocols
*** IP Routing is NSF aware ***

Routing Protocol is "application"
Sending updates every 0 seconds
Invalid after 0 seconds, hold down 0, flushed after 0
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Maximum path: 32
Routing for Networks:
Routing Information Sources:
Gateway         Distance      Last Update
Distance: (default is 4)

Routing Protocol is "eigrp 1"
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Default networks flagged in outgoing updates
Default networks accepted from incoming updates
EIGRP-IPv4 Protocol for AS(1)
Metric weight K1=1, K2=1, K3=1, K4=1, K5=0
Soft SIA disabled
NSF-aware route hold timer is 240
EIGRP NSF disabled
NSF signal timer is 20s
NSF converge timer is 120s
Router-ID: 3.3.3.3
Topology : 0 (base)
Active Timer: 3 min
Distance: internal 90 external 170
Maximum path: 4
Maximum hopcount 100
Maximum metric variance 5

Automatic Summarization: disabled
Maximum path: 4
```

```
Routing for Networks:
10.0.0.4/30
10.0.0.8/30
10.0.0.12/30
192.168.2.0
Passive Interface(s):
Loopback0
Routing Information Sources:
Gateway         Distance      Last Update
10.0.0.10             90      00:06:34
10.0.0.14             90      00:06:34
Gateway         Distance      Last Update
10.0.0.5              90      00:06:35
Distance: internal 90 external 170


R3#show ip eigrp topology
EIGRP-IPv4 Topology Table for AS(1)/ID(3.3.3.3)
Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
r - reply Status, s - sia Status

P 192.168.3.0/24, 2 successors, FD is 1413275
via 10.0.0.10 (1413275/128257), Serial0/1/0
via 10.0.0.14 (5319278/128257), Serial0/1/1
P 10.0.0.12/30, 1 successors, FD is 5191278
via Connected, Serial0/1/1
P 192.168.2.0/24, 1 successors, FD is 128257
via Connected, Loopback0
P 10.0.0.20/30, 2 successors, FD is 1285787
via 10.0.0.10 (1285787/3082), Serial0/1/0
via 10.0.0.14 (5191790/3082), Serial0/1/1
P 10.0.0.8/30, 1 successors, FD is 1285275
via Connected, Serial0/1/0
via 10.0.0.14 (5191534/1274995), Serial0/1/1
P 192.168.0.0/24, 1 successors, FD is 131082
via 10.0.0.5 (131082/130826), GigabitEthernet0/0/0
P 10.0.0.0/30, 1 successors, FD is 3082
via 10.0.0.5 (3082/2826), GigabitEthernet0/0/0
P 192.168.1.0/24, 1 successors, FD is 130826
via 10.0.0.5 (130826/128257), GigabitEthernet0/0/0
P 10.0.0.4/30, 1 successors, FD is 2826
via Connected, GigabitEthernet0/0/0
P 192.168.4.0/24, 2 successors, FD is 1413531
via 10.0.0.10 (1413531/130826), Serial0/1/0
via 10.0.0.14 (5319534/130826), Serial0/1/1
P 192.168.5.0/24, 2 successors, FD is 1413787
via 10.0.0.10 (1413787/131082), Serial0/1/0
via 10.0.0.14 (5319790/131082), Serial0/1/1
P 10.0.0.16/30, 2 successors, FD is 1285531
via 10.0.0.10 (1285531/2826), Serial0/1/0
via 10.0.0.14 (5191534/2826), Serial0/1/1


R3#show ipv6 eigrp topology
EIGRP-IPv6 Topology Table for AS(10)/ID(3.3.3.3)
Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
r - reply Status, s - sia Status

P 2001:DB8:ACAD:A::/64, 1 successors, FD is 131072
via FE80::2 (131072/130816), GigabitEthernet0/0/0
P 2001:DB8:ACAD:1::/64, 1 successors, FD is 3072
via FE80::2 (3072/2816), GigabitEthernet0/0/0
P 2001:DB8:ACAD:6::/64, 2 successors, FD is 1280768
via FE80::4 (5171712/3072), Serial0/1/1
via FE80::4 (1280768/3072), Serial0/1/0
P 2001:DB8:ACAD:C::/64, 1 successors, FD is 128256
via Connected, Loopback0
P 2001:DB8:ACAD:5::/64, 2 successors, FD is 1280512
via FE80::4 (5171456/2816), Serial0/1/1
via FE80::4 (1280512/2816), Serial0/1/0
P 2001:DB8:ACAD:F::/64, 2 successors, FD is 1408768
via FE80::4 (5299712/131072), Serial0/1/1
via FE80::4 (1408768/131072), Serial0/1/0
P 2001:DB8:ACAD:B::/64, 1 successors, FD is 130816
via FE80::2 (130816/128256), GigabitEthernet0/0/0
P 2001:DB8:ACAD:2::/64, 1 successors, FD is 2816
via Connected, GigabitEthernet0/0/0
```

```
P 2001:DB8:ACAD:D::/64, 2 successors, FD is 1408256
via FE80::4 (5299200/128256), Serial0/1/1
via FE80::4 (1408256/128256), Serial0/1/0
P 2001:DB8:ACAD:4::/64, 1 successors, FD is 5171200
via Connected, Serial0/1/1
P 2001:DB8:ACAD:3::/64, 1 successors, FD is 1280256
via Connected, Serial0/1/0
via FE80::4 (5171456/1270016), Serial0/1/1
via FE80::4 (1280512/1270016), Serial0/1/0
P 2001:DB8:ACAD:E::/64, 2 successors, FD is 1408512
via FE80::4 (5299456/130816), Serial0/1/1
via FE80::4 (1408512/130816), Serial0/1/0



R3#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
a - application route
+ - replicated route, % - next hop override, p - overrides from PfR

Gateway of last resort is not set

10.0.0.0/8 is variably subnetted, 9 subnets, 2 masks
D        10.0.0.0/30 [90/3082] via 10.0.0.5, 00:08:59, GigabitEthernet0/0/0
C        10.0.0.4/30 is directly connected, GigabitEthernet0/0/0
L        10.0.0.6/32 is directly connected, GigabitEthernet0/0/0
C        10.0.0.8/30 is directly connected, Serial0/1/0
L        10.0.0.9/32 is directly connected, Serial0/1/0
C        10.0.0.12/30 is directly connected, Serial0/1/1
L        10.0.0.13/32 is directly connected, Serial0/1/1
D        10.0.0.16/30 [90/5191534] via 10.0.0.14, 00:08:59, Serial0/1/1
[90/1285531] via 10.0.0.10, 00:08:59, Serial0/1/0
D        10.0.0.20/30 [90/5191790] via 10.0.0.14, 00:08:59, Serial0/1/1
[90/1285787] via 10.0.0.10, 00:08:59, Serial0/1/0
D     192.168.0.0/24 [90/131082] via 10.0.0.5, 00:08:59, GigabitEthernet0/0/0
D     192.168.1.0/24 [90/130826] via 10.0.0.5, 00:08:59, GigabitEthernet0/0/0
192.168.2.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.2.0/24 is directly connected, Loopback0
L        192.168.2.1/32 is directly connected, Loopback0
D     192.168.3.0/24 [90/5319278] via 10.0.0.14, 00:08:59, Serial0/1/1
[90/1413275] via 10.0.0.10, 00:08:59, Serial0/1/0
D     192.168.4.0/24 [90/5319534] via 10.0.0.14, 00:08:59, Serial0/1/1
[90/1413531] via 10.0.0.10, 00:08:59, Serial0/1/0
D     192.168.5.0/24 [90/5319790] via 10.0.0.14, 00:08:59, Serial0/1/1
[90/1413787] via 10.0.0.10, 00:08:59, Serial0/1/0


R3#show ipv6 route
IPv6 Routing Table - default - 17 entries
Codes: C - Connected, L - Local, S - Static, U - Per-user Static route
B - BGP, R - RIP, I1 - ISIS L1, I2 - ISIS L2
IA - ISIS interarea, IS - ISIS summary, D - EIGRP, EX - EIGRP external
ND - ND Default, NDp - ND Prefix, DCE - Destination, NDr - Redirect
O - OSPF Intra, OI - OSPF Inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2, a - Application
D   2001:DB8:ACAD:1::/64 [90/3072]
via FE80::2, GigabitEthernet0/0/0
C   2001:DB8:ACAD:2::/64 [0/0]
via GigabitEthernet0/0/0, directly connected
L   2001:DB8:ACAD:2::2/128 [0/0]
via GigabitEthernet0/0/0, receive
C   2001:DB8:ACAD:3::/64 [0/0]
via Serial0/1/0, directly connected
L   2001:DB8:ACAD:3::1/128 [0/0]
via Serial0/1/0, receive
C   2001:DB8:ACAD:4::/64 [0/0]
via Serial0/1/1, directly connected
L   2001:DB8:ACAD:4::1/128 [0/0]
via Serial0/1/1, receive
D   2001:DB8:ACAD:5::/64 [90/1280512]
via FE80::4, Serial0/1/0
```

```
via FE80::4, Serial0/1/1
D   2001:DB8:ACAD:6::/64 [90/1280768]
via FE80::4, Serial0/1/0
via FE80::4, Serial0/1/1
D   2001:DB8:ACAD:A::/64 [90/131072]
via FE80::2, GigabitEthernet0/0/0
D   2001:DB8:ACAD:B::/64 [90/130816]
via FE80::2, GigabitEthernet0/0/0
C   2001:DB8:ACAD:C::/64 [0/0]
via Loopback0, directly connected
L   2001:DB8:ACAD:C::1/128 [0/0]
via Loopback0, receive
D   2001:DB8:ACAD:D::/64 [90/1408256]
via FE80::4, Serial0/1/0
via FE80::4, Serial0/1/1
D   2001:DB8:ACAD:E::/64 [90/1408512]
via FE80::4, Serial0/1/0
via FE80::4, Serial0/1/1
D   2001:DB8:ACAD:F::/64 [90/1408768]
via FE80::4, Serial0/1/0
via FE80::4, Serial0/1/1
L   FF00::/8 [0/0]
via Null0, receive

R3#show ip eigrp neighbor
EIGRP-IPv4 Neighbors for AS(1)
H   Address                 Interface              Hold Uptime   SRTT   RTO  Q  Seq
(sec)          (ms)       Cnt Num
2   10.0.0.14               Se0/1/1                  14 00:09:50    3   294  0  50
1   10.0.0.10               Se0/1/0                  13 00:09:50    1   100  0  49
0   10.0.0.5                Gi0/0/0                  14 00:09:52    1   100  0  35
R3#show ipv6 eigrp neighbor
EIGRP-IPv6 Neighbors for AS(10)
H   Address                 Interface              Hold Uptime   SRTT   RTO  Q  Seq
(sec)          (ms)       Cnt Num
2   Link-local address:     Se0/1/1                  10 00:50:28    1   300  0  23
FE80::4
1   Link-local address:     Se0/1/0                  11 00:50:37    1   100  0  22
FE80::4
0   Link-local address:     Gi0/0/0                  14 00:51:34    1   100  0  30
FE80::2
```

Router 4 Config

Proof of unequal cost load-balancing shown in red:

```
R4#show ip route 10.0.0.1
Routing entry for 10.0.0.0/30
Known via "eigrp 1", distance 90, metric 1665024, type internal
Redistributing via eigrp 1
Last update from 10.0.0.9 on Serial0/1/0, 00:07:21 ago
Routing Descriptor Blocks:
* 10.0.0.9, from 10.0.0.9, 00:07:21 ago, via Serial0/1/0
Route metric is 1665024, traffic share count is 240
Total delay is 30 microseconds, minimum bandwidth is 1544 Kbit
Reliability 255/255, minimum MTU 1500 bytes
Loading 1/255, Hops 2
10.0.0.13, from 10.0.0.13, 00:07:21 ago, via Serial0/1/1
Route metric is 5191680, traffic share count is 59
Total delay is 2020 microseconds, minimum bandwidth is 500 Kbit
Reliability 255/255, minimum MTU 1500 bytes
Loading 1/255, Hops 2
```

```
R4#show run
Building configuration...

Current configuration : 1510 bytes
!
version 15.4
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname R4
!
no ip cef
ipv6 unicast-routing
```

```
!
no ipv6 cef
!
spanning-tree mode pvst
!
interface Loopback0
ip address 192.168.3.1 255.255.255.0
ipv6 address FE80::4 link-local
ipv6 address 2001:DB8:ACAD:D::1/64
ipv6 eigrp 10
!
interface GigabitEthernet0/0/0
no ip address
duplex auto
speed auto
shutdown
!
interface GigabitEthernet0/0/1
ip address 10.0.0.17 255.255.255.252
duplex auto
speed auto
ipv6 address FE80::4 link-local
ipv6 address 2001:DB8:ACAD:5::1/64
ipv6 eigrp 10
!
interface Serial0/1/0
ip address 10.0.0.10 255.255.255.252
delay 1
ipv6 address FE80::4 link-local
ipv6 address 2001:DB8:ACAD:3::2/64
ipv6 eigrp 10
clock rate 2000000
!
interface Serial0/1/1
bandwidth 500
ip address 10.0.0.14 255.255.255.252
delay 200
ipv6 address FE80::4 link-local
ipv6 address 2001:DB8:ACAD:4::2/64
ipv6 eigrp 10
clock rate 2000000
!
interface Vlan1
no ip address
shutdown
!
router eigrp 1
eigrp router-id 4.4.4.4
variance 4
passive-interface Loopback0
network 10.0.0.16 0.0.0.3
network 10.0.0.12 0.0.0.3
network 10.0.0.8 0.0.0.3
network 192.168.3.0
metric weights 0 1 1 1 1 0
!
ipv6 router eigrp 10
eigrp router-id 4.4.4.4
variance 5
no shutdown
passive-interface Loopback0
!
ip classless
!
ip flow-export version 9
!
line con 0
!
line aux 0
!
line vty 0 4
login
!
End
R4#show ip route 10.0.0.0
Routing entry for 10.0.0.0/8, 9 known subnets
Attached (6 connections)
```

```
Variably subnetted with 2 masks
Redistributing via eigrp 1
D        10.0.0.0/30 [90/5191790] via 10.0.0.13, 00:11:42, Serial0/1/1
[90/1275507] via 10.0.0.9, 00:11:42, Serial0/1/0
D        10.0.0.4/30 [90/5191534] via 10.0.0.13, 00:11:42, Serial0/1/1
[90/1275251] via 10.0.0.9, 00:11:42, Serial0/1/0
C        10.0.0.8/30 is directly connected, Serial0/1/0
L        10.0.0.10/32 is directly connected, Serial0/1/0
C        10.0.0.12/30 is directly connected, Serial0/1/1
L        10.0.0.14/32 is directly connected, Serial0/1/1
C        10.0.0.16/30 is directly connected, GigabitEthernet0/0/1
L        10.0.0.17/32 is directly connected, GigabitEthernet0/0/1
D        10.0.0.20/30 [90/3082] via 10.0.0.18, 00:11:42, GigabitEthernet0/0/1

R4#show ip protocols
*** IP Routing is NSF aware ***

Routing Protocol is "application"
Sending updates every 0 seconds
Invalid after 0 seconds, hold down 0, flushed after 0
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Maximum path: 32
Routing for Networks:
Routing Information Sources:
Gateway         Distance      Last Update
Distance: (default is 4)

Routing Protocol is "eigrp 1"
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Default networks flagged in outgoing updates
Default networks accepted from incoming updates
EIGRP-IPv4 Protocol for AS(1)
Metric weight K1=1, K2=1, K3=1, K4=1, K5=0
Soft SIA disabled
NSF-aware route hold timer is 240
EIGRP NSF disabled
NSF signal timer is 20s
NSF converge timer is 120s
Router-ID: 4.4.4.4
Topology : 0 (base)
Active Timer: 3 min
Distance: internal 90 external 170
Maximum path: 4
Maximum hopcount 100
Maximum metric variance 5

Automatic Summarization: disabled
Maximum path: 4
Routing for Networks:
10.0.0.8/30
10.0.0.12/30
10.0.0.16/30
192.168.3.0
Passive Interface(s):
Loopback0
Routing Information Sources:
Gateway         Distance      Last Update
10.0.0.9              90      00:11:55
10.0.0.13             90      00:11:55
Gateway         Distance      Last Update
10.0.0.18             90      00:11:57
Distance: internal 90 external 170

R4#show ip eigrp top
EIGRP-IPv4 Topology Table for AS(1)/ID(4.4.4.4)
Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
r - reply Status, s - sia Status

P 192.168.3.0/24, 1 successors, FD is 128257
via Connected, Loopback0
P 10.0.0.12/30, 1 successors, FD is 5191278
via Connected, Serial0/1/1
P 192.168.2.0/24, 2 successors, FD is 1402995
via 10.0.0.9 (1402995/128257), Serial0/1/0
via 10.0.0.13 (5319278/128257), Serial0/1/1
```

```
P 10.0.0.20/30, 1 successors, FD is 3082
via 10.0.0.18 (3082/2826), GigabitEthernet0/0/1
P 10.0.0.8/30, 1 successors, FD is 1274995
via Connected, Serial0/1/0
P 192.168.0.0/24, 2 successors, FD is 1403507
via 10.0.0.9 (1403507/131082), Serial0/1/0
via 10.0.0.13 (5319790/131082), Serial0/1/1
P 10.0.0.0/30, 2 successors, FD is 1275507
via 10.0.0.9 (1275507/3082), Serial0/1/0
via 10.0.0.13 (5191790/3082), Serial0/1/1
P 192.168.1.0/24, 2 successors, FD is 1403251
via 10.0.0.9 (1403251/130826), Serial0/1/0
via 10.0.0.13 (5319534/130826), Serial0/1/1
P 10.0.0.4/30, 2 successors, FD is 1275251
via 10.0.0.9 (1275251/2826), Serial0/1/0
via 10.0.0.13 (5191534/2826), Serial0/1/1
P 192.168.4.0/24, 1 successors, FD is 130826
via 10.0.0.18 (130826/128257), GigabitEthernet0/0/1
P 192.168.5.0/24, 1 successors, FD is 131082
via 10.0.0.18 (131082/130826), GigabitEthernet0/0/1
P 10.0.0.16/30, 1 successors, FD is 2826
via Connected, GigabitEthernet0/0/1
R4#show ipv6 eigrp top
EIGRP-IPv6 Topology Table for AS(10)/ID(4.4.4.4)
Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
r - reply Status, s - sia Status

P 2001:DB8:ACAD:A::/64, 2 successors, FD is 1398528
via FE80::3 (5299712/131072), Serial0/1/1
via FE80::3 (1398528/131072), Serial0/1/0
P 2001:DB8:ACAD:1::/64, 2 successors, FD is 1270528
via FE80::3 (5171712/3072), Serial0/1/1
via FE80::3 (1270528/3072), Serial0/1/0
P 2001:DB8:ACAD:6::/64, 1 successors, FD is 3072
via FE80::5 (3072/2816), GigabitEthernet0/0/1
P 2001:DB8:ACAD:C::/64, 2 successors, FD is 1398016
via FE80::3 (5299200/128256), Serial0/1/1
via FE80::3 (1398016/128256), Serial0/1/0
P 2001:DB8:ACAD:5::/64, 1 successors, FD is 2816
via Connected, GigabitEthernet0/0/1
P 2001:DB8:ACAD:F::/64, 1 successors, FD is 131072
via FE80::5 (131072/130816), GigabitEthernet0/0/1
P 2001:DB8:ACAD:B::/64, 2 successors, FD is 1398272
via FE80::3 (5299456/130816), Serial0/1/1
via FE80::3 (1398272/130816), Serial0/1/0
P 2001:DB8:ACAD:2::/64, 2 successors, FD is 1270272
via FE80::3 (5171456/2816), Serial0/1/1
via FE80::3 (1270272/2816), Serial0/1/0
P 2001:DB8:ACAD:D::/64, 1 successors, FD is 128256
via Connected, Loopback0
P 2001:DB8:ACAD:4::/64, 1 successors, FD is 5171200
via Connected, Serial0/1/1
P 2001:DB8:ACAD:3::/64, 1 successors, FD is 1270016
via Connected, Serial0/1/0
P 2001:DB8:ACAD:E::/64, 1 successors, FD is 130816
via FE80::5 (130816/128256), GigabitEthernet0/0/1

R4#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
a - application route
+ - replicated route, % - next hop override, p - overrides from PfR

Gateway of last resort is not set

10.0.0.0/8 is variably subnetted, 9 subnets, 2 masks
D        10.0.0.0/30 [90/5191790] via 10.0.0.13, 00:12:57, Serial0/1/1
[90/1275507] via 10.0.0.9, 00:12:57, Serial0/1/0
D        10.0.0.4/30 [90/5191534] via 10.0.0.13, 00:12:57, Serial0/1/1
[90/1275251] via 10.0.0.9, 00:12:57, Serial0/1/0
C        10.0.0.8/30 is directly connected, Serial0/1/0
L        10.0.0.10/32 is directly connected, Serial0/1/0
```

```
C        10.0.0.12/30 is directly connected, Serial0/1/1
L        10.0.0.14/32 is directly connected, Serial0/1/1
C        10.0.0.16/30 is directly connected, GigabitEthernet0/0/1
L        10.0.0.17/32 is directly connected, GigabitEthernet0/0/1
D        10.0.0.20/30 [90/3082] via 10.0.0.18, 00:12:57, GigabitEthernet0/0/1
D     192.168.0.0/24 [90/5319790] via 10.0.0.13, 00:12:57, Serial0/1/1
[90/1403507] via 10.0.0.9, 00:12:57, Serial0/1/0
D     192.168.1.0/24 [90/5319534] via 10.0.0.13, 00:12:57, Serial0/1/1
[90/1403251] via 10.0.0.9, 00:12:57, Serial0/1/0
D     192.168.2.0/24 [90/5319278] via 10.0.0.13, 00:12:57, Serial0/1/1
[90/1402995] via 10.0.0.9, 00:12:57, Serial0/1/0
192.168.3.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.3.0/24 is directly connected, Loopback0
L        192.168.3.1/32 is directly connected, Loopback0
D     192.168.4.0/24 [90/130826] via 10.0.0.18, 00:12:57, GigabitEthernet0/0/1
D     192.168.5.0/24 [90/131082] via 10.0.0.18, 00:12:57, GigabitEthernet0/0/1

R4#show ipv6 route
IPv6 Routing Table - default - 17 entries
Codes: C - Connected, L - Local, S - Static, U - Per-user Static route
B - BGP, R - RIP, I1 - ISIS L1, I2 - ISIS L2
IA - ISIS interarea, IS - ISIS summary, D - EIGRP, EX - EIGRP external
ND - ND Default, NDp - ND Prefix, DCE - Destination, NDr - Redirect
O - OSPF Intra, OI - OSPF Inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2, a - Application
D   2001:DB8:ACAD:1::/64 [90/1270528]
via FE80::3, Serial0/1/0
via FE80::3, Serial0/1/1
D   2001:DB8:ACAD:2::/64 [90/1270272]
via FE80::3, Serial0/1/0
via FE80::3, Serial0/1/1
C   2001:DB8:ACAD:3::/64 [0/0]
via Serial0/1/0, directly connected
L   2001:DB8:ACAD:3::2/128 [0/0]
via Serial0/1/0, receive
C   2001:DB8:ACAD:4::/64 [0/0]
via Serial0/1/1, directly connected
L   2001:DB8:ACAD:4::2/128 [0/0]
via Serial0/1/1, receive
C   2001:DB8:ACAD:5::/64 [0/0]
via GigabitEthernet0/0/1, directly connected
L   2001:DB8:ACAD:5::1/128 [0/0]
via GigabitEthernet0/0/1, receive
D   2001:DB8:ACAD:6::/64 [90/3072]
via FE80::5, GigabitEthernet0/0/1
D   2001:DB8:ACAD:A::/64 [90/1398528]
via FE80::3, Serial0/1/0
via FE80::3, Serial0/1/1
D   2001:DB8:ACAD:B::/64 [90/1398272]
via FE80::3, Serial0/1/0
via FE80::3, Serial0/1/1
D   2001:DB8:ACAD:C::/64 [90/1398016]
via FE80::3, Serial0/1/0
via FE80::3, Serial0/1/1
C   2001:DB8:ACAD:D::/64 [0/0]
via Loopback0, directly connected
L   2001:DB8:ACAD:D::1/128 [0/0]
via Loopback0, receive
D   2001:DB8:ACAD:E::/64 [90/130816]
via FE80::5, GigabitEthernet0/0/1
D   2001:DB8:ACAD:F::/64 [90/131072]
via FE80::5, GigabitEthernet0/0/1
L   FF00::/8 [0/0]
via Null0, receive
R4#show ip eigrp neighbor
EIGRP-IPv4 Neighbors for AS(1)
H   Address                 Interface              Hold Uptime   SRTT   RTO  Q  Seq
(sec)          (ms)       Cnt Num
2   10.0.0.13               Se0/1/1                 12 00:13:25    5   294  0  60
1   10.0.0.9                Se0/1/0                 13 00:13:25    1   100  0  62
0   10.0.0.18               Gi0/0/1                 10 00:13:33    1   100  0  22
R4#show ipv6 eigrp neighbor
EIGRP-IPv6 Neighbors for AS(10)
H   Address                 Interface              Hold Uptime   SRTT   RTO  Q  Seq
(sec)          (ms)       Cnt Num
2   Link-local address:     Gi0/0/1                 12 00:49:23  654  3924  0  11
FE80::5
```

```
1   Link-local address:     Se0/1/1                 12 00:49:56    1   300  0  33
FE80::3
0   Link-local address:     Se0/1/0                 11 00:50:05    1   100  0  32
FE80::3
```

Router 5 Config

```
R5#show run
Building configuration...

Current configuration : 1154 bytes
!
version 15.4
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname R5
!
ip cef
ipv6 unicast-routing
!
no ipv6 cef
spanning-tree mode pvst
!
interface Loopback0
ip address 192.168.4.1 255.255.255.0
ipv6 address 2001:DB8:ACAD:E::1/64
ipv6 eigrp 10
!
interface GigabitEthernet0/0/0
ip address 10.0.0.18 255.255.255.252
duplex auto
speed auto
ipv6 address FE80::5 link-local
ipv6 address 2001:DB8:ACAD:5::2/64
ipv6 eigrp 10
!
interface GigabitEthernet0/0/1
ip address 10.0.0.21 255.255.255.252
duplex auto
speed auto
ipv6 address FE80::5 link-local
ipv6 address 2001:DB8:ACAD:6::1/64
ipv6 eigrp 10
!
interface Vlan1
no ip address
shutdown
!
router eigrp 1
eigrp router-id 5.5.5.5
passive-interface Loopback0
network 10.0.0.16 0.0.0.3
network 10.0.0.20 0.0.0.3
network 192.168.4.0
metric weights 0 1 1 1 1 0
!
ipv6 router eigrp 10
eigrp router-id 5.5.5.5
no shutdown
passive-interface Loopback0
!
ip classless
!
ip flow-export version 9
line con 0
!
line aux 0
!
line vty 0 4
login
!
!
!
end

R5#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, E - EGP
i - IS-IS, 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

Gateway of last resort is not set

10.0.0.0/8 is variably subnetted, 8 subnets, 2 masks
D 10.0.0.0/30 [90/1665280] via 10.0.0.17, 01:50:40, GigabitEthernet0/0/0
D 10.0.0.4/30 [90/1665024] via 10.0.0.17, 01:50:40, GigabitEthernet0/0/0
D 10.0.0.8/30 [90/1664768] via 10.0.0.17, 01:50:40, GigabitEthernet0/0/0
D 10.0.0.12/30 [90/5191424] via 10.0.0.17, 01:50:40, GigabitEthernet0/0/0
C 10.0.0.16/30 is directly connected, GigabitEthernet0/0/0
L 10.0.0.18/32 is directly connected, GigabitEthernet0/0/0
C 10.0.0.20/30 is directly connected, GigabitEthernet0/0/1
L 10.0.0.21/32 is directly connected, GigabitEthernet0/0/1
D 192.168.0.0/24 [90/1793280] via 10.0.0.17, 01:50:39, GigabitEthernet0/0/0
D 192.168.1.0/24 [90/1793024] via 10.0.0.17, 01:50:40, GigabitEthernet0/0/0
D 192.168.2.0/24 [90/1792768] via 10.0.0.17, 01:50:40, GigabitEthernet0/0/0

R5#show ipv6 route
IPv6 Routing Table - 16 entries
Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
U - Per-user Static route, M - MIPv6
I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary
ND - ND Default, NDp - ND Prefix, DCE - Destination, NDr - Redirect
O - OSPF intra, OI - OSPF inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
D - EIGRP, EX - EIGRP external
D 2001:DB8:ACAD:1::/64 [90/1658880]
via FE80::4, GigabitEthernet0/0/0
D 2001:DB8:ACAD:2::/64 [90/1658624]
via FE80::4, GigabitEthernet0/0/0
D 2001:DB8:ACAD:3::/64 [90/1658368]
via FE80::4, GigabitEthernet0/0/0
D 2001:DB8:ACAD:4::/64 [90/5171456]
via FE80::4, GigabitEthernet0/0/0
C 2001:DB8:ACAD:5::/64 [0/0]
via GigabitEthernet0/0/0, directly connected
L 2001:DB8:ACAD:5::2/128 [0/0]
via GigabitEthernet0/0/0, receive
C 2001:DB8:ACAD:6::/64 [0/0]
via GigabitEthernet0/0/1, directly connected

R5#show ip protocols

Routing Protocol is "eigrp 1 "
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Default networks flagged in outgoing updates
Default networks accepted from incoming updates
EIGRP metric weight K1=1, K2=1, K3=1, K4=1, K5=0
EIGRP maximum hopcount 100
EIGRP maximum metric variance 1
Redistributing: eigrp 1
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
10.0.0.16/30
10.0.0.20/30
192.168.4.0
Passive Interface(s):
Loopback0
Routing Information Sources:
Gateway Distance Last Update
10.0.0.22 90 6653907
10.0.0.17 90 6655083

R5#show ipv6 protocols
IPv6 Routing Protocol is "connected"
IPv6 Routing Protocol is "ND"
IPv6 Routing Protocol is "eigrp 10"
EIGRP metric weight K1=1, K2=0, K3=1, K4=0, K5=0
EIGRP maximum hopcount 100
```

```
EIGRP maximum metric variance 1
Interfaces:
Loopback0 (passive)
GigabitEthernet0/0/0
GigabitEthernet0/0/1
Redistributing: eigrp 10
Maximum path: 16
Distance: internal 90 external 170

R5#
R5#show ip eigrp neighbors
IP-EIGRP neighbors for process 1
H Address Interface Hold Uptime SRTT RTO Q Seq
(sec) (ms) Cnt Num
0 10.0.0.22 Gig0/0/1 13 01:50:42 40 1000 0 92
1 10.0.0.17 Gig0/0/0 10 01:50:41 40 1000 0 108

R5#
R5#show ipv6 eigrp neighbors
IPv6-EIGRP neighbors for process 10
H Address Interface Hold Uptime SRTT RTO Q Seq
(sec) (ms) Cnt Num
0 Link-local address: Gig0/0/1 13 01:50:41 40 1000 0 77
FE80::6
1 Link-local address: Gig0/0/0 10 01:50:41 40 1000 0 102
FE80::4

R5#
R5#show ip eigrp topology
IP-EIGRP Topology Table for AS 1/ID(5.5.5.5)

Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
r - Reply status

P 10.0.0.0/30, 1 successors, FD is 1665280
via 10.0.0.17 (1665280/1665024), GigabitEthernet0/0/0
P 10.0.0.4/30, 1 successors, FD is 1665024
via 10.0.0.17 (1665024/1664768), GigabitEthernet0/0/0
P 10.0.0.8/30, 1 successors, FD is 1664768
via 10.0.0.17 (1664768/1664512), GigabitEthernet0/0/0
P 10.0.0.12/30, 1 successors, FD is 5191424
via 10.0.0.17 (5191424/5191168), GigabitEthernet0/0/0
P 10.0.0.16/30, 1 successors, FD is 2816
via Connected, GigabitEthernet0/0/0
P 10.0.0.20/30, 1 successors, FD is 2816
via Connected, GigabitEthernet0/0/1
P 192.168.0.0/24, 1 successors, FD is 1793280
via 10.0.0.17 (1793280/1793024), GigabitEthernet0/0/0
P 192.168.1.0/24, 1 successors, FD is 1793024
via 10.0.0.17 (1793024/1792768), GigabitEthernet0/0/0
P 192.168.2.0/24, 1 successors, FD is 1792768

R5#show ipv6 eigrp topology
IPv6-EIGRP Topology Table for AS 10/ID(5.5.5.5)

Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
r - Reply status

P 2001:DB8:ACAD:1::/64, 1 successors, FD is 1658880
via FE80::4 (1658880/1658624), GigabitEthernet0/0/0
P 2001:DB8:ACAD:2::/64, 1 successors, FD is 1658624
via FE80::4 (1658624/1658368), GigabitEthernet0/0/0
P 2001:DB8:ACAD:3::/64, 1 successors, FD is 1658368
via FE80::4 (1658368/1658112), GigabitEthernet0/0/0
P 2001:DB8:ACAD:4::/64, 1 successors, FD is 5171456
via FE80::4 (5171456/5171200), GigabitEthernet0/0/0
P 2001:DB8:ACAD:5::/64, 1 successors, FD is 2816
via Connected, GigabitEthernet0/0/0
P 2001:DB8:ACAD:6::/64, 1 successors, FD is 2816
via Connected, GigabitEthernet0/0/1
P 2001:DB8:ACAD:A::/64, 1 successors, FD is 1786880
via FE80::4 (1786880/1786624), GigabitEthernet0/0/0
P 2001:DB8:ACAD:B::/64, 1 successors, FD is 1786624
via FE80::4 (1786624/1786368), GigabitEthernet0/0/0
P 2001:DB8:ACAD:C::/64, 1 successors, FD is 1786368
via FE80::4 (1786368/1786112), GigabitEthernet0/0/0
P 2001:DB8:ACAD:D::/64, 1 successors, FD is 130816
```

```
via FE80::4 (130816/128256), GigabitEthernet0/0/0
P 2001:DB8:ACAD:E::/64, 1 successors, FD is 128256
via Connected, Loopback0
P 2001:DB8:ACAD:F::/64, 1 successors, FD is 130816
via FE80::6 (130816/128256), GigabitEthernet0/0/1
```

Router 6 Config

```
R6#show run
Building configuration...

Current configuration : 1063 bytes
!
version 15.4
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname R6
ip cef
ipv6 unicast-routing
!
no ipv6 cef
!
spanning-tree mode pvst
interface Loopback0
ip address 192.168.5.1 255.255.255.0
ipv6 address FE80::6 link-local
ipv6 address 2001:DB8:ACAD:F::1/64
ipv6 eigrp 10
!
interface GigabitEthernet0/0/0
ip address 10.0.0.22 255.255.255.252
duplex auto
speed auto
ipv6 address FE80::6 link-local
ipv6 address 2001:DB8:ACAD:6::2/64
ipv6 eigrp 10
!
interface GigabitEthernet0/0/1
no ip address
duplex auto
speed auto
shutdown
!
interface Vlan1
no ip address
shutdown
!
router eigrp 1
eigrp router-id 6.6.6.6
passive-interface Loopback0
network 10.0.0.20 0.0.0.3
network 192.168.5.0
metric weights 0 1 1 1 1 0
!
ipv6 router eigrp 10
eigrp router-id 6.6.6.6
no shutdown
passive-interface Loopback0
!
ip classless
!
ip flow-export version 9
!
line con 0
!
line aux 0
!
line vty 0 4
login
!
End
R6#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, E - EGP
```

```
i - IS-IS, 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

Gateway of last resort is not set

10.0.0.0/8 is variably subnetted, 7 subnets, 2 masks
D 10.0.0.0/30 [90/1665536] via 10.0.0.21, 01:52:09, GigabitEthernet0/0/0
D 10.0.0.4/30 [90/1665280] via 10.0.0.21, 01:52:09, GigabitEthernet0/0/0
D 10.0.0.8/30 [90/1665024] via 10.0.0.21, 01:52:09, GigabitEthernet0/0/0
D 10.0.0.12/30 [90/5191680] via 10.0.0.21, 01:52:09, GigabitEthernet0/0/0
D 10.0.0.16/30 [90/3072] via 10.0.0.21, 01:52:11, GigabitEthernet0/0/0
C 10.0.0.20/30 is directly connected, GigabitEthernet0/0/0
L 10.0.0.22/32 is directly connected, GigabitEthernet0/0/0
D 192.168.0.0/24 [90/1793536] via 10.0.0.21, 01:52:08, GigabitEthernet0/0/0
D 192.168.1.0/24 [90/1793280] via 10.0.0.21, 01:52:09, GigabitEthernet0/0/0
D 192.168.2.0/24 [90/1793024] via 10.0.0.21, 01:52:09, GigabitEthernet0/0/0
D 192.168.3.0/24 [90/131072] via 10.0.0.21, 01:52:10, GigabitEthernet0/0/0

R6#show ipv6 route
IPv6 Routing Table - 15 entries
Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
U - Per-user Static route, M - MIPv6
I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary
ND - ND Default, NDp - ND Prefix, DCE - Destination, NDr - Redirect
O - OSPF intra, OI - OSPF inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
D - EIGRP, EX - EIGRP external
D 2001:DB8:ACAD:1::/64 [90/1659136]
via FE80::5, GigabitEthernet0/0/0
D 2001:DB8:ACAD:2::/64 [90/1658880]
via FE80::5, GigabitEthernet0/0/0
D 2001:DB8:ACAD:3::/64 [90/1658624]
via FE80::5, GigabitEthernet0/0/0
D 2001:DB8:ACAD:4::/64 [90/5171712]
via FE80::5, GigabitEthernet0/0/0
D 2001:DB8:ACAD:5::/64 [90/3072]
via FE80::5, GigabitEthernet0/0/0
C 2001:DB8:ACAD:6::/64 [0/0]
via GigabitEthernet0/0/0, directly connected
L 2001:DB8:ACAD:6::2/128 [0/0]
via GigabitEthernet0/0/0, receive

R6#show ip protocols

Routing Protocol is "eigrp 1 "
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Default networks flagged in outgoing updates
Default networks accepted from incoming updates
EIGRP metric weight K1=1, K2=1, K3=1, K4=1, K5=0
EIGRP maximum hopcount 100
EIGRP maximum metric variance 1
Redistributing: eigrp 1
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
10.0.0.20/30
192.168.5.0
Passive Interface(s):
Loopback0
Routing Information Sources:
Gateway Distance Last Update
10.0.0.21 90 6654839
Distance: internal 90 external 170

R6#
R6#show ipv6 protocols
IPv6 Routing Protocol is "connected"
IPv6 Routing Protocol is "ND"
IPv6 Routing Protocol is "eigrp 10"
EIGRP metric weight K1=1, K2=0, K3=1, K4=0, K5=0
EIGRP maximum hopcount 100
EIGRP maximum metric variance 1
Interfaces:
Loopback0 (passive)
GigabitEthernet0/0/0
```

```
Redistributing: eigrp 10
Maximum path: 16
Distance: internal 90 external 170

R6#
R6#show ip eigrp neighbors
IP-EIGRP neighbors for process 1
H Address Interface Hold Uptime SRTT RTO Q Seq
(sec) (ms) Cnt Num
0 10.0.0.21 Gig0/0/0 11 01:52:10 40 1000 0 104

R6#
R6#show ipv6 eigrp neighbors
IPv6-EIGRP neighbors for process 10
H Address Interface Hold Uptime SRTT RTO Q Seq
(sec) (ms) Cnt Num
0 Link-local address: Gig0/0/0 12 01:52:10 40 1000 0 89
FE80::5

R6#
R6#show ip eigrp topology
IP-EIGRP Topology Table for AS 1/ID(6.6.6.6)

Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
r - Reply status

P 10.0.0.0/30, 1 successors, FD is 1665536
via 10.0.0.21 (1665536/1665280), GigabitEthernet0/0/0
P 10.0.0.4/30, 1 successors, FD is 1665280
via 10.0.0.21 (1665280/1665024), GigabitEthernet0/0/0
P 10.0.0.8/30, 1 successors, FD is 1665024
via 10.0.0.21 (1665024/1664768), GigabitEthernet0/0/0
P 10.0.0.12/30, 1 successors, FD is 5191680
via 10.0.0.21 (5191680/5191424), GigabitEthernet0/0/0
P 10.0.0.16/30, 1 successors, FD is 3072
via 10.0.0.21 (3072/2816), GigabitEthernet0/0/0
P 10.0.0.20/30, 1 successors, FD is 2816
via Connected, GigabitEthernet0/0/0
P 192.168.0.0/24, 1 successors, FD is 1793536
via 10.0.0.21 (1793536/1793280), GigabitEthernet0/0/0
P 192.168.1.0/24, 1 successors, FD is 1793280
via 10.0.0.21 (1793280/1793024), GigabitEthernet0/0/0
P 192.168.2.0/24, 1 successors, FD is 1793024

R6#show ipv6 eigrp topology
IPv6-EIGRP Topology Table for AS 10/ID(6.6.6.6)

Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
r - Reply status

P 2001:DB8:ACAD:1::/64, 1 successors, FD is 1659136
via FE80::5 (1659136/1658880), GigabitEthernet0/0/0
P 2001:DB8:ACAD:2::/64, 1 successors, FD is 1658880
via FE80::5 (1658880/1658624), GigabitEthernet0/0/0
P 2001:DB8:ACAD:3::/64, 1 successors, FD is 1658624
via FE80::5 (1658624/1658368), GigabitEthernet0/0/0
P 2001:DB8:ACAD:4::/64, 1 successors, FD is 5171712
via FE80::5 (5171712/5171456), GigabitEthernet0/0/0
P 2001:DB8:ACAD:5::/64, 1 successors, FD is 3072
via FE80::5 (3072/2816), GigabitEthernet0/0/0
P 2001:DB8:ACAD:6::/64, 1 successors, FD is 2816
via Connected, GigabitEthernet0/0/0
P 2001:DB8:ACAD:A::/64, 1 successors, FD is 1787136
via FE80::5 (1787136/1786880), GigabitEthernet0/0/0
P 2001:DB8:ACAD:B::/64, 1 successors, FD is 1786880
via FE80::5 (1786880/1786624), GigabitEthernet0/0/0
P 2001:DB8:ACAD:C::/64, 1 successors, FD is 1786624
via FE80::5 (1786624/1786368), GigabitEthernet0/0/0
P 2001:DB8:ACAD:D::/64, 1 successors, FD is 131072
via FE80::5 (131072/130816), GigabitEthernet0/0/0
P 2001:DB8:ACAD:E::/64, 1 successors, FD is 130816
via FE80::5 (130816/128256), GigabitEthernet0/0/0
P 2001:DB8:ACAD:F::/64, 1 successors, FD is 128256
via Connected, Loopback0
```

Problems and Troubleshooting:

I encountered several problems when completing this lab. First, when I first configured the topology, the ping from R1 to R3 did not work. I did a traceroute command and discovered that the G0/0/0 interface on R2 was down as I had forgotten to enter the no shutdown command. Second, after I enabled EIGRP for IPv4 on all routers, I noticed that R4 only showed one EIGRP neighbor when it should have had two. I checked the show run and noticed that one of the networks, the 10.0.0.10 address for S0/1/0 was had the wrong EIGRP network command and so that link was not sending out the hello packets to establish a neighbor adjacency. I entered the correct command, and the adjacency was reestablished. A third problem I encountered was over the two serial links connecting R3 and R4. I noticed when I entered the `show ip route` only one route was shown for the destination on the other side of the network. I did a show run on R4 and discovered that the link on S0/1/0 had no `ipv6 eigrp 10` command and wasn't advertised through EIGRP. Once fixed, the network worked. Some things I also learned were that for IPv6 EIGRP to stay online, a `no shutdown` command had to be entered in the global EIGRP IPv6 config. Also, when changing the metric weights they all need to be the same across connected routers.

Conclusion:

EIGRP is the best routing protocol using distance vector and is recommended for use in medium to large networks. With fast convergence of 200 milliseconds, support of equal and unequal cost load balancing, ease of configuration and support of both IPv4 and IPV6 routing, EIGRP is a very reliable and useful protocol. I learned a lot about how to set up EIGRP, unequal cost load-balancing, how the metrics are calculated and much more. There are many advantages and few disadvantages to using EIGRP. In our next lab, we will learn about BGP to redistribute between OSPF and EIGRP networks.