EIGRP

CCNP Lab 3

Jason Liu

CCNP – Mr. Mason, Mr. Hansen

Period 6, 7, 8

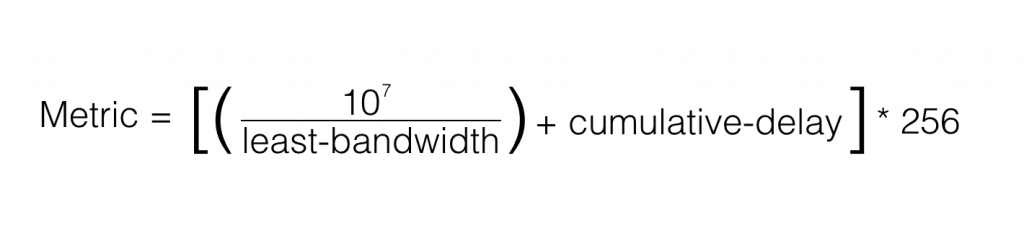
*Lab 3: EIGRP*

**Purpose**

The objective of the lab was to understand and configure EIGRP in a single Autonomous System for both IPv4 and IPv6. For further depth, K-values were manipulated for the entire system for the metric calculations. Uneven load-balancing of was also configured on a double serial cable connection between 2 central routers to demonstrate the utility and flexibility of EIGRP load-balancing.

**Background Information**

Enhanced Interior Gateway Routing Protocol (EIGRP) is a dynamic routing protocol for IPv4 and IPv6 networks that automates routing decisions and configurations. As a dynamic protocol, each router attempts to share its EIGRP data table and advertised networks to its neighboring routers, which are then passed on through EIGRP enabled routers to form the topology table. Each autonomous system determines the extent of the EIGRP topology, and also in which routers the protocol is confined to.

 There are 5 potential K-values that exist to calculate the metric of the path. Compared to OSPF, OSPF only uses one metric: path cost. By default, EIGRP only has 2 K-values activated: Bandwidth (K1) and Delay (K3). The default metric calculation is determined as:

Because EIGRP only shares to its neighboring routers, an EIGRP router determines the metric from itself to a destination as the sum of a Reported Distance (RD) from the neighbor, plus the metric to that neighbor router. This total distance is called the Feasible Distance (FD), which is visible in the EIGRP topology.

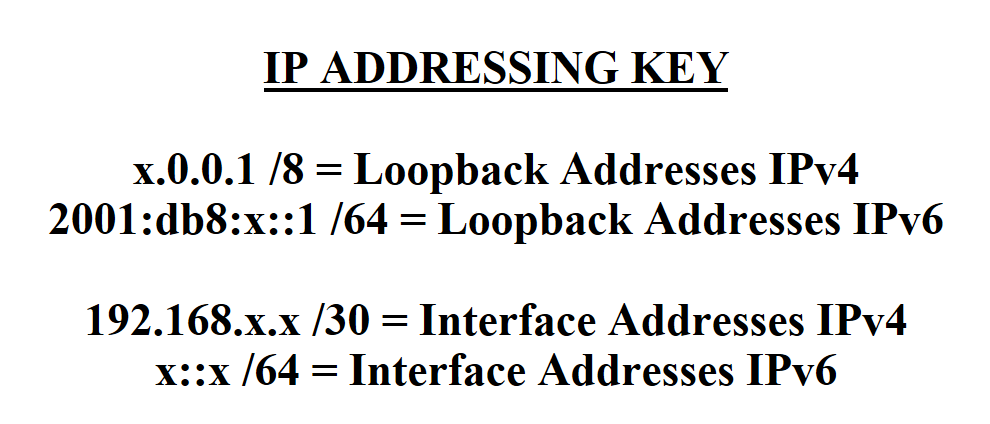
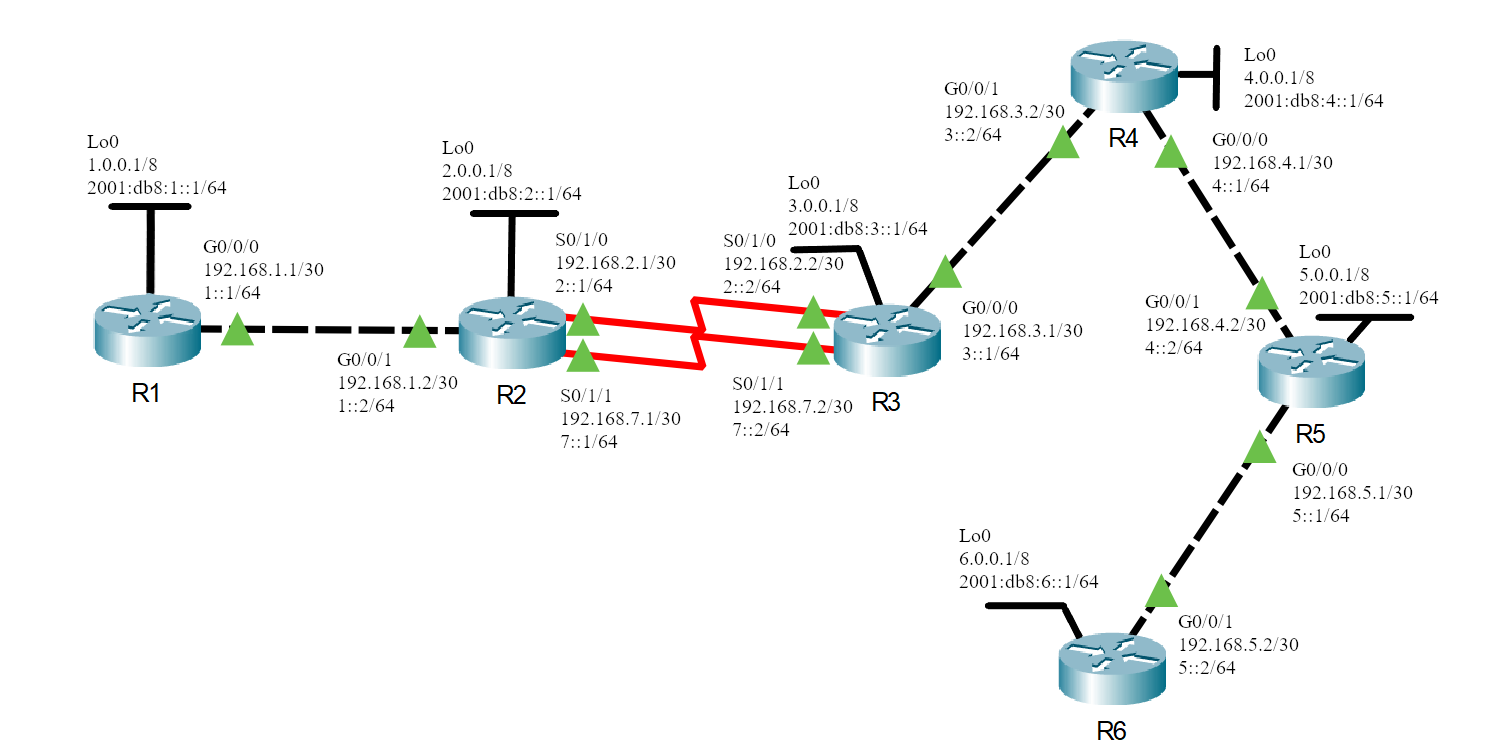
Uneven load balancing is uniquely achieved by EIGRP because of the Variance Multiplier. As bandwidth is calculated into the metric, the values of their metrics differ greatly. By dividing the greater metric value by the lesser one, you’d get a factor between the two. Since the EIGRP would take the faster metric by default, the variance command tells you the tolerable factor by which any metric slower than the fastest could be accepted and load balanced. For example, if the factor between the two routes was 2.78, a variance multiplier of 3 could be used to tolerate the slower route. The load balancing can be seen as operational in the routing tables of the routers that have variance applied. It can also be seen in the “Show Ip Route [*destination-address*]” in the Traffic Share Count category. This can be read as the number of packets that are sent through that route for every number of packets in a secondary route. This is proof of even load-balancing.

**Lab Summary**

Six Cisco 4321 routers were set up once again in bus-like topology, each chronologically following the other. However, the physical connection between routers R2 and R3 use two parallel serial cables instead of the single Gigabit crossover cable. A specific module was applied to the router to allow for these connections. These serial cables are significantly slower, running at approximately 4 mb each. This simulates the importance of load balancing to be able to utilize both cables at the same time if the situation arises. EIGRP is then enabled for all routers in both IPv4 and IPv6, where an Autonomous System number of 10 was used. Then, K-values have been manipulated to not only factor in Bandwidth and Delay metrics, but also Load and Reliability metrics. This means that the first four K-values, K1 – K4, are being calculated in this EIGRP autonomous system. Bandwidths for standard Gigabit Ethernet connections are set to 12000 kilobits. Uneven load balancing was configured for the parallel serial connection, where one was set to a bandwidth of 300 and the other, 100. After seeing the metrics in EIGRP topology, the factor was about 1.2. Thus, to account for consistency for uneven load balancing to activate, a safe variance multiplier of 3 was applied between R2 and R3 (a multiplier of 2 would work sufficiently as well).

**Table of IP’s**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Router 1** | **Router 2** | **Router 3** | **Router 4** | **Router 5** | **Router 6** |
| **Gig Interfaces (Ipv4)** | **-----**      **G0/0/0: 192.168.1.1** | **G0/0/1: 192.168.1.2**    **G0/0/0:**  **See Serial** | **G0/0/1:**  **See Serial**    **G0/0/0: 192.168.3.1** | **G0/0/1: 192.168.3.2**    **G0/0/0: 192.168.4.1** | **G0/0/1: 192.168.4.2**    **G0/0/0: 192.168.5.1** | **G0/0/1: 192.168.5.2**  **-----** |
| **Gig Interfaces (IPv6)** | **-----**      **G0/0:**  **1::1** | **G0/1:**  **1::2**    **G0/0:**  **See Serial** | **G0/1:**  **See Serial**    **G0/0:**  **3::1** | **G0/1:**  **3::2**    **G0/0:**  **4::1** | **G0/1:**  **4::2**    **G0/0:**  **5::1** | **G0/1:**  **5::2**    **-----** |
| **Serial Interfaces** | **-----** | **S0/1/0: 192.168.2.1**  **2::1**    **S0/1/1: 192.168.7.1**  **7::1** | **S0/1/0: 192.168.2.2**  **2::2**    **S0/1/1: 192.168.7.2**  **7::2** | **-----** | **-----** | **-----** |
| **Loopback** | **1.0.0.1**  **2001:db8:1::1** | **2.0.0.1**  **2001:db8:2::1** | **3.0.0.1**  **2001:db8:3::1** | **4.0.0.1**  **2001:db8:4::1** | **5.0.0.1**  **2001:db8:5::1** | **6.0.0.1**  **2001:db8:6::1** |
| **EIGRP Router-ID** | **1.1.1.1** | **2.2.2.2** | **3.3.3.3** | **4.4.4.4** | **5.5.5.5** | **6.6.6.6** |

**Lab Commands**

**Lab Commands**

Most commands were common network fundamentals. Key commands to this lab include:

**router eigrp [*autonomous-system-number]*** *–* Enables EIGRP-IPv4 routing protocol on the router and enters the router configuration mode. Autonomous System Number of 10 was used.

**ipv6 router eigrp [*autonomous-system-number]*** *–* Enables EIGRP-IPv6 routing protocol on the router and enters the router configuration mode. Autonomous System Number of 10 was used.

**network [network address] [wildcard mask]** – Enables said network to be advertised to the EIGRP database. In other words, enables that network for the EIGRP topology.

**metric weights [tos k1 k2 k3 k4 k5]–** Manipulates the K-values used for the metric calculation and EIGRP neighbor relationship requirements.

**show ip protocols–** Displays protocols enabled on the interface. Can be used to view configured K-values of the EIGRP system.

**variance [multiplier] –** Sets the variance for the range of tolerable Feasible Distances. Used to enable uneven load balancing.

**show ip eigrp topology –** Displays all information the router received relating to the EIGRP topology. Use keyword “IPv6” instead of “IP” to display IPv6 eigrp topology.

**show ip route [destination address] –** Displays routing entry to destination address, with specifics, such as Routing Descriptor Blocks that include traffic share count.

**Configurations**

Show Running-Configurations:

**R1**

**R1#show run**

no ip http server

ip http authentication local

ip http secure-server

ip tftp source-interface GigabitEthernet0

**ipv6 router eigrp 10**

**metric weights 0 1 1 1 1 0**

**eigrp router-id 1.1.1.1**

control-plane

line con 0

transport input none

stopbits 1

line aux 0

stopbits 1

line vty 0 4

login

wsma agent exec

wsma agent config

wsma agent filesys

wsma agent notify

end

Building configuration...

Current configuration : 1911 bytes

version 16.7

service timestamps debug datetime msec

service timestamps log datetime msec

platform qfp utilization monitor load 80

no platform punt-keepalive disable-kernel-core

hostname R1

boot-start-marker

boot-end-marker

vrf definition Mgmt-intf

address-family ipv4

exit-address-family

address-family ipv6

exit-address-family

no aaa new-model

login on-success log

subscriber templating

**ipv6 unicast-routing**

multilink bundle-name authenticated

license udi pid ISR4321/K9 sn FDO220523GF

no license smart enable

diagnostic bootup level minimal

spanning-tree extend system-id

redundancy

mode none

**interface Loopback0**

**bandwidth 12000**

**ip address 1.0.0.1 255.0.0.0**

**ipv6 address 2001:DB8:1::1/64**

**ipv6 enable**

**ipv6 eigrp 10**

**interface GigabitEthernet0/0/0**

**bandwidth 12000**

**ip address 192.168.1.1 255.255.255.252**

**negotiation auto**

**ipv6 address 1::1/64**

**ipv6 enable**

**ipv6 eigrp 10**

interface GigabitEthernet0/0/1

no ip address

negotiation auto

interface Serial0/1/0

interface Serial0/1/1

interface GigabitEthernet0/2/0

no ip address

negotiation auto

interface GigabitEthernet0/2/1

no ip address

negotiation auto

interface GigabitEthernet0

vrf forwarding Mgmt-intf

no ip address

shutdown

negotiation auto

**router eigrp 10**

**metric weights 0 1 1 1 1 0**

**network 1.0.0.0**

**network 192.168.1.0 0.0.0.3**

**eigrp router-id 1.1.1.1**

ip forward-protocol nd

**R2**

**R2#show run**

Building configuration...

Current configuration : 4345 bytes

version 16.9

service timestamps debug datetime msec

service timestamps log datetime msec

negotiation auto

**router eigrp 10**

**metric weights 0 1 1 1 1 0**

**variance 3**

**network 2.0.0.0**

**network 192.168.1.0 0.0.0.3**

**network 192.168.2.0 0.0.0.3**

**network 192.168.7.0 0.0.0.3**

**eigrp router-id 2.2.2.2**

ip forward-protocol nd

ip http server

ip http authentication local

ip http secure-server

ip tftp source-interface GigabitEthernet0

**ipv6 router eigrp 10**

**metric weights 0 1 1 1 1 0**

**eigrp router-id 2.2.2.2**

**variance 3**

control-plane

line con 0

transport input none

stopbits 1

line aux 0

stopbits 1

line vty 0 4

login

end

platform qfp utilization monitor load 80

platform punt-keepalive disable-kernel-core

hostname R2

boot-start-marker

boot-end-marker

vrf definition Mgmt-intf

address-family ipv4

exit-address-family

address-family ipv6

exit-address-family

no aaa new-model

login on-success log

subscriber templating

**ipv6 unicast-routing**

multilink bundle-name authenticated

license udi pid ISR4321/K9 sn FDO21482DXE

no license smart enable

diagnostic bootup level minimal

spanning-tree extend system-id

redundancy

mode none

**interface Loopback0**

**bandwidth 12000**

**ip address 2.0.0.1 255.0.0.0**

**ipv6 address 2001:DB8:2::1/64**

**ipv6 enable**

**ipv6 eigrp 10**

interface GigabitEthernet0/0/0

no ip address

negotiation auto

**interface GigabitEthernet0/0/1**

**bandwidth 12000**

**ip address 192.168.1.2 255.255.255.252**

**negotiation auto**

**ipv6 address 1::2/64**

**ipv6 enable**

**ipv6 eigrp 10**

**interface Serial0/1/0**

**bandwidth 3000**

**ip address 192.168.2.1 255.255.255.248**

**ipv6 address 2::1/64**

**ipv6 enable**

**ipv6 eigrp 10**

**interface Serial0/1/1**

**bandwidth 1000**

**ip address 192.168.7.1 255.255.255.248**

**ipv6 address 7::1/64**

**ipv6 enable**

**ipv6 eigrp 10**

interface GigabitEthernet0/2/0

no ip address

shutdown

negotiation auto

interface GigabitEthernet0/2/1

no ip address

shutdown

negotiation auto

interface GigabitEthernet0

vrf forwarding Mgmt-intf

no ip address

shutdown

**R3**

R3#show run

vrf forwarding Mgmt-intf

no ip address

shutdown

negotiation auto

**router eigrp 10**

**metric weights 0 1 1 1 1 0**

**variance 3**

**network 3.0.0.0**

**network 192.168.2.0 0.0.0.3**

**network 192.168.3.0 0.0.0.3**

**network 192.168.7.0 0.0.0.3**

**eigrp router-id 3.3.3.3**

ip forward-protocol nd

ip http server

ip http authentication local

ip http secure-server

ip tftp source-interface GigabitEthernet0

**ipv6 router eigrp 10**

**metric weights 0 1 1 1 1 0**

**eigrp router-id 3.3.3.3**

**variance 3**

control-plane

line con 0

transport input none

stopbits 1

line aux 0

stopbits 1

line vty 0 4

login

end

Building configuration...

Current configuration : 4392 bytes

version 16.9

service timestamps debug datetime msec

service timestamps log datetime msec

platform qfp utilization monitor load 80

platform punt-keepalive disable-kernel-core

hostname R3

boot-start-marker

boot-end-marker

vrf definition Mgmt-intf

address-family ipv4

exit-address-family

address-family ipv6

exit-address-family

no aaa new-model

login on-success log

subscriber templating

vtp domain cisco

vtp mode transparent

**ipv6 unicast-routing**

multilink bundle-name authenticated

license udi pid ISR4321/K9 sn FDO21500G1N

no license smart enable

diagnostic bootup level minimal

spanning-tree extend system-id

redundancy

mode none

**interface Loopback0**

**bandwidth 12000**

**ip address 3.0.0.1 255.0.0.0**

**ipv6 address 2001:DB8:3::1/64**

**ipv6 enable**

**ipv6 eigrp 10**

**interface GigabitEthernet0/0/0**

**bandwidth 12000**

**ip address 192.168.3.1 255.255.255.252**

**negotiation auto**

**ipv6 address 3::1/64**

**ipv6 enable**

**ipv6 eigrp 10**

interface GigabitEthernet0/0/1

no ip address

shutdown

negotiation auto

**interface Serial0/1/0**

**bandwidth 3000**

**ip address 192.168.2.2 255.255.255.252**

**ipv6 address 2::2/64**

**ipv6 enable**

**ipv6 eigrp 10**

**interface Serial0/1/1**

**bandwidth 1000**

**ip address 192.168.7.2 255.255.255.252**

**ipv6 address 7::2/64**

**ipv6 enable**

**ipv6 eigrp 10**

interface GigabitEthernet0/2/0

no ip address

shutdown

negotiation auto

interface GigabitEthernet0/2/1

no ip address

shutdown

negotiation auto

interface GigabitEthernet0

**R4**

R4#show run

ip http server

ip http authentication local

ip http secure-server

ip tftp source-interface GigabitEthernet0

**ipv6 router eigrp 10**

**metric weights 0 1 1 1 1 0**

**eigrp router-id 4.4.4.4**

control-plane

line con 0

stopbits 1

line aux 0

stopbits 1

line vty 0 4

login

end

Building configuration...

Current configuration : 1838 bytes

version 15.5

service timestamps debug datetime msec

service timestamps log datetime msec

platform punt-keepalive disable-kernel-core

hostname R4

boot-start-marker

boot-end-marker

vrf definition Mgmt-intf

address-family ipv4

exit-address-family

address-family ipv6

exit-address-family

no aaa new-model

login on-success log

**ipv6 unicast-routing**

subscriber templating

multilink bundle-name authenticated

license udi pid ISR4321/K9 sn FDO21441WDF

spanning-tree extend system-id

redundancy

mode none

vlan internal allocation policy ascending

**interface Loopback0**

**bandwidth 12000**

**ip address 4.0.0.1 255.0.0.0**

**ipv6 address 2001:DB8:4::1/64**

**ipv6 enable**

**ipv6 eigrp 10**

**interface GigabitEthernet0/0/0**

**bandwidth 12000**

**ip address 192.168.4.1 255.255.255.252**

**negotiation auto**

**ipv6 address 4::1/64**

**ipv6 enable**

**ipv6 eigrp 10**

**interface GigabitEthernet0/0/1**

**bandwidth 12000**

**ip address 192.168.3.2 255.255.255.252**

**negotiation auto**

**ipv6 address 3::2/64**

**ipv6 enable**

**ipv6 eigrp 10**

interface Serial0/1/0

no ip address

shutdown

interface Serial0/1/1

no ip address

shutdown

interface GigabitEthernet0

vrf forwarding Mgmt-intf

no ip address

shutdown

negotiation auto

interface Vlan1

no ip address

shutdown

**router eigrp 10**

**metric weights 0 1 1 1 1 0**

**network 4.0.0.0**

**network 192.168.3.0 0.0.0.3**

**network 192.168.4.0 0.0.0.3**

**eigrp router-id 4.4.4.4**

ip forward-protocol nd

**R5**

**R5#show run**

ip http authentication local

ip http secure-server

ip tftp source-interface GigabitEthernet0

**ipv6 router eigrp 10**

**metric weights 0 1 1 1 1 0**

**eigrp router-id 5.5.5.5**

control-plane

line con 0

stopbits 1

line aux 0

stopbits 1

line vty 0 4

login

end

Building configuration...

Current configuration : 1841 bytes

version 15.5

service timestamps debug datetime msec

service timestamps log datetime msec

no platform punt-keepalive disable-kernel-core

hostname R5

boot-start-marker

boot-end-marker

vrf definition Mgmt-intf

address-family ipv4

exit-address-family

address-family ipv6

exit-address-family

no aaa new-model

login on-success log

**ipv6 unicast-routing**

subscriber templating

multilink bundle-name authenticated

license udi pid ISR4321/K9 sn FDO215009QY

spanning-tree extend system-id

redundancy

mode none

vlan internal allocation policy ascending

**interface Loopback0**

**bandwidth 12000**

**ip address 5.0.0.1 255.0.0.0**

**ipv6 address 2001:DB8:5::1/64**

**ipv6 enable**

**ipv6 eigrp 10**

**interface GigabitEthernet0/0/0**

**bandwidth 12000**

**ip address 192.168.5.1 255.255.255.252**

**negotiation auto**

**ipv6 address 5::1/64**

**ipv6 enable**

**ipv6 eigrp 10**

**interface GigabitEthernet0/0/1**

**bandwidth 12000**

**ip address 192.168.4.2 255.255.255.252**

**negotiation auto**

**ipv6 address 4::2/64**

**ipv6 enable**

**ipv6 eigrp 10**

interface Serial0/1/0

no ip address

shutdown

interface Serial0/1/1

no ip address

shutdow

interface GigabitEthernet0

vrf forwarding Mgmt-intf

no ip address

shutdown

negotiation auto

interface Vlan1

no ip address

shutdown

**router eigrp 10**

**metric weights 0 1 1 1 1 0**

**network 5.0.0.0**

**network 192.168.4.0 0.0.0.3**

**network 192.168.5.0 0.0.0.3**

**eigrp router-id 5.5.5.5**

ip forward-protocol nd

ip http server

**R6**

R6#show run

**ipv6 router eigrp 10**

**metric weights 0 1 1 1 1 0**

**eigrp router-id 6.6.6.6**

control-plane

line con 0

stopbits 1

line aux 0

stopbits 1

line vty 0 4

login

end

Building configuration...

Current configuration : 1721 bytes

version 15.5

service timestamps debug datetime msec

service timestamps log datetime msec

no platform punt-keepalive disable-kernel-core

hostname R6

boot-start-marker

boot-end-marker

vrf definition Mgmt-intf

address-family ipv4

exit-address-family

address-family ipv6

exit-address-family

no aaa new-model

login on-success log

**ipv6 unicast-routing**

subscriber templating

multilink bundle-name authenticated

license udi pid ISR4321/K9 sn FDO214420HM

spanning-tree extend system-id

redundancy

mode none

vlan internal allocation policy ascending

**interface Loopback0**

**bandwidth 12000**

**ip address 6.0.0.1 255.0.0.0**

**ipv6 address 2001:DB8:6::1/64**

**ipv6 enable**

**ipv6 eigrp 10**

interface GigabitEthernet0/0/0

no ip address

negotiation auto

**interface GigabitEthernet0/0/1**

**bandwidth 12000**

**ip address 192.168.5.2 255.255.255.252**

**negotiation auto**

**ipv6 address 5::2/64**

**ipv6 enable**

**ipv6 eigrp 10**

interface Serial0/1/0

no ip address

shutdown

interface Serial0/1/1

no ip address

shutdown

interface GigabitEthernet0

vrf forwarding Mgmt-intf

no ip address

shutdown

negotiation auto

interface Vlan1

no ip address

shutdown

**router eigrp 10**

**metric weights 0 1 1 1 1 0**

**network 6.0.0.0**

**network 192.168.5.0 0.0.0.3**

**eigrp router-id 6.6.6.6**

ip forward-protocol nd

ip http server

ip http authentication local

ip http secure-server

ip tftp source-interface GigabitEthernet0

Show IP Routes:

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

**R1**

1.0.0.0/8 is variably subnetted, 2 subnets, 2 masks

C 1.0.0.0/8 is directly connected, Loopback0

L 1.0.0.1/32 is directly connected, Loopback0

D 2.0.0.0/8 [90/342340] via 192.168.1.2, 00:42:14, GigabitEthernet0/0/0

D 3.0.0.0/8 [90/1496850] via 192.168.1.2, 00:31:25, GigabitEthernet0/0/0

D 4.0.0.0/8 [90/2782125] via 192.168.1.2, 00:37:14, GigabitEthernet0/0/0

D 5.0.0.0/8 [90/2782381] via 192.168.1.2, 00:34:26, GigabitEthernet0/0/0

D 6.0.0.0/8 [90/2782637] via 192.168.1.2, 00:28:47, GigabitEthernet0/0/0

192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks

C 192.168.1.0/30 is directly connected, GigabitEthernet0/0/0

L 192.168.1.1/32 is directly connected, GigabitEthernet0/0/0

192.168.2.0/24 is variably subnetted, 2 subnets, 2 masks

D 192.168.2.0/29

[90/1368850] via 192.168.1.2, 00:51:56, GigabitEthernet0/0/0

D 192.168.2.0/30

[90/3594295] via 192.168.1.2, 00:44:31, GigabitEthernet0/0/0

192.168.3.0/30 is subnetted, 1 subnets

D 192.168.3.0

[90/2654125] via 192.168.1.2, 00:37:18, GigabitEthernet0/0/0

192.168.4.0/30 is subnetted, 1 subnets

D 192.168.4.0

[90/2654381] via 192.168.1.2, 00:37:14, GigabitEthernet0/0/0

192.168.5.0/30 is subnetted, 1 subnets

D 192.168.5.0

[90/2654637] via 192.168.1.2, 00:28:49, GigabitEthernet0/0/0

192.168.7.0/24 is variably subnetted, 2 subnets, 2 masks

D 192.168.7.0/29

[90/3082295] via 192.168.1.2, 00:51:56, GigabitEthernet0/0/0

D 192.168.7.0/30

[90/3594295] via 192.168.1.2, 00:44:34, GigabitEthernet0/0/0

**R2**

D 1.0.0.0/8 [90/342340] via 192.168.1.1, 00:44:22, GigabitEthernet0/0/1

2.0.0.0/8 is variably subnetted, 2 subnets, 2 masks

C 2.0.0.0/8 is directly connected, Loopback0

L 2.0.0.1/32 is directly connected, Loopback0

D 3.0.0.0/8 [90/3210039] via 192.168.7.2, 00:34:46, Serial0/1/1

[90/1496594] via 192.168.2.2, 00:34:46, Serial0/1/0

D 4.0.0.0/8 [90/3210295] via 192.168.7.2, 00:40:35, Serial0/1/1

[90/2781869] via 192.168.2.2, 00:40:35, Serial0/1/0

D 5.0.0.0/8 [90/3210551] via 192.168.7.2, 00:37:47, Serial0/1/1

[90/2782125] via 192.168.2.2, 00:37:47, Serial0/1/0

D 6.0.0.0/8 [90/3210807] via 192.168.7.2, 00:32:08, Serial0/1/1

[90/2782381] via 192.168.2.2, 00:32:08, Serial0/1/0

192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks

C 192.168.1.0/30 is directly connected, GigabitEthernet0/0/1

L 192.168.1.2/32 is directly connected, GigabitEthernet0/0/1

192.168.2.0/24 is variably subnetted, 3 subnets, 3 masks

C 192.168.2.0/29 is directly connected, Serial0/1/0

D 192.168.2.0/30 [90/3594039] via 192.168.7.2, 00:47:52, Serial0/1/1

L 192.168.2.1/32 is directly connected, Serial0/1/0

192.168.3.0/30 is subnetted, 1 subnets

D 192.168.3.0 [90/3082295] via 192.168.7.2, 00:40:39, Serial0/1/1

[90/2653869] via 192.168.2.2, 00:40:39, Serial0/1/0

192.168.4.0/30 is subnetted, 1 subnets

D 192.168.4.0 [90/3082551] via 192.168.7.2, 00:40:35, Serial0/1/1

[90/2654125] via 192.168.2.2, 00:40:35, Serial0/1/0

192.168.5.0/30 is subnetted, 1 subnets

D 192.168.5.0 [90/3082807] via 192.168.7.2, 00:32:10, Serial0/1/1

[90/2654381] via 192.168.2.2, 00:32:10, Serial0/1/0

192.168.7.0/24 is variably subnetted, 3 subnets, 3 masks

C 192.168.7.0/29 is directly connected, Serial0/1/1

D 192.168.7.0/30 [90/3594039] via 192.168.2.2, 00:47:55, Serial0/1/0

L 192.168.7.1/32 is directly connected, Serial0/1/1

**R3**

D 1.0.0.0/8 [90/3210295] via 192.168.7.1, 00:43:33, Serial0/1/1

[90/1496850] via 192.168.2.1, 00:43:33, Serial0/1/0

D 2.0.0.0/8 [90/3210039] via 192.168.7.1, 00:44:45, Serial0/1/1

[90/1496594] via 192.168.2.1, 00:44:45, Serial0/1/0

3.0.0.0/8 is variably subnetted, 2 subnets, 2 masks

C 3.0.0.0/8 is directly connected, Loopback0

L 3.0.0.1/32 is directly connected, Loopback0

D 4.0.0.0/8 [90/2269869] via 192.168.3.2, 00:39:46, GigabitEthernet0/0/0

D 5.0.0.0/8 [90/2270125] via 192.168.3.2, 00:36:58, GigabitEthernet0/0/0

D 6.0.0.0/8 [90/2270381] via 192.168.3.2, 00:31:18, GigabitEthernet0/0/0

192.168.1.0/30 is subnetted, 1 subnets

D 192.168.1.0 [90/3082295] via 192.168.7.1, 00:47:03, Serial0/1/1

[90/1368850] via 192.168.2.1, 00:47:03, Serial0/1/0

192.168.2.0/24 is variably subnetted, 3 subnets, 3 masks

D 192.168.2.0/29 [90/3594039] via 192.168.7.1, 00:47:03, Serial0/1/1

C 192.168.2.0/30 is directly connected, Serial0/1/0

L 192.168.2.2/32 is directly connected, Serial0/1/0

192.168.3.0/24 is variably subnetted, 2 subnets, 2 masks

C 192.168.3.0/30 is directly connected, GigabitEthernet0/0/0

L 192.168.3.1/32 is directly connected, GigabitEthernet0/0/0

192.168.4.0/30 is subnetted, 1 subnets

D 192.168.4.0

[90/2142125] via 192.168.3.2, 00:39:46, GigabitEthernet0/0/0

192.168.5.0/30 is subnetted, 1 subnets

D 192.168.5.0

[90/2142381] via 192.168.3.2, 00:31:20, GigabitEthernet0/0/0

192.168.7.0/24 is variably subnetted, 3 subnets, 3 masks

D 192.168.7.0/29 [90/3594039] via 192.168.2.1, 00:47:06, Serial0/1/0

C 192.168.7.0/30 is directly connected, Serial0/1/1

L 192.168.7.2/32 is directly connected, Serial0/1/1

**R4**

D 1.0.0.0/8 [90/2782125] via 192.168.3.1, 00:37:41, GigabitEthernet0/0/1

D 2.0.0.0/8 [90/2781869] via 192.168.3.1, 00:37:41, GigabitEthernet0/0/1

D 3.0.0.0/8 [90/2269869] via 192.168.3.1, 00:31:54, GigabitEthernet0/0/1

4.0.0.0/8 is variably subnetted, 2 subnets, 2 masks

C 4.0.0.0/8 is directly connected, Loopback0

L 4.0.0.1/32 is directly connected, Loopback0

D 5.0.0.0/8 [90/2269869] via 192.168.4.2, 00:34:56, GigabitEthernet0/0/0

D 6.0.0.0/8 [90/2270125] via 192.168.4.2, 00:29:16, GigabitEthernet0/0/0

192.168.1.0/30 is subnetted, 1 subnets

D 192.168.1.0

[90/2654125] via 192.168.3.1, 00:37:41, GigabitEthernet0/0/1

192.168.2.0/24 is variably subnetted, 2 subnets, 2 masks

D 192.168.2.0/29

[90/3594295] via 192.168.3.1, 00:37:41, GigabitEthernet0/0/1

D 192.168.2.0/30

[90/2653869] via 192.168.3.1, 00:37:41, GigabitEthernet0/0/1

192.168.3.0/24 is variably subnetted, 2 subnets, 2 masks

C 192.168.3.0/30 is directly connected, GigabitEthernet0/0/1

L 192.168.3.2/32 is directly connected, GigabitEthernet0/0/1

192.168.4.0/24 is variably subnetted, 2 subnets, 2 masks

C 192.168.4.0/30 is directly connected, GigabitEthernet0/0/0

L 192.168.4.1/32 is directly connected, GigabitEthernet0/0/0

192.168.5.0/30 is subnetted, 1 subnets

D 192.168.5.0

[90/2142125] via 192.168.4.2, 00:29:18, GigabitEthernet0/0/0

192.168.7.0/24 is variably subnetted, 2 subnets, 2 masks

D 192.168.7.0/29

[90/3594295] via 192.168.3.1, 00:37:41, GigabitEthernet0/0/1

D 192.168.7.0/30

[90/3082295] via 192.168.3.1, 00:37:41, GigabitEthernet0/0/1

**R5**

D 1.0.0.0/8 [90/2782381] via 192.168.4.1, 00:35:20, GigabitEthernet0/0/1

D 2.0.0.0/8 [90/2782125] via 192.168.4.1, 00:35:20, GigabitEthernet0/0/1

D 3.0.0.0/8 [90/2270125] via 192.168.4.1, 00:29:33, GigabitEthernet0/0/1

D 4.0.0.0/8 [90/2269869] via 192.168.4.1, 00:37:23, GigabitEthernet0/0/1

5.0.0.0/8 is variably subnetted, 2 subnets, 2 masks

C 5.0.0.0/8 is directly connected, Loopback0

L 5.0.0.1/32 is directly connected, Loopback0

D 6.0.0.0/8 [90/2269869] via 192.168.5.2, 00:26:55, GigabitEthernet0/0/0

192.168.1.0/30 is subnetted, 1 subnets

D 192.168.1.0

[90/2654381] via 192.168.4.1, 00:35:20, GigabitEthernet0/0/1

192.168.2.0/24 is variably subnetted, 2 subnets, 2 masks

D 192.168.2.0/29

[90/3594551] via 192.168.4.1, 00:35:20, GigabitEthernet0/0/1

D 192.168.2.0/30

[90/2654125] via 192.168.4.1, 00:35:20, GigabitEthernet0/0/1

192.168.3.0/30 is subnetted, 1 subnets

D 192.168.3.0

[90/2142125] via 192.168.4.1, 00:35:26, GigabitEthernet0/0/1

192.168.4.0/24 is variably subnetted, 2 subnets, 2 masks

C 192.168.4.0/30 is directly connected, GigabitEthernet0/0/1

L 192.168.4.2/32 is directly connected, GigabitEthernet0/0/1

192.168.5.0/24 is variably subnetted, 2 subnets, 2 masks

C 192.168.5.0/30 is directly connected, GigabitEthernet0/0/0

L 192.168.5.1/32 is directly connected, GigabitEthernet0/0/0

192.168.7.0/24 is variably subnetted, 2 subnets, 2 masks

D 192.168.7.0/29

[90/3594551] via 192.168.4.1, 00:35:20, GigabitEthernet0/0/1

D 192.168.7.0/30

[90/3082551] via 192.168.4.1, 00:35:20, GigabitEthernet0/0/1

**R6**

D 1.0.0.0/8 [90/2782637] via 192.168.5.1, 00:23:32, GigabitEthernet0/0/1

D 2.0.0.0/8 [90/2782381] via 192.168.5.1, 00:23:32, GigabitEthernet0/0/1

D 3.0.0.0/8 [90/2270381] via 192.168.5.1, 00:23:32, GigabitEthernet0/0/1

D 4.0.0.0/8 [90/2270125] via 192.168.5.1, 00:23:32, GigabitEthernet0/0/1

D 5.0.0.0/8 [90/2269869] via 192.168.5.1, 00:23:32, GigabitEthernet0/0/1

6.0.0.0/8 is variably subnetted, 2 subnets, 2 masks

C 6.0.0.0/8 is directly connected, Loopback0

L 6.0.0.1/32 is directly connected, Loopback0

192.168.1.0/30 is subnetted, 1 subnets

D 192.168.1.0

[90/2654637] via 192.168.5.1, 00:23:32, GigabitEthernet0/0/1

192.168.2.0/24 is variably subnetted, 2 subnets, 2 masks

D 192.168.2.0/29

[90/3594807] via 192.168.5.1, 00:23:32, GigabitEthernet0/0/1

D 192.168.2.0/30

[90/2654381] via 192.168.5.1, 00:23:32, GigabitEthernet0/0/1

192.168.3.0/30 is subnetted, 1 subnets

D 192.168.3.0

[90/2142381] via 192.168.5.1, 00:23:32, GigabitEthernet0/0/1

192.168.4.0/30 is subnetted, 1 subnets

D 192.168.4.0

[90/2142125] via 192.168.5.1, 00:23:32, GigabitEthernet0/0/1

192.168.5.0/24 is variably subnetted, 2 subnets, 2 masks

C 192.168.5.0/30 is directly connected, GigabitEthernet0/0/1

L 192.168.5.2/32 is directly connected, GigabitEthernet0/0/1

192.168.7.0/24 is variably subnetted, 2 subnets, 2 masks

D 192.168.7.0/29

[90/3594807] via 192.168.5.1, 00:23:32, GigabitEthernet0/0/1

D 192.168.7.0/30

[90/3082807] via 192.168.5.1, 00:23:32, GigabitEthernet0/0/1

Show IPv6 Routes:

IPv6 Routing Table - default - 16 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

**R1**

C 1::/64 [0/0]

via GigabitEthernet0/0/0, directly connected

L 1::1/128 [0/0]

via GigabitEthernet0/0/0, receive

D 2::/64 [90/1368850]

via FE80::521C:B0FF:FE2C:5101, GigabitEthernet0/0/0

D 3::/64 [90/3082551]

via FE80::521C:B0FF:FE2C:5101, GigabitEthernet0/0/0

D 4::/64 [90/3082807]

via FE80::521C:B0FF:FE2C:5101, GigabitEthernet0/0/0

D 5::/64 [90/3083063]

via FE80::521C:B0FF:FE2C:5101, GigabitEthernet0/0/0

D 7::/64 [90/3082295]

via FE80::521C:B0FF:FE2C:5101, GigabitEthernet0/0/0

C 2001:DB8:1::/64 [0/0]

via Loopback0, directly connected

L 2001:DB8:1::1/128 [0/0]

via Loopback0, receive

D 2001:DB8:2::/64 [90/342340]

via FE80::521C:B0FF:FE2C:5101, GigabitEthernet0/0/0

D 2001:DB8:3::/64 [90/3210295]

via FE80::521C:B0FF:FE2C:5101, GigabitEthernet0/0/0

D 2001:DB8:4::/64 [90/3210551]

via FE80::521C:B0FF:FE2C:5101, GigabitEthernet0/0/0

D 2001:DB8:5::/64 [90/3210807]

via FE80::521C:B0FF:FE2C:5101, GigabitEthernet0/0/0

D 2001:DB8:6::/64 [90/3211063]

via FE80::521C:B0FF:FE2C:5101, GigabitEthernet0/0/0

L FF00::/8 [0/0]

via Null0, receive

**R2**

C 1::/64 [0/0]

via GigabitEthernet0/0/1, directly connected

L 1::2/128 [0/0]

via GigabitEthernet0/0/1, receive

C 2::/64 [0/0]

via Serial0/1/0, directly connected

L 2::1/128 [0/0]

via Serial0/1/0, receive

D 3::/64 [90/2653869]

via FE80::521C:B0FF:FE63:3830, Serial0/1/0

via FE80::521C:B0FF:FE63:3830, Serial0/1/1

D 4::/64 [90/2654125]

via FE80::521C:B0FF:FE63:3830, Serial0/1/0

via FE80::521C:B0FF:FE63:3830, Serial0/1/1

D 5::/64 [90/2654381]

via FE80::521C:B0FF:FE63:3830, Serial0/1/0

via FE80::521C:B0FF:FE63:3830, Serial0/1/1

C 7::/64 [0/0]

via Serial0/1/1, directly connected

L 7::1/128 [0/0]

via Serial0/1/1, receive

D 2001:DB8:1::/64 [90/342340]

via FE80::272:78FF:FED6:D4A0, GigabitEthernet0/0/1

C 2001:DB8:2::/64 [0/0]

via Loopback0, directly connected

L 2001:DB8:2::1/128 [0/0]

via Loopback0, receive

D 2001:DB8:3::/64 [90/1496594]

via FE80::521C:B0FF:FE63:3830, Serial0/1/0

via FE80::521C:B0FF:FE63:3830, Serial0/1/1

D 2001:DB8:4::/64 [90/2781869]

via FE80::521C:B0FF:FE63:3830, Serial0/1/0

via FE80::521C:B0FF:FE63:3830, Serial0/1/1

D 2001:DB8:5::/64 [90/2782125]

via FE80::521C:B0FF:FE63:3830, Serial0/1/0

via FE80::521C:B0FF:FE63:3830, Serial0/1/1

D 2001:DB8:6::/64 [90/2782381]

via FE80::521C:B0FF:FE63:3830, Serial0/1/0

via FE80::521C:B0FF:FE63:3830, Serial0/1/1

L FF00::/8 [0/0]

via Null0, receive

**R3**

D 1::/64 [90/1368850]

via FE80::521C:B0FF:FE2C:5100, Serial0/1/1

via FE80::521C:B0FF:FE2C:5100, Serial0/1/0

C 2::/64 [0/0]

via Serial0/1/0, directly connected

L 2::2/128 [0/0]

via Serial0/1/0, receive

C 3::/64 [0/0]

via GigabitEthernet0/0/0, directly connected

L 3::1/128 [0/0]

via GigabitEthernet0/0/0, receive

D 4::/64 [90/2142125]

via FE80::B6A8:B9FF:FE47:9231, GigabitEthernet0/0/0

D 5::/64 [90/2142381]

via FE80::B6A8:B9FF:FE47:9231, GigabitEthernet0/0/0

C 7::/64 [0/0]

via Serial0/1/1, directly connected

L 7::2/128 [0/0]

via Serial0/1/1, receive

D 2001:DB8:1::/64 [90/1496850]

via FE80::521C:B0FF:FE2C:5100, Serial0/1/1

via FE80::521C:B0FF:FE2C:5100, Serial0/1/0

D 2001:DB8:2::/64 [90/1496594]

via FE80::521C:B0FF:FE2C:5100, Serial0/1/0

via FE80::521C:B0FF:FE2C:5100, Serial0/1/1

C 2001:DB8:3::/64 [0/0]

via Loopback0, directly connected

L 2001:DB8:3::1/128 [0/0]

via Loopback0, receive

D 2001:DB8:4::/64 [90/2269869]

via FE80::B6A8:B9FF:FE47:9231, GigabitEthernet0/0/0

D 2001:DB8:5::/64 [90/2270125]

via FE80::B6A8:B9FF:FE47:9231, GigabitEthernet0/0/0

D 2001:DB8:6::/64 [90/2270381]

via FE80::B6A8:B9FF:FE47:9231, GigabitEthernet0/0/0

L FF00::/8 [0/0]

via Null0, receive

**R4**

D 1::/64 [90/2654125]

via FE80::521C:B0FF:FE63:3830, GigabitEthernet0/0/1

D 2::/64 [90/2653869]

via FE80::521C:B0FF:FE63:3830, GigabitEthernet0/0/1

C 3::/64 [0/0]

via GigabitEthernet0/0/1, directly connected

L 3::2/128 [0/0]

via GigabitEthernet0/0/1, receive

C 4::/64 [0/0]

via GigabitEthernet0/0/0, directly connected

L 4::1/128 [0/0]

via GigabitEthernet0/0/0, receive

D 5::/64 [90/2142125]

via FE80::CE8E:71FF:FE1E:22E1, GigabitEthernet0/0/0

D 7::/64 [90/3082295]

via FE80::521C:B0FF:FE63:3830, GigabitEthernet0/0/1

D 2001:DB8:1::/64 [90/2782125]

via FE80::521C:B0FF:FE63:3830, GigabitEthernet0/0/1

D 2001:DB8:2::/64 [90/3210295]

via FE80::521C:B0FF:FE63:3830, GigabitEthernet0/0/1

D 2001:DB8:3::/64 [90/2269869]

via FE80::521C:B0FF:FE63:3830, GigabitEthernet0/0/1

C 2001:DB8:4::/64 [0/0]

via Loopback0, directly connected

L 2001:DB8:4::1/128 [0/0]

via Loopback0, receive

D 2001:DB8:5::/64 [90/2269869]

via FE80::CE8E:71FF:FE1E:22E1, GigabitEthernet0/0/0

D 2001:DB8:6::/64 [90/2270125]

via FE80::CE8E:71FF:FE1E:22E1, GigabitEthernet0/0/0

L FF00::/8 [0/0]

via Null0, receive

**R5**

D 1::/64 [90/2654381]

via FE80::B6A8:B9FF:FE47:9230, GigabitEthernet0/0/1

D 2::/64 [90/2654125]

via FE80::B6A8:B9FF:FE47:9230, GigabitEthernet0/0/1

D 3::/64 [90/2142125]

via FE80::B6A8:B9FF:FE47:9230, GigabitEthernet0/0/1

C 4::/64 [0/0]

via GigabitEthernet0/0/1, directly connected

L 4::2/128 [0/0]

via GigabitEthernet0/0/1, receive

C 5::/64 [0/0]

via GigabitEthernet0/0/0, directly connected

L 5::1/128 [0/0]

via GigabitEthernet0/0/0, receive

D 7::/64 [90/3082551]

via FE80::B6A8:B9FF:FE47:9230, GigabitEthernet0/0/1

D 2001:DB8:1::/64 [90/2782381]

via FE80::B6A8:B9FF:FE47:9230, GigabitEthernet0/0/1

D 2001:DB8:2::/64 [90/3210551]

via FE80::B6A8:B9FF:FE47:9230, GigabitEthernet0/0/1

D 2001:DB8:3::/64 [90/2270125]

via FE80::B6A8:B9FF:FE47:9230, GigabitEthernet0/0/1

D 2001:DB8:4::/64 [90/2269869]

via FE80::B6A8:B9FF:FE47:9230, GigabitEthernet0/0/1

C 2001:DB8:5::/64 [0/0]

via Loopback0, directly connected

L 2001:DB8:5::1/128 [0/0]

via Loopback0, receive

D 2001:DB8:6::/64 [90/2269869]

via FE80::B6A8:B9FF:FE47:9351, GigabitEthernet0/0/0

L FF00::/8 [0/0]

via Null0, receive

**R6**

D 1::/64 [90/2654637]

via FE80::CE8E:71FF:FE1E:22E0, GigabitEthernet0/0/1

D 2::/64 [90/2654381]

via FE80::CE8E:71FF:FE1E:22E0, GigabitEthernet0/0/1

D 3::/64 [90/2142381]

via FE80::CE8E:71FF:FE1E:22E0, GigabitEthernet0/0/1

D 4::/64 [90/2142125]

via FE80::CE8E:71FF:FE1E:22E0, GigabitEthernet0/0/1

C 5::/64 [0/0]

via GigabitEthernet0/0/1, directly connected

L 5::2/128 [0/0]

via GigabitEthernet0/0/1, receive

D 7::/64 [90/3082807]

via FE80::CE8E:71FF:FE1E:22E0, GigabitEthernet0/0/1

D 2001:DB8:1::/64 [90/2782637]

via FE80::CE8E:71FF:FE1E:22E0, GigabitEthernet0/0/1

D 2001:DB8:2::/64 [90/3210807]

via FE80::CE8E:71FF:FE1E:22E0, GigabitEthernet0/0/1

D 2001:DB8:3::/64 [90/2270381]

via FE80::CE8E:71FF:FE1E:22E0, GigabitEthernet0/0/1

D 2001:DB8:4::/64 [90/2270125]

via FE80::CE8E:71FF:FE1E:22E0, GigabitEthernet0/0/1

D 2001:DB8:5::/64 [90/2269869]

via FE80::CE8E:71FF:FE1E:22E0, GigabitEthernet0/0/1

C 2001:DB8:6::/64 [0/0]

via Loopback0, directly connected

L 2001:DB8:6::1/128 [0/0]

via Loopback0, receive

L FF00::/8 [0/0]

via Null0, receive

Verification Commands – Pings from Edge to Edge of Topology:

**R1**

**R1#ping 192.168.5.2**

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 192.168.5.2, timeout is 2 seconds:

!!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 2/2/3 ms

**R1#ping 6.0.0.1**

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 6.0.0.1, timeout is 2 seconds:

!!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 2/3/10 ms

**R1#ping 5::2**

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 5::2, timeout is 2 seconds:

!!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 2/2/3 ms

**R1#ping 2001:db8:6::1**

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 2001:DB8:6::1, timeout is 2 seconds:

!!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 2/2/3 ms

**R6**

**R6#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 = 2/2/3 ms

**R6#ping 1.0.0.1**

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 1.0.0.1, timeout is 2 seconds:

!!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 2/12/52 ms

**R6#ping 1::1**

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 1::1, timeout is 2 seconds:

!!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 2/2/3 ms

**R6#ping 2001:db8:1::1**

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 2001:DB8:1::1, timeout is 2 seconds:

!!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 2/2/3 ms

Verification Commands – Uneven Load Balancing (via Traffic Share Count)

**R2**

**R2#show ip route 192.168.3.2**

Routing entry for 192.168.3.0/30

Known via "eigrp 10", distance 90, metric 1368850, type internal

Redistributing via eigrp 10

Last update from 192.168.7.2 on Serial0/1/1, 00:03:24 ago

Routing Descriptor Blocks:

192.168.7.2, from 192.168.7.2, 00:03:24 ago, via Serial0/1/1

Route metric is 3082295, **traffic share count is 107**

Total delay is 20010 microseconds, minimum bandwidth is 1000 Kbit

Reliability 255/255, minimum MTU 1500 bytes

Loading 1/255, Hops 1

\* 192.168.2.2, from 192.168.2.2, 00:03:24 ago, via Serial0/1/0

Route metric is 1368850, **traffic share count is 240**

Total delay is 20010 microseconds, minimum bandwidth is 3000 Kbit

Reliability 255/255, minimum MTU 1500 bytes

Loading 1/255, Hops 1

**R3**

**R3#show ip route 192.168.1.1**

Routing entry for 192.168.1.0/30

Known via "eigrp 10", distance 90, metric 1368850, type internal

Redistributing via eigrp 10

Last update from 192.168.7.1 on Serial0/1/1, 00:04:04 ago

Routing Descriptor Blocks:

192.168.7.1, from 192.168.7.1, 00:04:04 ago, via Serial0/1/1

Route metric is 3082295, **traffic share count is 107**

Total delay is 20010 microseconds, minimum bandwidth is 1000 Kbit

Reliability 255/255, minimum MTU 1500 bytes

Loading 1/255, Hops 1

\* 192.168.2.1, from 192.168.2.1, 00:04:04 ago, via Serial0/1/0

Route metric is 1368850, **traffic share count is 240**

Total delay is 20010 microseconds, minimum bandwidth is 3000 Kbit

Reliability 255/255, minimum MTU 1500 bytes

Loading 1/255, Hops 1

Verification Commands – Other Show Commands:

**R1**

**R1#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 10"

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(10)

**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: 1.1.1.1

Topology : 0 (base)

Active Timer: 3 min

Distance: internal 90 external 170

Maximum path: 4

Maximum hopcount 100

Maximum metric variance 1

Automatic Summarization: disabled

Maximum path: 4

Routing for Networks:

1.0.0.0

192.168.1.0/30

Routing Information Sources:

Gateway Distance Last Update

192.168.1.2 90 00:29:02

Distance: internal 90 external 170

**R1#show ip eigrp topology**

EIGRP-IPv4 Topology Table for AS(10)/ID(1.1.1.1)

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

r - reply Status, s - sia Status

P 192.168.3.0/30, 1 successors, FD is 2654125

via 192.168.1.2 (2654125/2653869), GigabitEthernet0/0/0

P 6.0.0.0/8, 1 successors, FD is 2782637

via 192.168.1.2 (2782637/2782381), GigabitEthernet0/0/0

P 192.168.2.0/30, 1 successors, FD is 3594295

via 192.168.1.2 (3594295/3594039), GigabitEthernet0/0/0

P 192.168.2.0/29, 1 successors, FD is 1368850

via 192.168.1.2 (1368850/1368594), GigabitEthernet0/0/0

P 2.0.0.0/8, 1 successors, FD is 342340

via 192.168.1.2 (342340/342084), GigabitEthernet0/0/0

P 5.0.0.0/8, 1 successors, FD is 2782381

via 192.168.1.2 (2782381/2782125), GigabitEthernet0/0/0

P 4.0.0.0/8, 1 successors, FD is 2782125

via 192.168.1.2 (2782125/2781869), GigabitEthernet0/0/0

P 192.168.7.0/30, 1 successors, FD is 3594295

via 192.168.1.2 (3594295/3594039), GigabitEthernet0/0/0

P 192.168.7.0/29, 1 successors, FD is 3082295

via 192.168.1.2 (3082295/3082039), GigabitEthernet0/0/0

P 192.168.1.0/30, 1 successors, FD is 214340

via Connected, GigabitEthernet0/0/0

P 192.168.4.0/30, 1 successors, FD is 2654381

via 192.168.1.2 (2654381/2654125), GigabitEthernet0/0/0

P 3.0.0.0/8, 1 successors, FD is 1496850

via 192.168.1.2 (1496850/1496594), GigabitEthernet0/0/0

P 192.168.5.0/30, 1 successors, FD is 2654637

via 192.168.1.2 (2654637/2654381), GigabitEthernet0/0/0

P 1.0.0.0/8, 1 successors, FD is 342084

via Connected, Loopback0

**R1#show ipv6 eigrp topology**

EIGRP-IPv6 Topology Table for AS(10)/ID(1.1.1.1)

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

r - reply Status, s - sia Status

P 1::/64, 1 successors, FD is 214340

via Connected, GigabitEthernet0/0/0

P 2001:DB8:3::/64, 1 successors, FD is 3210295

via FE80::521C:B0FF:FE2C:5101 (3210295/3210039), GigabitEthernet0/0/0

P 5::/64, 1 successors, FD is 3083063

via FE80::521C:B0FF:FE2C:5101 (3083063/3082807), GigabitEthernet0/0/0

P 2001:DB8:5::/64, 1 successors, FD is 3210807

via FE80::521C:B0FF:FE2C:5101 (3210807/3210551), GigabitEthernet0/0/0

P 2001:DB8:6::/64, 1 successors, FD is 3211063

via FE80::521C:B0FF:FE2C:5101 (3211063/3210807), GigabitEthernet0/0/0

P 2001:DB8:4::/64, 1 successors, FD is 3210551

via FE80::521C:B0FF:FE2C:5101 (3210551/3210295), GigabitEthernet0/0/0

P 2::/64, 1 successors, FD is 1368850

via FE80::521C:B0FF:FE2C:5101 (1368850/1368594), GigabitEthernet0/0/0

P 2001:DB8:2::/64, 1 successors, FD is 342340

via FE80::521C:B0FF:FE2C:5101 (342340/342084), GigabitEthernet0/0/0

P 3::/64, 1 successors, FD is 3082551

via FE80::521C:B0FF:FE2C:5101 (3082551/3082295), GigabitEthernet0/0/0

P 4::/64, 1 successors, FD is 3082807

via FE80::521C:B0FF:FE2C:5101 (3082807/3082551), GigabitEthernet0/0/0

P 2001:DB8:1::/64, 1 successors, FD is 342084

via Connected, Loopback0

P 7::/64, 1 successors, FD is 3082295

via FE80::521C:B0FF:FE2C:5101 (3082295/3082039), GigabitEthernet0/0/0

**R2**

**R2#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 10"

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(10)

**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: 2.2.2.2

Topology : 0 (base)

Active Timer: 3 min

Distance: internal 90 external 170

Maximum path: 4

Maximum hopcount 100

**Maximum metric variance 3**

Automatic Summarization: disabled

Maximum path: 4

Routing for Networks:

2.0.0.0

192.168.1.0/30

192.168.2.0/30

192.168.7.0/30

Routing Information Sources:

Gateway Distance Last Update

192.168.1.1 90 00:32:34

192.168.2.2 90 00:32:34

192.168.7.2 90 00:32:34

Distance: internal 90 external 170

**R2#show ip eigrp topology**

EIGRP-IPv4 Topology Table for AS(10)/ID(2.2.2.2)

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

r - reply Status, s - sia Status

P 192.168.3.0/30, 2 successors, FD is 2653869

via 192.168.2.2 (2653869/2141869), Serial0/1/0

via 192.168.7.2 (3082295/2141869), Serial0/1/1

P 6.0.0.0/8, 2 successors, FD is 2782381

via 192.168.2.2 (2782381/2270381), Serial0/1/0

via 192.168.7.2 (3210807/2270381), Serial0/1/1

P 192.168.2.0/30, 1 successors, FD is 3594039

via 192.168.7.2 (3594039/1368594), Serial0/1/1

P 192.168.2.0/29, 1 successors, FD is 1368594

via Connected, Serial0/1/0

P 2.0.0.0/8, 1 successors, FD is 342084

via Connected, Loopback0

P 5.0.0.0/8, 2 successors, FD is 2782125

via 192.168.2.2 (2782125/2270125), Serial0/1/0

via 192.168.7.2 (3210551/2270125), Serial0/1/1

P 4.0.0.0/8, 2 successors, FD is 2781869

via 192.168.2.2 (2781869/2269869), Serial0/1/0

via 192.168.7.2 (3210295/2269869), Serial0/1/1

P 192.168.7.0/30, 1 successors, FD is 3594039

via 192.168.2.2 (3594039/3082039), Serial0/1/0

P 192.168.7.0/29, 1 successors, FD is 3082039

via Connected, Serial0/1/1

P 192.168.1.0/30, 1 successors, FD is 214340

via Connected, GigabitEthernet0/0/1

P 192.168.4.0/30, 2 successors, FD is 2654125

via 192.168.2.2 (2654125/2142125), Serial0/1/0

via 192.168.7.2 (3082551/2142125), Serial0/1/1

P 3.0.0.0/8, 2 successors, FD is 1496594

via 192.168.2.2 (1496594/342084), Serial0/1/0

via 192.168.7.2 (3210039/342084), Serial0/1/1

P 192.168.5.0/30, 2 successors, FD is 2654381

via 192.168.2.2 (2654381/2142381), Serial0/1/0

via 192.168.7.2 (3082807/2142381), Serial0/1/1

P 1.0.0.0/8, 1 successors, FD is 342340

via 192.168.1.1 (342340/342084), GigabitEthernet0/0/1

**R2#show ipv6 eigrp topology**

EIGRP-IPv6 Topology Table for AS(10)/ID(2.2.2.2)

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

r - reply Status, s - sia Status

P 1::/64, 1 successors, FD is 214340

via Connected, GigabitEthernet0/0/1

P 2001:DB8:3::/64, 2 successors, FD is 1496594

via FE80::521C:B0FF:FE63:3830 (3210039/342084), Serial0/1/1

via FE80::521C:B0FF:FE63:3830 (1496594/342084), Serial0/1/0

P 5::/64, 2 successors, FD is 2654381

via FE80::521C:B0FF:FE63:3830 (3082807/2142381), Serial0/1/1

via FE80::521C:B0FF:FE63:3830 (2654381/2142381), Serial0/1/0

P 2001:DB8:5::/64, 2 successors, FD is 2782125

via FE80::521C:B0FF:FE63:3830 (3210551/2270125), Serial0/1/1

via FE80::521C:B0FF:FE63:3830 (2782125/2270125), Serial0/1/0

P 2001:DB8:6::/64, 2 successors, FD is 2782381

via FE80::521C:B0FF:FE63:3830 (3210807/2270381), Serial0/1/1

via FE80::521C:B0FF:FE63:3830 (2782381/2270381), Serial0/1/0

P 2001:DB8:4::/64, 2 successors, FD is 2781869

via FE80::521C:B0FF:FE63:3830 (3210295/2269869), Serial0/1/1

via FE80::521C:B0FF:FE63:3830 (2781869/2269869), Serial0/1/0

P 2::/64, 1 successors, FD is 1368594

via Connected, Serial0/1/0

P 2001:DB8:2::/64, 1 successors, FD is 342084

via Connected, Loopback0

P 3::/64, 2 successors, FD is 2653869

via FE80::521C:B0FF:FE63:3830 (3082295/2141869), Serial0/1/1

via FE80::521C:B0FF:FE63:3830 (2653869/2141869), Serial0/1/0

P 4::/64, 2 successors, FD is 2654125

via FE80::521C:B0FF:FE63:3830 (3082551/2142125), Serial0/1/1

via FE80::521C:B0FF:FE63:3830 (2654125/2142125), Serial0/1/0

P 2001:DB8:1::/64, 1 successors, FD is 342340

via FE80::272:78FF:FED6:D4A0 (342340/342084), GigabitEthernet0/0/1

P 7::/64, 1 successors, FD is 3082039

via Connected, Serial0/1/1

**R3**

**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 10"

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(10)

**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 3**

Automatic Summarization: disabled

Maximum path: 4

Routing for Networks:

3.0.0.0

192.168.2.0/30

192.168.3.0/30

192.168.7.0/30

Routing Information Sources:

Gateway Distance Last Update

192.168.3.2 90 00:31:46

192.168.2.1 90 00:31:46

192.168.7.1 90 00:31:46

Distance: internal 90 external 170

**R3#show ip eigrp topology**

EIGRP-IPv4 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 192.168.3.0/30, 1 successors, FD is 2141869

via Connected, GigabitEthernet0/0/0

P 6.0.0.0/8, 1 successors, FD is 2270381

via 192.168.3.2 (2270381/2270125), GigabitEthernet0/0/0

P 192.168.2.0/29, 1 successors, FD is 3594039

via 192.168.7.1 (3594039/1368594), Serial0/1/1

P 192.168.2.0/30, 1 successors, FD is 1368594

via Connected, Serial0/1/0

P 2.0.0.0/8, 2 successors, FD is 1496594

via 192.168.2.1 (1496594/342084), Serial0/1/0

via 192.168.7.1 (3210039/342084), Serial0/1/1

P 5.0.0.0/8, 1 successors, FD is 2270125

via 192.168.3.2 (2270125/2269869), GigabitEthernet0/0/0

P 4.0.0.0/8, 1 successors, FD is 2269869

via 192.168.3.2 (2269869/342084), GigabitEthernet0/0/0

P 192.168.7.0/29, 1 successors, FD is 3594039

via 192.168.2.1 (3594039/3082039), Serial0/1/0

P 192.168.7.0/30, 1 successors, FD is 3082039

via Connected, Serial0/1/1

P 192.168.1.0/30, 2 successors, FD is 1368850

via 192.168.2.1 (1368850/214340), Serial0/1/0

via 192.168.7.1 (3082295/214340), Serial0/1/1

P 192.168.4.0/30, 1 successors, FD is 2142125

via 192.168.3.2 (2142125/2141869), GigabitEthernet0/0/0

P 3.0.0.0/8, 1 successors, FD is 342084

via Connected, Loopback0

P 192.168.5.0/30, 1 successors, FD is 2142381

via 192.168.3.2 (2142381/2142125), GigabitEthernet0/0/0

P 1.0.0.0/8, 2 successors, FD is 1496850

via 192.168.2.1 (1496850/342340), Serial0/1/0

via 192.168.7.1 (3210295/342340), 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 1::/64, 1 successors, FD is 1368850

via FE80::521C:B0FF:FE2C:5100 (1368850/214340), Serial0/1/0

via FE80::521C:B0FF:FE2C:5100 (3082295/214340), Serial0/1/1

P 2001:DB8:3::/64, 1 successors, FD is 342084

via Connected, Loopback0

P 5::/64, 1 successors, FD is 2142381

via FE80::B6A8:B9FF:FE47:9231 (2142381/2142125), GigabitEthernet0/0/0

P 2001:DB8:5::/64, 1 successors, FD is 2270125

via FE80::B6A8:B9FF:FE47:9231 (2270125/2269869), GigabitEthernet0/0/0

P 2001:DB8:6::/64, 1 successors, FD is 2270381

via FE80::B6A8:B9FF:FE47:9231 (2270381/2270125), GigabitEthernet0/0/0

P 2001:DB8:4::/64, 1 successors, FD is 2269869

via FE80::B6A8:B9FF:FE47:9231 (2269869/342084), GigabitEthernet0/0/0

P 2::/64, 1 successors, FD is 1368594

via Connected, Serial0/1/0

P 2001:DB8:2::/64, 2 successors, FD is 1496594

via FE80::521C:B0FF:FE2C:5100 (3210039/342084), Serial0/1/1

via FE80::521C:B0FF:FE2C:5100 (1496594/342084), Serial0/1/0

P 3::/64, 1 successors, FD is 2141869

via Connected, GigabitEthernet0/0/0

P 4::/64, 1 successors, FD is 2142125

via FE80::B6A8:B9FF:FE47:9231 (2142125/2141869), GigabitEthernet0/0/0

P 2001:DB8:1::/64, 1 successors, FD is 1496850

via FE80::521C:B0FF:FE2C:5100 (1496850/342340), Serial0/1/0

via FE80::521C:B0FF:FE2C:5100 (3210295/342340), Serial0/1/1

P 7::/64, 1 successors, FD is 3082039

via Connected, Serial0/1/1

**R4**

**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 10"

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(10)

**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 1

Automatic Summarization: disabled

Maximum path: 4

Routing for Networks:

4.0.0.0

192.168.3.0/30

192.168.4.0/30

Routing Information Sources:

Gateway Distance Last Update

192.168.3.1 90 00:29:46

192.168.4.2 90 00:29:46

Distance: internal 90 external 170

**R4#show ip eigrp topology**

EIGRP-IPv4 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 192.168.3.0/30, 1 successors, FD is 2141869

via Connected, GigabitEthernet0/0/1

P 6.0.0.0/8, 1 successors, FD is 2270125

via 192.168.4.2 (2270125/2269869), GigabitEthernet0/0/0

P 192.168.2.0/29, 1 successors, FD is 3594295

via 192.168.3.1 (3594295/3594039), GigabitEthernet0/0/1

P 192.168.2.0/30, 1 successors, FD is 2653869

via 192.168.3.1 (2653869/1368594), GigabitEthernet0/0/1

P 2.0.0.0/8, 1 successors, FD is 2781869

via 192.168.3.1 (2781869/1496594), GigabitEthernet0/0/1

P 5.0.0.0/8, 1 successors, FD is 2269869

via 192.168.4.2 (2269869/342084), GigabitEthernet0/0/0

P 4.0.0.0/8, 1 successors, FD is 342084

via Connected, Loopback0

P 192.168.7.0/29, 1 successors, FD is 3594295

via 192.168.3.1 (3594295/3594039), GigabitEthernet0/0/1

P 192.168.7.0/30, 1 successors, FD is 3082295

via 192.168.3.1 (3082295/3082039), GigabitEthernet0/0/1

P 192.168.1.0/30, 1 successors, FD is 2654125

via 192.168.3.1 (2654125/1368850), GigabitEthernet0/0/1

P 192.168.4.0/30, 1 successors, FD is 2141869

via Connected, GigabitEthernet0/0/0

P 3.0.0.0/8, 1 successors, FD is 2269869

via 192.168.3.1 (2269869/342084), GigabitEthernet0/0/1

P 192.168.5.0/30, 1 successors, FD is 2142125

via 192.168.4.2 (2142125/2141869), GigabitEthernet0/0/0

P 1.0.0.0/8, 1 successors, FD is 2782125

via 192.168.3.1 (2782125/1496850), GigabitEthernet0/0/1

**R4#show ipv6 eigrp topology**

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 1::/64, 1 successors, FD is 2654125

via FE80::521C:B0FF:FE63:3830 (2654125/1368850), GigabitEthernet0/0/1

P 2001:DB8:3::/64, 1 successors, FD is 2269869

via FE80::521C:B0FF:FE63:3830 (2269869/342084), GigabitEthernet0/0/1

P 5::/64, 1 successors, FD is 2142125

via FE80::CE8E:71FF:FE1E:22E1 (2142125/2141869), GigabitEthernet0/0/0

P 2001:DB8:5::/64, 1 successors, FD is 2269869

via FE80::CE8E:71FF:FE1E:22E1 (2269869/342084), GigabitEthernet0/0/0

P 2001:DB8:6::/64, 1 successors, FD is 2270125

via FE80::CE8E:71FF:FE1E:22E1 (2270125/2269869), GigabitEthernet0/0/0

P 2001:DB8:4::/64, 1 successors, FD is 342084

via Connected, Loopback0

P 2::/64, 1 successors, FD is 2653869

via FE80::521C:B0FF:FE63:3830 (2653869/1368594), GigabitEthernet0/0/1

P 2001:DB8:2::/64, 1 successors, FD is 3210295

via FE80::521C:B0FF:FE63:3830 (3210295/3210039), GigabitEthernet0/0/1

P 3::/64, 1 successors, FD is 2141869

via Connected, GigabitEthernet0/0/1

P 4::/64, 1 successors, FD is 2141869

via Connected, GigabitEthernet0/0/0

P 2001:DB8:1::/64, 1 successors, FD is 2782125

via FE80::521C:B0FF:FE63:3830 (2782125/1496850), GigabitEthernet0/0/1

P 7::/64, 1 successors, FD is 3082295

via FE80::521C:B0FF:FE63:3830 (3082295/3082039), GigabitEthernet0/0/1

**R5**

**R5#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 10"

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(10)

**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: 5.5.5.5

Topology : 0 (base)

Active Timer: 3 min

Distance: internal 90 external 170

Maximum path: 4

Maximum hopcount 100

Maximum metric variance 1

Automatic Summarization: disabled

Maximum path: 4

Routing for Networks:

5.0.0.0

192.168.4.0/30

192.168.5.0/30

Routing Information Sources:

Gateway Distance Last Update

192.168.4.1 90 00:27:34

192.168.5.2 90 00:27:31

Distance: internal 90 external 170

**R5#show ip eigrp topology**

EIGRP-IPv4 Topology Table for AS(10)/ID(5.5.5.5)

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

r - reply Status, s - sia Status

P 192.168.3.0/30, 1 successors, FD is 2142125

via 192.168.4.1 (2142125/2141869), GigabitEthernet0/0/1

P 6.0.0.0/8, 1 successors, FD is 2269869

via 192.168.5.2 (2269869/342084), GigabitEthernet0/0/0

P 192.168.2.0/29, 1 successors, FD is 3594551

via 192.168.4.1 (3594551/3594295), GigabitEthernet0/0/1

P 192.168.2.0/30, 1 successors, FD is 2654125

via 192.168.4.1 (2654125/2653869), GigabitEthernet0/0/1

P 2.0.0.0/8, 1 successors, FD is 2782125

via 192.168.4.1 (2782125/2781869), GigabitEthernet0/0/1

P 5.0.0.0/8, 1 successors, FD is 342084

via Connected, Loopback0

P 4.0.0.0/8, 1 successors, FD is 2269869

via 192.168.4.1 (2269869/342084), GigabitEthernet0/0/1

P 192.168.7.0/29, 1 successors, FD is 3594551

via 192.168.4.1 (3594551/3594295), GigabitEthernet0/0/1

P 192.168.7.0/30, 1 successors, FD is 3082551

via 192.168.4.1 (3082551/3082295), GigabitEthernet0/0/1

P 192.168.1.0/30, 1 successors, FD is 2654381

via 192.168.4.1 (2654381/2654125), GigabitEthernet0/0/1

P 192.168.4.0/30, 1 successors, FD is 2141869

via Connected, GigabitEthernet0/0/1

P 3.0.0.0/8, 1 successors, FD is 2270125

via 192.168.4.1 (2270125/2269869), GigabitEthernet0/0/1

P 192.168.5.0/30, 1 successors, FD is 2141869

via Connected, GigabitEthernet0/0/0

P 1.0.0.0/8, 1 successors, FD is 2782381

via 192.168.4.1 (2782381/2782125), GigabitEthernet0/0/1

**R5#show ipv6 eigrp topology**

EIGRP-IPv6 Topology Table for AS(10)/ID(5.5.5.5)

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

r - reply Status, s - sia Status

P 1::/64, 1 successors, FD is 2654381

via FE80::B6A8:B9FF:FE47:9230 (2654381/2654125), GigabitEthernet0/0/1

P 2001:DB8:3::/64, 1 successors, FD is 2270125

via FE80::B6A8:B9FF:FE47:9230 (2270125/2269869), GigabitEthernet0/0/1

P 5::/64, 1 successors, FD is 2141869

via Connected, GigabitEthernet0/0/0

P 2001:DB8:5::/64, 1 successors, FD is 342084

via Connected, Loopback0

P 2001:DB8:6::/64, 1 successors, FD is 2269869

via FE80::B6A8:B9FF:FE47:9351 (2269869/342084), GigabitEthernet0/0/0

P 2001:DB8:4::/64, 1 successors, FD is 2269869

via FE80::B6A8:B9FF:FE47:9230 (2269869/342084), GigabitEthernet0/0/1

P 2::/64, 1 successors, FD is 2654125

via FE80::B6A8:B9FF:FE47:9230 (2654125/2653869), GigabitEthernet0/0/1

P 2001:DB8:2::/64, 1 successors, FD is 3210551

via FE80::B6A8:B9FF:FE47:9230 (3210551/3210295), GigabitEthernet0/0/1

P 3::/64, 1 successors, FD is 2142125

via FE80::B6A8:B9FF:FE47:9230 (2142125/2141869), GigabitEthernet0/0/1

P 4::/64, 1 successors, FD is 2141869

via Connected, GigabitEthernet0/0/1

P 2001:DB8:1::/64, 1 successors, FD is 2782381

via FE80::B6A8:B9FF:FE47:9230 (2782381/2782125), GigabitEthernet0/0/1

P 7::/64, 1 successors, FD is 3082551

via FE80::B6A8:B9FF:FE47:9230 (3082551/3082295), GigabitEthernet0/0/1

**R6**

**R6#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 10"

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(10)

**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: 6.6.6.6

Topology : 0 (base)

Active Timer: 3 min

Distance: internal 90 external 170

Maximum path: 4

Maximum hopcount 100

Maximum metric variance 1

Automatic Summarization: disabled

Maximum path: 4

Routing for Networks:

6.0.0.0

192.168.5.0/30

Routing Information Sources:

Gateway Distance Last Update

192.168.5.1 90 00:24:06

Distance: internal 90 external 170

**R6#show ip eigrp topology**

EIGRP-IPv4 Topology Table for AS(10)/ID(6.6.6.6)

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

r - reply Status, s - sia Status

P 192.168.3.0/30, 1 successors, FD is 2142381

via 192.168.5.1 (2142381/2142125), GigabitEthernet0/0/1

P 6.0.0.0/8, 1 successors, FD is 342084

via Connected, Loopback0

P 192.168.2.0/29, 1 successors, FD is 3594807

via 192.168.5.1 (3594807/3594551), GigabitEthernet0/0/1

P 192.168.2.0/30, 1 successors, FD is 2654381

via 192.168.5.1 (2654381/2654125), GigabitEthernet0/0/1

P 2.0.0.0/8, 1 successors, FD is 2782381

via 192.168.5.1 (2782381/2782125), GigabitEthernet0/0/1

P 5.0.0.0/8, 1 successors, FD is 2269869

via 192.168.5.1 (2269869/342084), GigabitEthernet0/0/1

P 4.0.0.0/8, 1 successors, FD is 2270125

via 192.168.5.1 (2270125/2269869), GigabitEthernet0/0/1

P 192.168.7.0/29, 1 successors, FD is 3594807

via 192.168.5.1 (3594807/3594551), GigabitEthernet0/0/1

P 192.168.7.0/30, 1 successors, FD is 3082807

via 192.168.5.1 (3082807/3082551), GigabitEthernet0/0/1

P 192.168.1.0/30, 1 successors, FD is 2654637

via 192.168.5.1 (2654637/2654381), GigabitEthernet0/0/1

P 192.168.4.0/30, 1 successors, FD is 2142125

via 192.168.5.1 (2142125/2141869), GigabitEthernet0/0/1

P 3.0.0.0/8, 1 successors, FD is 2270381

via 192.168.5.1 (2270381/2270125), GigabitEthernet0/0/1

P 192.168.5.0/30, 1 successors, FD is 2141869

via Connected, GigabitEthernet0/0/1

P 1.0.0.0/8, 1 successors, FD is 2782637

via 192.168.5.1 (2782637/2782381), GigabitEthernet0/0/1

**Problems**

There were several issues related to the manipulation of the metrics and uneven load balancing. At first, during the research phase of the project, it was difficult to understand the nature of calculating metrics, especially when it came to calculating variance multipliers for uneven load balancing. Cisco peer Manmeet Ranu helped clarify and guided us through a couple examples of the process, which helped my partner Aidan Garner and I configure and calculate a bandwidth scheme for our metrics. We resulted in applying a variance multiplier of 3, with significantly slower bandwidths on the serial cables compared to the Gigabits to simulate their slow connections. The method of viewing “traffic share count” to testify uneven load balancing was also discovered by a peer from a class prior in the day, which was a novel idea accordingly to senior admin Mr. Mason. This solved our issue of finding concrete evidence that uneven load balancing was functional.

Also, because the racks of the Cisco labs are shared throughout multiple classes, we ran into several physical issues. We switched throughout several different racks throughout the weeks of this project. The first being that the preset serial cables differ in location from rack to rack, so we adapted and adjusted the network diagram to accommodate for differences. Other issues include previous lab users copying their running configurations into the VRAM, thus we had to erase their configurations with the “erase startup-configuration” command to configure our own work.

**Conclusion**

Configuring Enhanced Interior Gateway Routing Protocol was an enduring challenge, but a rewarding accomplishment in the same respect. I improved on the concision and clarity of the addressing scheme since the previous OSPFv3 lab. This helped in the fluidity and communication with my partner. I also noticed that the configuration procedure of EIGRP was very similar to that of OSPF, making it easier to remember the associated commands. Ultimately, EIGRP configuration, uneven load balancing, and learning how to inspect the values within the EIGRP topology all serve as extremely valuable skills as I further my research into the networking world.