**Graphical user interface, application

Description automatically generated**

**Purpose**

The network built demonstrates the usage of the Enhanced Interior Gateway Routing Protocol (EIGRP) to route packets across the network. It showcases the usefulness of dynamic routing protocols to quickly learn and choose the optimal paths over manual configuration. Compared to the other dynamic routing protocol OSPF, EIGRP is a Cisco proprietary protocol and calculates the best path based off load, reliability, delay, and bandwidth instead of solely bandwidth of the links. It is also the only routing protocol that supports balancing the load of traffic across multiple different connections whereas other protocols will prioritize their calculated best path only. Because of this, EIGRP is a quick, simple, and powerful way for routing networks where supporting multiple paths is important.

**Background Information**

In this lab, the dynamic routing protocol EIGRP’s configurations and operation were explored. Both IPv4 and IPv6 addresses are used to give networks a virtual mailing address to be reached through.

The IPv4 addressing scheme works with a unique combination of 4 numbers from 0-255 (8 bits in binary) separated by dots in order to denote the IPv4 address. An example IPv4 address would be 192.168.0.1. However, different networks are separated from each other, and 4 simple numbers delimited by dots cannot identify what network the devices belong to. To accommodate this, the IPv4 addressing scheme uses a subnet mask to denote which part of the IPv4 address represents the network it belongs to, and which part of the address represents which host it is within that network. Since IPv4 addresses are binary based, the subnet mask separates network parts from host parts by denoting whether a certain bit belongs to the network or not. A sample subnet mask is 255.255.255.0, which donates that the first 3 numbers (24 bits) of the address belong to the network and the last number (8 bits) belongs to the host. Combined with the earlier 192.168.0.1 IPv4 address, the network address would be 192.168.0.0 and the host portion would be .1 within the network. This could also be written as 192.168.0.1/24 to show the IPv4 address and the subnet mask.

Because IPv4 addresses are only 32 bits long, there are constraints on the number of unique addresses available. IPv4 provides about 4 billion unique addresses, a number that is well within the scope of being all used up. Thus, IPv6 addressing was introduced, a 128-bit long address which has an astronomically larger address space. This helped solve the depletion of unique IPv4 addresses. They are represented in hexadecimal, meaning every digit represents a number from 0 to 15 as it is a base 16 number system. Groups of 4 hexadecimal digits are separated by colons and each represent 16 bits of the 128 bit-long address. If a group of hexadecimal digits does not have 4 digits, then there are leading 0s in that group of digits. A shorthand used in IPv6 addressing is using double colons in order to denote that until the next group of 4 hexadecimal digits, everything in between are all zeros. The last part of an IPv6 address is the network prefix, which signals how many of the 128 bits are used to distinguish the network portion and the host portion, like the subnet mask. By typical convention, the network portion would be 64 bits long and the host portion would be 64 bits long. A sample IPv6 address is 2001:0db8:acad:000a:0000:0000:0000:00ef/64. Notice that there are groups of 4 digits, and that there are the letters a, b, c, d, e, and f. These represents decimal 10, 11, 12, 13, 14, and 15 respectively. The slash followed by 64 signals the network prefix is 64 bits, meaning that the first 4 groups separated by colons belong to the network portion and the last 4 groups are used to identify hosts within that network. Using the shorthand mentioned before, this address can be shortened to 2001:db8:acad:a::ef/64. All the leading 0s of each group of 4 have been omitted and the long chain of 0s were replaced with a double colon. This keeps IPv6 addresses cleaner and shorter while still having the flexibility and access to the full 128-bit address-space.

With that in mind, the first step of the EIGRP routing process is to make sure every router has a virtual mailing address for every connection it has. Every router represents the intersection between networks, so the router with 4 connections would be connected to 4 networks and would require 4 separate IPv4 addresses and subnet mask pairs as well as 4 separate IPv6 addresses and prefixes. Afterwards, EIGRP is configured on every router to advertise every connection it has with other routers. The connected IPv4 networks to be advertised are configured using the IPv4 address of the networks and a wildcard mask. The wildcard mask is the opposite of the subnet mask as when the subnet mask shows which part of the IPv4 address is the network address, the wildcard mask shows which parts are the host portion. For the earlier sample of the subnet mask, the 255.255.255.0 has the counterpart wildcard mask of 0.0.0.255, effectively flipping the binary bits.

All routers that are configured with EIGRP keep neighbor information from other routers in a table. Routers maintain the information and connections with other neighbors using periodic messages to each other. Routers send hello packets to each other in order to make sure they are still in contact with each other. After a while, if the routers do not receive a hello packet back from a router, they are removed from the table, signaling that the EIGRP communication between the routers have been terminated. EIGRP routers also keep a second table that holds routing information about other neighbors. Instead of maintaining their communication, this table is responsible for holding information to choose the best path.

As with all routing protocols, they choose paths based on which path is the most efficient. Every routing protocol has a different way of determining which path is the best path for data to move through, but EIGRP can calculate that based off load, reliability, bandwidth, and delay. Load is determined in real time and relates to the amount of traffic a connection currently has. Reliability is determined by how much data was lost when trying to transmit over a connection. Bandwidth is synonymous to how wide the path is, signaling the maximum amount of traffic that a connection can carry. Delay is the time that it takes for data to travel from point A to point B. A lower load, more reliable connection, larger bandwidth, and less delay are all desirable for a path and a greater load, less reliable connection, smaller bandwidth, and greater delay make a path less desirable. By default, EIGRP only determines the best route using bandwidth and delay, however EIGRP can be configured to alter their path formula to include load and reliability.

Another specific configuration for EIGRP path choosing is that it’s the only protocol that supports using two paths with unequal bandwidths to reach the same point. Suppose there are two highways, one which has 5 lanes and another with only 3 lanes, that connect the same areas together. On any given day, it would be right to assume that most people would choose to take the highway with 5 lanes as it is perceived to be smoother and with less traffic. Most routing protocols, including OSPF can make decisions like this where they choose the path that is perceived to be faster. The problem with this pathing is that if everyone decides to take the highway with 5 lanes, the highway with 3 lanes will not be utilized and be wasted. Furthermore, the highway with 5 lanes will be incredibly congested. EIGRP is the only widely used protocol that supports splitting the traffic between both highways. As such, if two routers were connected across two separate connections, one with a greater bandwidth than the other, EIGRP can be configured to split the traffic between both connections to get the most efficient distribution of traffic.

**Lab Summary**

6 Routers were physically connected in a line, with a link between two of the central routers sharing two connections for the load balancing. EIGRP was configured for the entire network for both IPv4 and IPv6 routing, creating full connectivity between all routers. Loopback interfaces were configured on each router to simulate a connected LAN to be routed to. Each router was configured to calculate routes based off load, reliability, bandwidth, and delay. The routers that share a double link were configured for unequal cost load balancing to fully utilize both links.

**Lab Commands**

**Router (config) # router eigrp <EIGRP number>**

Enters EIGRP configuration mode, which contains access to all other commands for configuring EIGRP. The EIGRP number is a number from 1-65535 and identifies the instance number of the EIGRP process. All routers in the EIGRP network must use the same EIGRP number when configured.

**Router (config-router) # network <network-address> <wildcard mask>**

Enables the specified network for IPv4 EIGRP advertisement. The network address is the IPv4 address of a specified network, and the wildcard mask is the inverse of the subnet mask. For example, the corresponding wildcard mask of the subnet mask 255.255.255.0 would be 0.0.0.255 as it would be flipping every binary bit in the subnet mask.

**Router (config-router) # variance <1-128>**

Enables unequal cost load balancing. The number represents the multiplier that signifies the range of path costs that can coexist and load-balance. For example, a configured variance of 5 and 3 separate paths with cost 3, 14, and 16 would allow only the paths with cost 3 and 14 to coexist. This is because the variance multiplier takes the path with the lowest metric (3) and multiply it by the variance number to create a range of acceptable path metrics. In this case the range would be 3 – 3 \* 5. Thus, the path with metric of 14 can load balance with the path with metric 3 as it is within the variance range. The path with 16 is outside the variance range and would be left out of the load-balancing process. This command can be used in either IPv4 or IPv6 EIGRP configuration modes.

**Router (config-router) # metric weights <ToS > <k1> <k2> <k3> <k4> <k5>**

Influences the path metric calculation formula. The ToS means the type of service and must always be set to 0. The rest of the k values are used to influence the calculations based off load, reliability, bandwidth, and delay. The default k values are 1 0 1 0 0, which enables metric calculation using bandwidth and delay only. Configured k values of 1 1 1 1 1 will enable EIGRP to calculate metrics using all four of load, reliability, bandwidth, and delay. This command can be used in either IPv4 or IPv6 EIGRP configuration modes.

**Router (config) # ipv6 router eigrp <process-id>**

Enters EIGRP configuration mode for IPv6, which contains access to all other commands for configuring EIGRP. The EIGRP number is a number from 1-65535 and identifies the instance number of the EIGRP process. All routers in the EIGRP network must use the same EIGRP number when configured.

**Router (config-if) # ipv6 eigrp <EIGRP number>**

Enables the specific interface to be advertised over the IPv6 EIGRP network. The EIGRP number is a number from 1-65535 and identifies the instance number of the EIGRP process. All routers in the EIGRP network must use the same EIGRP number when configured.

**Router# show ip protocols**

Shows all the configured IPv4 protocols on the router, including EIGRP’s configured number, locally configured EIGRP networks, variance, and metric weight k values.

**Router# show ip eigrp topology**

Shows the collected IPv4 EIGRP routing configuration across the entire EIGRP network. Includes the routes to each network, the metrics for each path, backup paths, alternate load-balanced paths, and interfaces to reach each destination network.

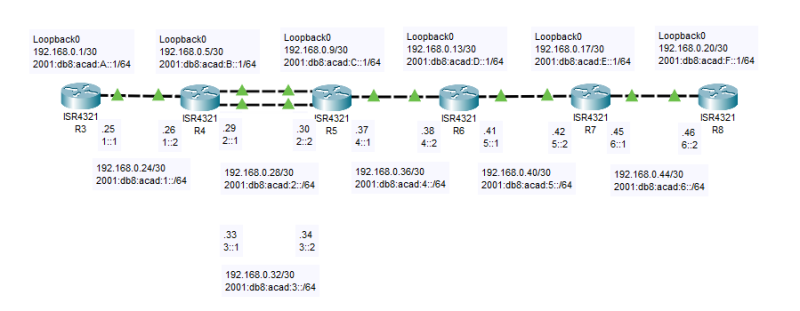
**Router# show ipv6 protocols**

Shows all the configured IPv6 protocols on the router, including EIGRP’s configured number, locally configured EIGRP networks, variance, and metric weight k values.

**Router# show ipv6 eigrp topology**

Shows the collected IPv6 EIGRP routing configuration across the entire EIGRP network. Includes the routes to each network, the metrics for each path, backup paths, alternate load-balanced paths, and interfaces to reach each destination network.

**Network Diagram**



|  |  |  |  |
| --- | --- | --- | --- |
| **Router Name** | Interface | IP Address | IPv6 Global Address |
| **R3** | G0/0/0 | 192.168.0.25/30 | 2001:db8:acad:1::1/64 |
|  | G0/0/1 | N/A | N/A |
|  | Loopback0 | 192.168.0.1/30 | 2001:db8:acad:a::1/64 |
|  |  |  |  |
| **R4** | G0/0/0 | 192.168.0.26/30 | 2001:db8:acad:1::2/64 |
|  | G0/0/1 | 192.168.0.29/30 | 2001:db8:acad:2::1/64 |
|  | G0/2/0 | 192.168.0.33/30 | 2001:db8:acad:3::1/64 |
|  | Loopback0 | 192.168.0.5/30 | 2001:db8:acad:b::1/64 |
|  |  |  |  |
| **R5** | G0/0/0 | 192.168.0.37/30 | 2001:db8:acad:4::1/64 |
|  | G0/0/1 | 192.168.0.30/30 | 2001:db8:acad:2::2/64 |
|  | G0/2/0 | 192.168.0.34/30 | 2001:db8:acad:3::1 |
|  | Loopback0 | 192.168.0.9/30 | 2001:db8:acad:c::1/64 |
|  |  |  |  |
| **R6** | G0/0/0 | 192.168.0.38/30 | 2001:db8:acad:4::2/64 |
|  | G0/0/1 | 192.168.0.41/30 | 2001:db8:acad:5::1/64 |
|  | Loopback0 | 192.168.0.13/30 | 2001:db8:acad:d::1/64 |
|  |  |  |  |
| **R7** | G0/0/0 | 192.168.0.45/30 | 2001:db8:acad:6::1/64 |
|  | G0/0/1 | 192.168.0.42/30 | 2001:db8:acad:5::2/64 |
|  | Loopback0 | 192.168.0.17/30 | 2001:db8:acad:e::1/64 |
|  |  |  |  |
| **R8** | G0/0/0 | 192.168.0.46/30 | 2001:db8:acad:6::2/64 |
|  | G0/0/1 | N/A |  |
|  | Loopback0 | 192.168.0.21/30 | 2001:db8:acad:f::1/64 |

**Configurations**

**Router 3**

**R3#show running-config**

Current configuration : 1793 bytes

version 15.5

service timestamps debug datetime msec

service timestamps log datetime msec

no 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

ipv6 unicast-routing

subscriber templating

multilink bundle-name authenticated

license udi pid ISR4321/K9 sn FDO214421BY

spanning-tree extend system-id

redundancy

mode none

vlan internal allocation policy ascending

interface Loopback0

ip address 192.168.0.1 255.255.255.252

ipv6 address 2001:DB8:ACAD:A::1/64

ipv6 eigrp 1

interface GigabitEthernet0/0/0

ip address 192.168.0.25 255.255.255.252

negotiation auto

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

ipv6 eigrp 1

interface GigabitEthernet0/0/1

no ip address

shutdown

negotiation auto

interface Serial0/1/0

no ip address

shutdown

interface Serial0/1/1

no ip address

shutdown

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

negotiation auto

interface Vlan1

no ip address

shutdown

router eigrp 1

metric weights 0 1 1 1 1 1

variance 3

network 192.168.0.0 0.0.0.3

network 192.168.0.24 0.0.0.3

ip forward-protocol nd

no ip http server

no ip http secure-server

ip tftp source-interface GigabitEthernet0

ipv6 router eigrp 1

metric weights 0 1 1 1 1 1

variance 3

control-plane

line con 0

stopbits 1

line aux 0

stopbits 1

line vty 0 4

login

end

**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

192.168.0.0/24 is variably subnetted, 14 subnets, 2 masks

C 192.168.0.0/30 is directly connected, Loopback0

L 192.168.0.1/32 is directly connected, Loopback0

D 192.168.0.4/30

[90/511] via 192.168.0.26, 00:24:50, GigabitEthernet0/0/0

D 192.168.0.8/30

[90/512] via 192.168.0.26, 00:24:50, GigabitEthernet0/0/0

D 192.168.0.12/30

[90/513] via 192.168.0.26, 00:24:50, GigabitEthernet0/0/0

D 192.168.0.16/30

[90/514] via 192.168.0.26, 00:24:50, GigabitEthernet0/0/0

D 192.168.0.20/30

[90/515] via 192.168.0.26, 00:24:50, GigabitEthernet0/0/0

C 192.168.0.24/30 is directly connected, GigabitEthernet0/0/0

L 192.168.0.25/32 is directly connected, GigabitEthernet0/0/0

D 192.168.0.28/30

[90/12] via 192.168.0.26, 00:24:50, GigabitEthernet0/0/0

D 192.168.0.32/30

[90/22] via 192.168.0.26, 00:24:50, GigabitEthernet0/0/0

D 192.168.0.36/30

[90/13] via 192.168.0.26, 00:24:50, GigabitEthernet0/0/0

D 192.168.0.40/30

[90/14] via 192.168.0.26, 00:24:50, GigabitEthernet0/0/0

D 192.168.0.44/30

[90/15] via 192.168.0.26, 00:24:50, GigabitEthernet0/0/0

**R3#show ip eigrp topology**

EIGRP-IPv4 Topology Table for AS(1)/ID(192.168.0.1)

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

r - reply Status, s - sia Status

P 192.168.0.8/30, 1 successors, FD is 512

via 192.168.0.26 (512/511), GigabitEthernet0/0/0

P 192.168.0.28/30, 1 successors, FD is 12

via 192.168.0.26 (12/11), GigabitEthernet0/0/0

P 192.168.0.4/30, 1 successors, FD is 511

via 192.168.0.26 (511/501), GigabitEthernet0/0/0

P 192.168.0.16/30, 1 successors, FD is 514

via 192.168.0.26 (514/513), GigabitEthernet0/0/0

P 192.168.0.44/30, 1 successors, FD is 15

via 192.168.0.26 (15/14), GigabitEthernet0/0/0

P 192.168.0.40/30, 1 successors, FD is 14

via 192.168.0.26 (14/13), GigabitEthernet0/0/0

P 192.168.0.0/30, 1 successors, FD is 501

via Connected, Loopback0

P 192.168.0.32/30, 1 successors, FD is 22

via 192.168.0.26 (22/21), GigabitEthernet0/0/0

P 192.168.0.24/30, 1 successors, FD is 11

via Connected, GigabitEthernet0/0/0

P 192.168.0.20/30, 1 successors, FD is 515

via 192.168.0.26 (515/514), GigabitEthernet0/0/0

P 192.168.0.36/30, 1 successors, FD is 13

via 192.168.0.26 (13/12), GigabitEthernet0/0/0

P 192.168.0.12/30, 1 successors, FD is 513

via 192.168.0.26 (513/512), GigabitEthernet0/0/0

**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=1

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: 192.168.0.1

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:

192.168.0.0/30

192.168.0.24/30

Routing Information Sources:

Gateway Distance Last Update

192.168.0.26 90 00:25:01

Distance: internal 90 external 170

**R3#show ipv6 route**

IPv6 Routing Table - default - 15 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

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

via GigabitEthernet0/0/0, directly connected

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

via GigabitEthernet0/0/0, receive

D 2001:DB8:ACAD:2::/64 [90/12]

via FE80::521C:B0FF:FE42:AF80, GigabitEthernet0/0/0

D 2001:DB8:ACAD:3::/64 [90/22]

via FE80::521C:B0FF:FE42:AF80, GigabitEthernet0/0/0

D 2001:DB8:ACAD:4::/64 [90/13]

via FE80::521C:B0FF:FE42:AF80, GigabitEthernet0/0/0

D 2001:DB8:ACAD:5::/64 [90/14]

via FE80::521C:B0FF:FE42:AF80, GigabitEthernet0/0/0

D 2001:DB8:ACAD:6::/64 [90/15]

via FE80::521C:B0FF:FE42:AF80, GigabitEthernet0/0/0

C 2001:DB8:ACAD:A::/64 [0/0]

via Loopback0, directly connected

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

via Loopback0, receive

D 2001:DB8:ACAD:B::/64 [90/511]

via FE80::521C:B0FF:FE42:AF80, GigabitEthernet0/0/0

D 2001:DB8:ACAD:C::/64 [90/512]

via FE80::521C:B0FF:FE42:AF80, GigabitEthernet0/0/0

D 2001:DB8:ACAD:D::/64 [90/513]

via FE80::521C:B0FF:FE42:AF80, GigabitEthernet0/0/0

D 2001:DB8:ACAD:E::/64 [90/514]

via FE80::521C:B0FF:FE42:AF80, GigabitEthernet0/0/0

D 2001:DB8:ACAD:F::/64 [90/515]

via FE80::521C:B0FF:FE42:AF80, GigabitEthernet0/0/0

L FF00::/8 [0/0]

via Null0, receive

**R3#show ipv6 eigrp topology**

EIGRP-IPv6 Topology Table for AS(1)/ID(192.168.0.1)

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 501

via Connected, Loopback0

P 2001:DB8:ACAD:1::/64, 1 successors, FD is 11

via Connected, GigabitEthernet0/0/0

P 2001:DB8:ACAD:6::/64, 1 successors, FD is 15

via FE80::521C:B0FF:FE42:AF80 (15/14), GigabitEthernet0/0/0

P 2001:DB8:ACAD:C::/64, 1 successors, FD is 512

via FE80::521C:B0FF:FE42:AF80 (512/511), GigabitEthernet0/0/0

P 2001:DB8:ACAD:5::/64, 1 successors, FD is 14

via FE80::521C:B0FF:FE42:AF80 (14/13), GigabitEthernet0/0/0

P 2001:DB8:ACAD:F::/64, 1 successors, FD is 515

via FE80::521C:B0FF:FE42:AF80 (515/514), GigabitEthernet0/0/0

P 2001:DB8:ACAD:B::/64, 1 successors, FD is 511

via FE80::521C:B0FF:FE42:AF80 (511/501), GigabitEthernet0/0/0

P 2001:DB8:ACAD:2::/64, 1 successors, FD is 12

via FE80::521C:B0FF:FE42:AF80 (12/11), GigabitEthernet0/0/0

P 2001:DB8:ACAD:D::/64, 1 successors, FD is 513

via FE80::521C:B0FF:FE42:AF80 (513/512), GigabitEthernet0/0/0

P 2001:DB8:ACAD:4::/64, 1 successors, FD is 13

via FE80::521C:B0FF:FE42:AF80 (13/12), GigabitEthernet0/0/0

P 2001:DB8:ACAD:3::/64, 1 successors, FD is 22

via FE80::521C:B0FF:FE42:AF80 (22/21), GigabitEthernet0/0/0

P 2001:DB8:ACAD:E::/64, 1 successors, FD is 514

via FE80::521C:B0FF:FE42:AF80 (514/513), GigabitEthernet0/0/0

**R3#show ipv6 protocols**

IPv6 Routing Protocol is "connected"

IPv6 Routing Protocol is "application"

IPv6 Routing Protocol is "ND"

IPv6 Routing Protocol is "eigrp 1"

EIGRP-IPv6 Protocol for AS(1)

Metric weight K1=1, K2=1, K3=1, K4=1, K5=1

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: 192.168.0.1

Topology : 0 (base)

Active Timer: 3 min

Distance: internal 90 external 170

Maximum path: 16

Maximum hopcount 100

Maximum metric variance 3

Interfaces:

Loopback0

GigabitEthernet0/0/0

Redistribution:

None

**Router 4**

**R4#show running-config**

Current configuration : 2065 bytes

version 15.5

service timestamps debug datetime msec

service timestamps log datetime msec

no 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

ipv6 unicast-routing

subscriber templating

multilink bundle-name authenticated

license udi pid ISR4321/K9 sn FDO214913GF

spanning-tree extend system-id

redundancy

mode none

vlan internal allocation policy ascending

interface Loopback0

ip address 192.168.0.5 255.255.255.252

ipv6 address 2001:DB8:ACAD:B::1/64

ipv6 eigrp 1

interface GigabitEthernet0/0/0

ip address 192.168.0.26 255.255.255.252

negotiation auto

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

ipv6 eigrp 1

interface GigabitEthernet0/0/1

ip address 192.168.0.29 255.255.255.252

negotiation auto

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

ipv6 eigrp 1

interface Serial0/1/0

no ip address

shutdown

interface Serial0/1/1

no ip address

shutdown

interface GigabitEthernet0/2/0

bandwidth 500000

ip address 192.168.0.33 255.255.255.252

negotiation auto

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

ipv6 eigrp 1

interface GigabitEthernet0/2/1

no ip address

shutdown

negotiation auto

interface GigabitEthernet0

vrf forwarding Mgmt-intf

ip address 192.168.0.33 255.255.255.252

shutdown

negotiation auto

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

interface Vlan1

no ip address

shutdown

router eigrp 1

metric weights 0 1 1 1 1 1

variance 3

network 192.168.0.4 0.0.0.3

network 192.168.0.24 0.0.0.3

network 192.168.0.28 0.0.0.3

network 192.168.0.32 0.0.0.3

ip forward-protocol nd

no ip http server

no ip http secure-server

ip tftp source-interface GigabitEthernet0

ipv6 router eigrp 1

metric weights 0 1 1 1 1 1

variance 3

control-plane

line con 0

stopbits 1

line aux 0

stopbits 1

line vty 0 4

login

end

**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

192.168.0.0/24 is variably subnetted, 16 subnets, 2 masks

D 192.168.0.0/30

[90/511] via 192.168.0.25, 00:27:09, GigabitEthernet0/0/0

C 192.168.0.4/30 is directly connected, Loopback0

L 192.168.0.5/32 is directly connected, Loopback0

D 192.168.0.8/30

[90/521] via 192.168.0.34, 00:28:10, GigabitEthernet0/2/0

[90/511] via 192.168.0.30, 00:28:10, GigabitEthernet0/0/1

D 192.168.0.12/30

[90/522] via 192.168.0.34, 00:27:49, GigabitEthernet0/2/0

[90/512] via 192.168.0.30, 00:27:49, GigabitEthernet0/0/1

D 192.168.0.16/30

[90/523] via 192.168.0.34, 00:27:13, GigabitEthernet0/2/0

[90/513] via 192.168.0.30, 00:27:13, GigabitEthernet0/0/1

D 192.168.0.20/30

[90/524] via 192.168.0.34, 00:26:55, GigabitEthernet0/2/0

[90/514] via 192.168.0.30, 00:26:55, GigabitEthernet0/0/1

C 192.168.0.24/30 is directly connected, GigabitEthernet0/0/0

L 192.168.0.26/32 is directly connected, GigabitEthernet0/0/0

C 192.168.0.28/30 is directly connected, GigabitEthernet0/0/1

L 192.168.0.29/32 is directly connected, GigabitEthernet0/0/1

C 192.168.0.32/30 is directly connected, GigabitEthernet0/2/0

L 192.168.0.33/32 is directly connected, GigabitEthernet0/2/0

D 192.168.0.36/30

[90/22] via 192.168.0.34, 00:28:10, GigabitEthernet0/2/0

[90/12] via 192.168.0.30, 00:28:10, GigabitEthernet0/0/1

D 192.168.0.40/30

[90/23] via 192.168.0.34, 00:27:49, GigabitEthernet0/2/0

[90/13] via 192.168.0.30, 00:27:49, GigabitEthernet0/0/1

D 192.168.0.44/30

[90/24] via 192.168.0.34, 00:27:13, GigabitEthernet0/2/0

[90/14] via 192.168.0.30, 00:27:13, GigabitEthernet0/0/1

**R4#show ip eigrp topology**

EIGRP-IPv4 Topology Table for AS(1)/ID(192.168.0.5)

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

r - reply Status, s - sia Status

P 192.168.0.8/30, 2 successors, FD is 511

via 192.168.0.30 (511/501), GigabitEthernet0/0/1

via 192.168.0.34 (521/501), GigabitEthernet0/2/0

P 192.168.0.28/30, 1 successors, FD is 11

via Connected, GigabitEthernet0/0/1

P 192.168.0.4/30, 1 successors, FD is 501

via Connected, Loopback0

P 192.168.0.16/30, 2 successors, FD is 513

via 192.168.0.30 (513/512), GigabitEthernet0/0/1

via 192.168.0.34 (523/512), GigabitEthernet0/2/0

P 192.168.0.44/30, 2 successors, FD is 14

via 192.168.0.30 (14/13), GigabitEthernet0/0/1

via 192.168.0.34 (24/13), GigabitEthernet0/2/0

P 192.168.0.40/30, 1 successors, FD is 13

via 192.168.0.30 (13/12), GigabitEthernet0/0/1

via 192.168.0.34 (23/12), GigabitEthernet0/2/0

P 192.168.0.0/30, 1 successors, FD is 511

via 192.168.0.25 (511/501), GigabitEthernet0/0/0

P 192.168.0.32/30, 1 successors, FD is 21

via Connected, GigabitEthernet0/2/0

P 192.168.0.24/30, 1 successors, FD is 11

via Connected, GigabitEthernet0/0/0

P 192.168.0.20/30, 2 successors, FD is 514

via 192.168.0.30 (514/513), GigabitEthernet0/0/1

via 192.168.0.34 (524/513), GigabitEthernet0/2/0

P 192.168.0.36/30, 2 successors, FD is 12

via 192.168.0.30 (12/11), GigabitEthernet0/0/1

via 192.168.0.34 (22/11), GigabitEthernet0/2/0

P 192.168.0.12/30, 1 successors, FD is 512

via 192.168.0.30 (512/511), GigabitEthernet0/0/1

via 192.168.0.34 (522/511), GigabitEthernet0/2/0

**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=1

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: 192.168.0.5

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:

192.168.0.4/30

192.168.0.24/30

192.168.0.28/30

192.168.0.32/30

Routing Information Sources:

Gateway Distance Last Update

192.168.0.34 90 00:27:07

192.168.0.25 90 00:27:07

192.168.0.30 90 00:27:07

Distance: internal 90 external 170

**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

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

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

via GigabitEthernet0/2/0, directly connected

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

via GigabitEthernet0/2/0, receive

D 2001:DB8:ACAD:4::/64 [90/12]

via FE80::521C:B0FF:FE2C:4C81, GigabitEthernet0/0/1

via FE80::521C:B0FF:FE2C:4C90, GigabitEthernet0/2/0

D 2001:DB8:ACAD:5::/64 [90/13]

via FE80::521C:B0FF:FE2C:4C81, GigabitEthernet0/0/1

via FE80::521C:B0FF:FE2C:4C90, GigabitEthernet0/2/0

D 2001:DB8:ACAD:6::/64 [90/14]

via FE80::521C:B0FF:FE2C:4C90, GigabitEthernet0/2/0

via FE80::521C:B0FF:FE2C:4C81, GigabitEthernet0/0/1

D 2001:DB8:ACAD:A::/64 [90/511]

via FE80::B6A8:B9FF:FE01:B510, GigabitEthernet0/0/0

C 2001:DB8:ACAD:B::/64 [0/0]

via Loopback0, directly connected

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

via Loopback0, receive

D 2001:DB8:ACAD:C::/64 [90/511]

via FE80::521C:B0FF:FE2C:4C81, GigabitEthernet0/0/1

via FE80::521C:B0FF:FE2C:4C90, GigabitEthernet0/2/0

D 2001:DB8:ACAD:D::/64 [90/512]

via FE80::521C:B0FF:FE2C:4C81, GigabitEthernet0/0/1

via FE80::521C:B0FF:FE2C:4C90, GigabitEthernet0/2/0

D 2001:DB8:ACAD:E::/64 [90/513]

via FE80::521C:B0FF:FE2C:4C90, GigabitEthernet0/2/0

via FE80::521C:B0FF:FE2C:4C81, GigabitEthernet0/0/1

D 2001:DB8:ACAD:F::/64 [90/514]

via FE80::521C:B0FF:FE2C:4C81, GigabitEthernet0/0/1

via FE80::521C:B0FF:FE2C:4C90, GigabitEthernet0/2/0

L FF00::/8 [0/0]

via Null0, receive

**R4#show ipv6 eigrp topology**

EIGRP-IPv6 Topology Table for AS(1)/ID(192.168.0.5)

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 511

via FE80::B6A8:B9FF:FE01:B510 (511/501), GigabitEthernet0/0/0

P 2001:DB8:ACAD:1::/64, 1 successors, FD is 11

via Connected, GigabitEthernet0/0/0

P 2001:DB8:ACAD:6::/64, 1 successors, FD is 14

via FE80::521C:B0FF:FE2C:4C81 (14/13), GigabitEthernet0/0/1

via FE80::521C:B0FF:FE2C:4C90 (24/13), GigabitEthernet0/2/0

P 2001:DB8:ACAD:C::/64, 2 successors, FD is 511

via FE80::521C:B0FF:FE2C:4C81 (511/501), GigabitEthernet0/0/1

via FE80::521C:B0FF:FE2C:4C90 (521/501), GigabitEthernet0/2/0

P 2001:DB8:ACAD:5::/64, 2 successors, FD is 13

via FE80::521C:B0FF:FE2C:4C81 (13/12), GigabitEthernet0/0/1

via FE80::521C:B0FF:FE2C:4C90 (23/12), GigabitEthernet0/2/0

P 2001:DB8:ACAD:F::/64, 2 successors, FD is 514

via FE80::521C:B0FF:FE2C:4C81 (514/513), GigabitEthernet0/0/1

via FE80::521C:B0FF:FE2C:4C90 (524/513), GigabitEthernet0/2/0

P 2001:DB8:ACAD:B::/64, 1 successors, FD is 501

via Connected, Loopback0

P 2001:DB8:ACAD:2::/64, 1 successors, FD is 11

via Connected, GigabitEthernet0/0/1

P 2001:DB8:ACAD:D::/64, 2 successors, FD is 512

via FE80::521C:B0FF:FE2C:4C81 (512/511), GigabitEthernet0/0/1

via FE80::521C:B0FF:FE2C:4C90 (522/511), GigabitEthernet0/2/0

P 2001:DB8:ACAD:4::/64, 2 successors, FD is 12

via FE80::521C:B0FF:FE2C:4C81 (12/11), GigabitEthernet0/0/1

via FE80::521C:B0FF:FE2C:4C90 (22/11), GigabitEthernet0/2/0

P 2001:DB8:ACAD:3::/64, 1 successors, FD is 21

via Connected, GigabitEthernet0/2/0

P 2001:DB8:ACAD:E::/64, 1 successors, FD is 513

via FE80::521C:B0FF:FE2C:4C81 (513/512), GigabitEthernet0/0/1

via FE80::521C:B0FF:FE2C:4C90 (523/512), GigabitEthernet0/2/0

**R4#show ipv6 protocols**

IPv6 Routing Protocol is "connected"

IPv6 Routing Protocol is "application"

IPv6 Routing Protocol is "ND"

IPv6 Routing Protocol is "eigrp 1"

EIGRP-IPv6 Protocol for AS(1)

Metric weight K1=1, K2=1, K3=1, K4=1, K5=1

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: 192.168.0.5

Topology : 0 (base)

Active Timer: 3 min

Distance: internal 90 external 170

Maximum path: 16

Maximum hopcount 100

Maximum metric variance 3

Interfaces:

Loopback0

GigabitEthernet0/0/1

GigabitEthernet0/0/0

GigabitEthernet0/2/0

Redistribution:

None

**Router 5**

**R5#show running-config**

Current configuration : 2003 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

ipv6 unicast-routing

subscriber templating

multilink bundle-name authenticated

license udi pid ISR4321/K9 sn FDO21482HYV

spanning-tree extend system-id

redundancy

mode none

vlan internal allocation policy ascending

interface Loopback0

ip address 192.168.0.9 255.255.255.252

ipv6 address 2001:DB8:ACAD:C::1/64

ipv6 eigrp 1

interface GigabitEthernet0/0/0

ip address 192.168.0.37 255.255.255.252

negotiation auto

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

ipv6 eigrp 1

interface GigabitEthernet0/0/1

ip address 192.168.0.30 255.255.255.252

negotiation auto

ipv6 address 2001:DB8:ACAD:2::2/64

ipv6 eigrp 1

interface Serial0/1/0

no ip address

shutdown

interface Serial0/1/1

no ip address

shutdown

interface GigabitEthernet0/2/0

bandwidth 500000

ip address 192.168.0.34 255.255.255.252

negotiation auto

ipv6 address 2001:DB8:ACAD:3::2/64

ipv6 eigrp 1

interface GigabitEthernet0/2/1

no ip address

shutdown

negotiation auto

interface GigabitEthernet0

vrf forwarding Mgmt-intf

no ip address

shutdown

negotiation auto

interface Vlan1

no ip address

shutdown

router eigrp 1

metric weights 0 1 1 1 1 1

variance 3

network 192.168.0.8 0.0.0.3

network 192.168.0.28 0.0.0.3

network 192.168.0.32 0.0.0.3

network 192.168.0.36 0.0.0.3

ip forward-protocol nd

no ip http server

no ip http secure-server

ip tftp source-interface GigabitEthernet0

ipv6 router eigrp 1

metric weights 0 1 1 1 1 1

variance 3

control-plane

line con 0

stopbits 1

line aux 0

stopbits 1

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

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

192.168.0.0/24 is variably subnetted, 16 subnets, 2 masks

D 192.168.0.0/30

[90/522] via 192.168.0.33, 00:22:12, GigabitEthernet0/2/0

[90/512] via 192.168.0.29, 00:22:12, GigabitEthernet0/0/1

D 192.168.0.4/30

[90/521] via 192.168.0.33, 00:23:13, GigabitEthernet0/2/0

[90/511] via 192.168.0.29, 00:23:13, GigabitEthernet0/0/1

C 192.168.0.8/30 is directly connected, Loopback0

L 192.168.0.9/32 is directly connected, Loopback0

D 192.168.0.12/30

[90/511] via 192.168.0.38, 00:22:52, GigabitEthernet0/0/0

D 192.168.0.16/30

[90/512] via 192.168.0.38, 00:22:16, GigabitEthernet0/0/0

D 192.168.0.20/30

[90/513] via 192.168.0.38, 00:21:58, GigabitEthernet0/0/0

D 192.168.0.24/30

[90/22] via 192.168.0.33, 00:23:13, GigabitEthernet0/2/0

[90/12] via 192.168.0.29, 00:23:13, GigabitEthernet0/0/1

C 192.168.0.28/30 is directly connected, GigabitEthernet0/0/1

L 192.168.0.30/32 is directly connected, GigabitEthernet0/0/1

C 192.168.0.32/30 is directly connected, GigabitEthernet0/2/0

L 192.168.0.34/32 is directly connected, GigabitEthernet0/2/0

C 192.168.0.36/30 is directly connected, GigabitEthernet0/0/0

L 192.168.0.37/32 is directly connected, GigabitEthernet0/0/0

D 192.168.0.40/30

[90/12] via 192.168.0.38, 00:22:52, GigabitEthernet0/0/0

D 192.168.0.44/30

[90/13] via 192.168.0.38, 00:22:16, GigabitEthernet0/0/0

**R5#show ip eigrp topology**

EIGRP-IPv4 Topology Table for AS(1)/ID(192.168.0.9)

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

r - reply Status, s - sia Status

P 192.168.0.8/30, 1 successors, FD is 501

via Connected, Loopback0

P 192.168.0.28/30, 1 successors, FD is 11

via Connected, GigabitEthernet0/0/1

P 192.168.0.4/30, 2 successors, FD is 511

via 192.168.0.29 (511/501), GigabitEthernet0/0/1

via 192.168.0.33 (521/501), GigabitEthernet0/2/0

P 192.168.0.16/30, 1 successors, FD is 512

via 192.168.0.38 (512/511), GigabitEthernet0/0/0

P 192.168.0.44/30, 1 successors, FD is 13

via 192.168.0.38 (13/12), GigabitEthernet0/0/0

P 192.168.0.40/30, 1 successors, FD is 12

via 192.168.0.38 (12/11), GigabitEthernet0/0/0

P 192.168.0.0/30, 1 successors, FD is 512

via 192.168.0.29 (512/511), GigabitEthernet0/0/1

via 192.168.0.33 (522/511), GigabitEthernet0/2/0

P 192.168.0.32/30, 1 successors, FD is 21

via Connected, GigabitEthernet0/2/0

P 192.168.0.24/30, 2 successors, FD is 12

via 192.168.0.29 (12/11), GigabitEthernet0/0/1

via 192.168.0.33 (22/11), GigabitEthernet0/2/0

P 192.168.0.20/30, 1 successors, FD is 513

via 192.168.0.38 (513/512), GigabitEthernet0/0/0

P 192.168.0.36/30, 1 successors, FD is 11

via Connected, GigabitEthernet0/0/0

P 192.168.0.12/30, 1 successors, FD is 511

via 192.168.0.38 (511/501), GigabitEthernet0/0/0

**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 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=1

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: 192.168.0.9

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:

192.168.0.8/30

192.168.0.28/30

192.168.0.32/30

192.168.0.36/30

Routing Information Sources:

Gateway Distance Last Update

192.168.0.33 90 00:22:13

192.168.0.38 90 00:22:13

192.168.0.29 90 00:22:13

Distance: internal 90 external 170

**R5#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 [90/12]

via FE80::521C:B0FF:FE42:AF81, GigabitEthernet0/0/1

via FE80::521C:B0FF:FE42:AF90, GigabitEthernet0/2/0

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

via GigabitEthernet0/0/1, directly connected

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

via GigabitEthernet0/0/1, receive

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

via GigabitEthernet0/2/0, directly connected

L 2001:DB8:ACAD:3::2/128 [0/0]

via GigabitEthernet0/2/0, receive

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

via GigabitEthernet0/0/0, directly connected

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

via GigabitEthernet0/0/0, receive

D 2001:DB8:ACAD:5::/64 [90/12]

via FE80::227:90FF:FEC7:8DB0, GigabitEthernet0/0/0

D 2001:DB8:ACAD:6::/64 [90/13]

via FE80::227:90FF:FEC7:8DB0, GigabitEthernet0/0/0

D 2001:DB8:ACAD:A::/64 [90/512]

via FE80::521C:B0FF:FE42:AF81, GigabitEthernet0/0/1

via FE80::521C:B0FF:FE42:AF90, GigabitEthernet0/2/0

D 2001:DB8:ACAD:B::/64 [90/511]

via FE80::521C:B0FF:FE42:AF81, GigabitEthernet0/0/1

via FE80::521C:B0FF:FE42:AF90, GigabitEthernet0/2/0

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 [90/511]

via FE80::227:90FF:FEC7:8DB0, GigabitEthernet0/0/0

D 2001:DB8:ACAD:E::/64 [90/512]

via FE80::227:90FF:FEC7:8DB0, GigabitEthernet0/0/0

D 2001:DB8:ACAD:F::/64 [90/513]

via FE80::227:90FF:FEC7:8DB0, GigabitEthernet0/0/0

L FF00::/8 [0/0]

via Null0, receive

**R5#show ipv6 eigrp topology**

EIGRP-IPv6 Topology Table for AS(1)/ID(192.168.0.9)

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 512

via FE80::521C:B0FF:FE42:AF81 (512/511), GigabitEthernet0/0/1

via FE80::521C:B0FF:FE42:AF90 (522/511), GigabitEthernet0/2/0

P 2001:DB8:ACAD:1::/64, 2 successors, FD is 12

via FE80::521C:B0FF:FE42:AF81 (12/11), GigabitEthernet0/0/1

via FE80::521C:B0FF:FE42:AF90 (22/11), GigabitEthernet0/2/0

P 2001:DB8:ACAD:6::/64, 1 successors, FD is 13

via FE80::227:90FF:FEC7:8DB0 (13/12), GigabitEthernet0/0/0

P 2001:DB8:ACAD:C::/64, 1 successors, FD is 501

via Connected, Loopback0

P 2001:DB8:ACAD:5::/64, 1 successors, FD is 12

via FE80::227:90FF:FEC7:8DB0 (12/11), GigabitEthernet0/0/0

P 2001:DB8:ACAD:F::/64, 1 successors, FD is 513

via FE80::227:90FF:FEC7:8DB0 (513/512), GigabitEthernet0/0/0

P 2001:DB8:ACAD:B::/64, 2 successors, FD is 511

via FE80::521C:B0FF:FE42:AF81 (511/501), GigabitEthernet0/0/1

via FE80::521C:B0FF:FE42:AF90 (521/501), GigabitEthernet0/2/0

P 2001:DB8:ACAD:2::/64, 1 successors, FD is 11

via Connected, GigabitEthernet0/0/1

P 2001:DB8:ACAD:D::/64, 1 successors, FD is 511

via FE80::227:90FF:FEC7:8DB0 (511/501), GigabitEthernet0/0/0

P 2001:DB8:ACAD:4::/64, 1 successors, FD is 11

via Connected, GigabitEthernet0/0/0

P 2001:DB8:ACAD:3::/64, 1 successors, FD is 21

via Connected, GigabitEthernet0/2/0

P 2001:DB8:ACAD:E::/64, 1 successors, FD is 512

via FE80::227:90FF:FEC7:8DB0 (512/511), GigabitEthernet0/0/0

**R5#show ipv6 protocols**

IPv6 Routing Protocol is "connected"

IPv6 Routing Protocol is "application"

IPv6 Routing Protocol is "ND"

IPv6 Routing Protocol is "eigrp 1"

EIGRP-IPv6 Protocol for AS(1)

Metric weight K1=1, K2=1, K3=1, K4=1, K5=1

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: 192.168.0.9

Topology : 0 (base)

Active Timer: 3 min

Distance: internal 90 external 170

Maximum path: 16

Maximum hopcount 100

Maximum metric variance 3

Interfaces:

Loopback0

GigabitEthernet0/0/1

GigabitEthernet0/0/0

GigabitEthernet0/2/0

Redistribution:

None

**Router 6**

**R6#show running-config**

Current configuration : 1739 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

ipv6 unicast-routing

subscriber templating

multilink bundle-name authenticated

license udi pid ISR4321/K9 sn FDO214333H6

spanning-tree extend system-id

redundancy

mode none

vlan internal allocation policy ascending

interface Loopback0

ip address 192.168.0.13 255.255.255.252

ipv6 address 2001:DB8:ACAD:D::1/64

ipv6 eigrp 1

interface GigabitEthernet0/0/0

ip address 192.168.0.38 255.255.255.252

negotiation auto

ipv6 address 2001:DB8:ACAD:4::2/64

ipv6 eigrp 1

interface GigabitEthernet0/0/1

ip address 192.168.0.41 255.255.255.252

negotiation auto

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

ipv6 eigrp 1

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 1

metric weights 0 1 1 1 1 1

variance 3

network 192.168.0.12 0.0.0.3

network 192.168.0.36 0.0.0.3

network 192.168.0.40 0.0.0.3

ip forward-protocol nd

no ip http server

no ip http secure-server

ip tftp source-interface GigabitEthernet0

ipv6 router eigrp 1

metric weights 0 1 1 1 1 1

variance 3

control-plane

line con 0

stopbits 1

line aux 0

stopbits 1

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

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

192.168.0.0/24 is variably subnetted, 15 subnets, 2 masks

D 192.168.0.0/30

[90/513] via 192.168.0.37, 00:19:25, GigabitEthernet0/0/0

D 192.168.0.4/30

[90/512] via 192.168.0.37, 00:19:25, GigabitEthernet0/0/0

D 192.168.0.8/30

[90/511] via 192.168.0.37, 00:19:25, GigabitEthernet0/0/0

C 192.168.0.12/30 is directly connected, Loopback0

L 192.168.0.13/32 is directly connected, Loopback0

D 192.168.0.16/30

[90/511] via 192.168.0.42, 00:19:25, GigabitEthernet0/0/1

D 192.168.0.20/30

[90/512] via 192.168.0.42, 00:19:25, GigabitEthernet0/0/1

D 192.168.0.24/30

[90/13] via 192.168.0.37, 00:19:25, GigabitEthernet0/0/0

D 192.168.0.28/30

[90/12] via 192.168.0.37, 00:19:25, GigabitEthernet0/0/0

D 192.168.0.32/30

[90/22] via 192.168.0.37, 00:19:25, GigabitEthernet0/0/0

C 192.168.0.36/30 is directly connected, GigabitEthernet0/0/0

L 192.168.0.38/32 is directly connected, GigabitEthernet0/0/0

C 192.168.0.40/30 is directly connected, GigabitEthernet0/0/1

L 192.168.0.41/32 is directly connected, GigabitEthernet0/0/1

D 192.168.0.44/30

[90/12] via 192.168.0.42, 00:19:25, GigabitEthernet0/0/1

**R6#show ip eigrp topology**

EIGRP-IPv4 Topology Table for AS(1)/ID(192.168.0.13)

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

r - reply Status, s - sia Status

P 192.168.0.8/30, 1 successors, FD is 511

via 192.168.0.37 (511/501), GigabitEthernet0/0/0

P 192.168.0.28/30, 1 successors, FD is 12

via 192.168.0.37 (12/11), GigabitEthernet0/0/0

P 192.168.0.4/30, 1 successors, FD is 512

via 192.168.0.37 (512/511), GigabitEthernet0/0/0

P 192.168.0.16/30, 1 successors, FD is 511

via 192.168.0.42 (511/501), GigabitEthernet0/0/1

P 192.168.0.44/30, 1 successors, FD is 12

via 192.168.0.42 (12/11), GigabitEthernet0/0/1

P 192.168.0.40/30, 1 successors, FD is 11

via Connected, GigabitEthernet0/0/1

P 192.168.0.0/30, 1 successors, FD is 513

via 192.168.0.37 (513/512), GigabitEthernet0/0/0

P 192.168.0.32/30, 1 successors, FD is 22

via 192.168.0.37 (22/21), GigabitEthernet0/0/0

P 192.168.0.24/30, 1 successors, FD is 13

via 192.168.0.37 (13/12), GigabitEthernet0/0/0

P 192.168.0.20/30, 1 successors, FD is 512

via 192.168.0.42 (512/511), GigabitEthernet0/0/1

P 192.168.0.36/30, 1 successors, FD is 11

via Connected, GigabitEthernet0/0/0

P 192.168.0.12/30, 1 successors, FD is 501

via Connected, Loopback0

**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 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=1

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: 192.168.0.13

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:

192.168.0.12/30

192.168.0.36/30

192.168.0.40/30

Routing Information Sources:

Gateway Distance Last Update

192.168.0.42 90 00:19:50

192.168.0.37 90 00:19:50

Distance: internal 90 external 170

**R6#show ipv6 route**

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

D 2001:DB8:ACAD:1::/64 [90/13]

via FE80::521C:B0FF:FE2C:4C80, GigabitEthernet0/0/0

D 2001:DB8:ACAD:2::/64 [90/12]

via FE80::521C:B0FF:FE2C:4C80, GigabitEthernet0/0/0

D 2001:DB8:ACAD:3::/64 [90/22]

via FE80::521C:B0FF:FE2C:4C80, GigabitEthernet0/0/0

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

via GigabitEthernet0/0/0, directly connected

L 2001:DB8:ACAD:4::2/128 [0/0]

via GigabitEthernet0/0/0, 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 [90/12]

via FE80::B6A8:B9FF:FE01:AE51, GigabitEthernet0/0/1

D 2001:DB8:ACAD:A::/64 [90/513]

via FE80::521C:B0FF:FE2C:4C80, GigabitEthernet0/0/0

D 2001:DB8:ACAD:B::/64 [90/512]

via FE80::521C:B0FF:FE2C:4C80, GigabitEthernet0/0/0

D 2001:DB8:ACAD:C::/64 [90/511]

via FE80::521C:B0FF:FE2C:4C80, GigabitEthernet0/0/0

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 [90/511]

via FE80::B6A8:B9FF:FE01:AE51, GigabitEthernet0/0/1

D 2001:DB8:ACAD:F::/64 [90/512]

via FE80::B6A8:B9FF:FE01:AE51, GigabitEthernet0/0/1

L FF00::/8 [0/0]

via Null0, receive

**R6#show ipv6 eigrp topology**

EIGRP-IPv6 Topology Table for AS(1)/ID(192.168.0.13)

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 513

via FE80::521C:B0FF:FE2C:4C80 (513/512), GigabitEthernet0/0/0

P 2001:DB8:ACAD:1::/64, 1 successors, FD is 13

via FE80::521C:B0FF:FE2C:4C80 (13/12), GigabitEthernet0/0/0

P 2001:DB8:ACAD:6::/64, 1 successors, FD is 12

via FE80::B6A8:B9FF:FE01:AE51 (12/11), GigabitEthernet0/0/1

P 2001:DB8:ACAD:C::/64, 1 successors, FD is 511

via FE80::521C:B0FF:FE2C:4C80 (511/501), GigabitEthernet0/0/0

P 2001:DB8:ACAD:5::/64, 1 successors, FD is 11

via Connected, GigabitEthernet0/0/1

P 2001:DB8:ACAD:F::/64, 1 successors, FD is 512

via FE80::B6A8:B9FF:FE01:AE51 (512/511), GigabitEthernet0/0/1

P 2001:DB8:ACAD:B::/64, 1 successors, FD is 512

via FE80::521C:B0FF:FE2C:4C80 (512/511), GigabitEthernet0/0/0

P 2001:DB8:ACAD:2::/64, 1 successors, FD is 12

via FE80::521C:B0FF:FE2C:4C80 (12/11), GigabitEthernet0/0/0

P 2001:DB8:ACAD:D::/64, 1 successors, FD is 501

via Connected, Loopback0

P 2001:DB8:ACAD:4::/64, 1 successors, FD is 11

via Connected, GigabitEthernet0/0/0

P 2001:DB8:ACAD:3::/64, 1 successors, FD is 22

via FE80::521C:B0FF:FE2C:4C80 (22/21), GigabitEthernet0/0/0

P 2001:DB8:ACAD:E::/64, 1 successors, FD is 511

via FE80::B6A8:B9FF:FE01:AE51 (511/501), GigabitEthernet0/0/1

**R6#show ipv6 protocols**

IPv6 Routing Protocol is "connected"

IPv6 Routing Protocol is "application"

IPv6 Routing Protocol is "ND"

IPv6 Routing Protocol is "eigrp 1"

EIGRP-IPv6 Protocol for AS(1)

Metric weight K1=1, K2=1, K3=1, K4=1, K5=1

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: 192.168.0.13

Topology : 0 (base)

Active Timer: 3 min

Distance: internal 90 external 170

Maximum path: 16

Maximum hopcount 100

Maximum metric variance 3

Interfaces:

Loopback0

GigabitEthernet0/0/1

GigabitEthernet0/0/0

Redistribution:

None

**Router 7**

**R7#show running-config**

Current configuration : 1657 bytes

version 15.5

service timestamps debug datetime msec

service timestamps log datetime msec

no platform punt-keepalive disable-kernel-core

hostname R7

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

ipv6 unicast-routing

subscriber templating

multilink bundle-name authenticated

license udi pid ISR4321/K9 sn FDO214420HY

spanning-tree extend system-id

redundancy

mode none

vlan internal allocation policy ascending

interface Loopback0

ip address 192.168.0.17 255.255.255.252

ipv6 address 2001:DB8:ACAD:E::1/64

ipv6 eigrp 1

interface GigabitEthernet0/0/0

ip address 192.168.0.45 255.255.255.252

negotiation auto

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

ipv6 eigrp 1

interface GigabitEthernet0/0/1

ip address 192.168.0.42 255.255.255.252

negotiation auto

ipv6 address 2001:DB8:ACAD:5::2/64

ipv6 eigrp 1

interface Serial0/1/0

no ip address

interface Serial0/1/1

no ip address

interface GigabitEthernet0

vrf forwarding Mgmt-intf

no ip address

negotiation auto

interface Vlan1

no ip address

router eigrp 1

metric weights 0 1 1 1 1 1

variance 3

network 192.168.0.16 0.0.0.3

network 192.168.0.40 0.0.0.3

network 192.168.0.44 0.0.0.3

ip forward-protocol nd

no ip http server

no ip http secure-server

ipv6 router eigrp 1

metric weights 0 1 1 1 1 1

variance 3

control-plane

line con 0

stopbits 1

line aux 0

stopbits 1

line vty 0 4

login

end

**R7#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

192.168.0.0/24 is variably subnetted, 15 subnets, 2 masks

D 192.168.0.0/30

[90/514] via 192.168.0.41, 00:15:15, GigabitEthernet0/0/1

D 192.168.0.4/30

[90/513] via 192.168.0.41, 00:15:15, GigabitEthernet0/0/1

D 192.168.0.8/30

[90/512] via 192.168.0.41, 00:15:15, GigabitEthernet0/0/1

D 192.168.0.12/30

[90/511] via 192.168.0.41, 00:15:15, GigabitEthernet0/0/1

C 192.168.0.16/30 is directly connected, Loopback0

L 192.168.0.17/32 is directly connected, Loopback0

D 192.168.0.20/30

[90/511] via 192.168.0.46, 00:15:15, GigabitEthernet0/0/0

D 192.168.0.24/30

[90/14] via 192.168.0.41, 00:15:15, GigabitEthernet0/0/1

D 192.168.0.28/30

[90/13] via 192.168.0.41, 00:15:15, GigabitEthernet0/0/1

D 192.168.0.32/30

[90/23] via 192.168.0.41, 00:15:15, GigabitEthernet0/0/1

D 192.168.0.36/30

[90/12] via 192.168.0.41, 00:15:15, GigabitEthernet0/0/1

C 192.168.0.40/30 is directly connected, GigabitEthernet0/0/1

L 192.168.0.42/32 is directly connected, GigabitEthernet0/0/1

C 192.168.0.44/30 is directly connected, GigabitEthernet0/0/0

L 192.168.0.45/32 is directly connected, GigabitEthernet0/0/0

**R7#show ip eigrp topology**

EIGRP-IPv4 Topology Table for AS(1)/ID(192.168.0.17)

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

r - reply Status, s - sia Status

P 192.168.0.8/30, 1 successors, FD is 512

via 192.168.0.41 (512/511), GigabitEthernet0/0/1

P 192.168.0.28/30, 1 successors, FD is 13

via 192.168.0.41 (13/12), GigabitEthernet0/0/1

P 192.168.0.4/30, 1 successors, FD is 513

via 192.168.0.41 (513/512), GigabitEthernet0/0/1

P 192.168.0.16/30, 1 successors, FD is 501

via Connected, Loopback0

P 192.168.0.44/30, 1 successors, FD is 11

via Connected, GigabitEthernet0/0/0

P 192.168.0.40/30, 1 successors, FD is 11

via Connected, GigabitEthernet0/0/1

P 192.168.0.0/30, 1 successors, FD is 514

via 192.168.0.41 (514/513), GigabitEthernet0/0/1

P 192.168.0.32/30, 1 successors, FD is 23

via 192.168.0.41 (23/22), GigabitEthernet0/0/1

P 192.168.0.24/30, 1 successors, FD is 14

via 192.168.0.41 (14/13), GigabitEthernet0/0/1

P 192.168.0.20/30, 1 successors, FD is 511

via 192.168.0.46 (511/501), GigabitEthernet0/0/0

P 192.168.0.36/30, 1 successors, FD is 12

via 192.168.0.41 (12/11), GigabitEthernet0/0/1

P 192.168.0.12/30, 1 successors, FD is 511

via 192.168.0.41 (511/501), GigabitEthernet0/0/1

**R7#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=1

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: 192.168.0.17

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:

192.168.0.16/30

192.168.0.40/30

192.168.0.44/30

Routing Information Sources:

Gateway Distance Last Update

192.168.0.41 90 00:15:26

192.168.0.46 90 00:15:26

Distance: internal 90 external 170

**R7#show ipv6 route**

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

D 2001:DB8:ACAD:1::/64 [90/14]

via FE80::227:90FF:FEC7:8DB1, GigabitEthernet0/0/1

D 2001:DB8:ACAD:2::/64 [90/13]

via FE80::227:90FF:FEC7:8DB1, GigabitEthernet0/0/1

D 2001:DB8:ACAD:3::/64 [90/23]

via FE80::227:90FF:FEC7:8DB1, GigabitEthernet0/0/1

D 2001:DB8:ACAD:4::/64 [90/12]

via FE80::227:90FF:FEC7:8DB1, GigabitEthernet0/0/1

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

via GigabitEthernet0/0/1, directly connected

L 2001:DB8:ACAD:5::2/128 [0/0]

via GigabitEthernet0/0/1, receive

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

via GigabitEthernet0/0/0, directly connected

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

via GigabitEthernet0/0/0, receive

D 2001:DB8:ACAD:A::/64 [90/514]

via FE80::227:90FF:FEC7:8DB1, GigabitEthernet0/0/1

D 2001:DB8:ACAD:B::/64 [90/513]

via FE80::227:90FF:FEC7:8DB1, GigabitEthernet0/0/1

D 2001:DB8:ACAD:C::/64 [90/512]

via FE80::227:90FF:FEC7:8DB1, GigabitEthernet0/0/1

D 2001:DB8:ACAD:D::/64 [90/511]

via FE80::227:90FF:FEC7:8DB1, GigabitEthernet0/0/1

C 2001:DB8:ACAD:E::/64 [0/0]

via Loopback0, directly connected

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

via Loopback0, receive

D 2001:DB8:ACAD:F::/64 [90/511]

via FE80::B6A8:B9FF:FE47:92C0, GigabitEthernet0/0/0

L FF00::/8 [0/0]

via Null0, receive

**R7#show ipv6 eigrp topology**

EIGRP-IPv6 Topology Table for AS(1)/ID(192.168.0.17)

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 514

via FE80::227:90FF:FEC7:8DB1 (514/513), GigabitEthernet0/0/1

P 2001:DB8:ACAD:1::/64, 1 successors, FD is 14

via FE80::227:90FF:FEC7:8DB1 (14/13), GigabitEthernet0/0/1

P 2001:DB8:ACAD:6::/64, 1 successors, FD is 11

via Connected, GigabitEthernet0/0/0

P 2001:DB8:ACAD:C::/64, 1 successors, FD is 512

via FE80::227:90FF:FEC7:8DB1 (512/511), GigabitEthernet0/0/1

P 2001:DB8:ACAD:5::/64, 1 successors, FD is 11

via Connected, GigabitEthernet0/0/1

P 2001:DB8:ACAD:F::/64, 1 successors, FD is 511

via FE80::B6A8:B9FF:FE47:92C0 (511/501), GigabitEthernet0/0/0

P 2001:DB8:ACAD:B::/64, 1 successors, FD is 513

via FE80::227:90FF:FEC7:8DB1 (513/512), GigabitEthernet0/0/1

P 2001:DB8:ACAD:2::/64, 1 successors, FD is 13

via FE80::227:90FF:FEC7:8DB1 (13/12), GigabitEthernet0/0/1

P 2001:DB8:ACAD:D::/64, 1 successors, FD is 511

via FE80::227:90FF:FEC7:8DB1 (511/501), GigabitEthernet0/0/1

P 2001:DB8:ACAD:4::/64, 1 successors, FD is 12

via FE80::227:90FF:FEC7:8DB1 (12/11), GigabitEthernet0/0/1

P 2001:DB8:ACAD:3::/64, 1 successors, FD is 23

via FE80::227:90FF:FEC7:8DB1 (23/22), GigabitEthernet0/0/1

P 2001:DB8:ACAD:E::/64, 1 successors, FD is 501

via Connected, Loopback0

**R7#show ipv6 protocols**

IPv6 Routing Protocol is "connected"

IPv6 Routing Protocol is "application"

IPv6 Routing Protocol is "ND"

IPv6 Routing Protocol is "eigrp 1"

EIGRP-IPv6 Protocol for AS(1)

Metric weight K1=1, K2=1, K3=1, K4=1, K5=1

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: 192.168.0.17

Topology : 0 (base)

Active Timer: 3 min

Distance: internal 90 external 170

Maximum path: 16

Maximum hopcount 100

Maximum metric variance 3

Interfaces:

Loopback0

GigabitEthernet0/0/0

GigabitEthernet0/0/1

Redistribution:

None

**Router 8**

**R8#show running-config**

Current configuration : 1643 bytes

version 15.5

service timestamps debug datetime msec

service timestamps log datetime msec

no platform punt-keepalive disable-kernel-core

hostname R8

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

ipv6 unicast-routing

subscriber templating

multilink bundle-name authenticated

license udi pid ISR4321/K9 sn FDO214420QQ

spanning-tree extend system-id

redundancy

mode none

vlan internal allocation policy ascending

interface Loopback0

ip address 192.168.0.21 255.255.255.252

ipv6 address 2001:DB8:ACAD:F::1/64

ipv6 eigrp 1

interface GigabitEthernet0/0/0

ip address 192.168.0.46 255.255.255.252

negotiation auto

ipv6 address 2001:DB8:ACAD:6::2/64

ipv6 eigrp 1

interface GigabitEthernet0/0/1

no ip address

shutdown

negotiation auto

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 1

metric weights 0 1 1 1 1 1

variance 3

network 192.168.0.20 0.0.0.3

network 192.168.0.44 0.0.0.3

ip forward-protocol nd

no ip http server

no ip http secure-server

ip tftp source-interface GigabitEthernet0

ipv6 router eigrp 1

metric weights 0 1 1 1 1 1

variance 3

control-plane

line con 0

stopbits 1

line aux 0

stopbits 1

line vty 0 4

login

end

**R8#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

192.168.0.0/24 is variably subnetted, 14 subnets, 2 masks

D 192.168.0.0/30

[90/515] via 192.168.0.45, 00:18:42, GigabitEthernet0/0/0

D 192.168.0.4/30

[90/514] via 192.168.0.45, 00:18:42, GigabitEthernet0/0/0

D 192.168.0.8/30

[90/513] via 192.168.0.45, 00:18:42, GigabitEthernet0/0/0

D 192.168.0.12/30

[90/512] via 192.168.0.45, 00:18:42, GigabitEthernet0/0/0

D 192.168.0.16/30

[90/511] via 192.168.0.45, 00:18:42, GigabitEthernet0/0/0

C 192.168.0.20/30 is directly connected, Loopback0

L 192.168.0.21/32 is directly connected, Loopback0

D 192.168.0.24/30

[90/15] via 192.168.0.45, 00:18:42, GigabitEthernet0/0/0

D 192.168.0.28/30

[90/14] via 192.168.0.45, 00:18:42, GigabitEthernet0/0/0

D 192.168.0.32/30

[90/24] via 192.168.0.45, 00:18:42, GigabitEthernet0/0/0

D 192.168.0.36/30

[90/13] via 192.168.0.45, 00:18:42, GigabitEthernet0/0/0

D 192.168.0.40/30

[90/12] via 192.168.0.45, 00:18:42, GigabitEthernet0/0/0

C 192.168.0.44/30 is directly connected, GigabitEthernet0/0/0

L 192.168.0.46/32 is directly connected, GigabitEthernet0/0/0

**R8#show ip eigrp topology**

EIGRP-IPv4 Topology Table for AS(1)/ID(192.168.0.21)

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

r - reply Status, s - sia Status

P 192.168.0.8/30, 1 successors, FD is 513

via 192.168.0.45 (513/512), GigabitEthernet0/0/0

P 192.168.0.28/30, 1 successors, FD is 14

via 192.168.0.45 (14/13), GigabitEthernet0/0/0

P 192.168.0.4/30, 1 successors, FD is 514

via 192.168.0.45 (514/513), GigabitEthernet0/0/0

P 192.168.0.16/30, 1 successors, FD is 511

via 192.168.0.45 (511/501), GigabitEthernet0/0/0

P 192.168.0.44/30, 1 successors, FD is 11

via Connected, GigabitEthernet0/0/0

P 192.168.0.40/30, 1 successors, FD is 12

via 192.168.0.45 (12/11), GigabitEthernet0/0/0

P 192.168.0.0/30, 1 successors, FD is 515

via 192.168.0.45 (515/514), GigabitEthernet0/0/0

P 192.168.0.32/30, 1 successors, FD is 24

via 192.168.0.45 (24/23), GigabitEthernet0/0/0

P 192.168.0.24/30, 1 successors, FD is 15

via 192.168.0.45 (15/14), GigabitEthernet0/0/0

P 192.168.0.20/30, 1 successors, FD is 501

via Connected, Loopback0

P 192.168.0.36/30, 1 successors, FD is 13

via 192.168.0.45 (13/12), GigabitEthernet0/0/0

P 192.168.0.12/30, 1 successors, FD is 512

via 192.168.0.45 (512/511), GigabitEthernet0/0/0

**R8#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=1

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: 192.168.0.21

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:

192.168.0.20/30

192.168.0.44/30

Routing Information Sources:

Gateway Distance Last Update

192.168.0.45 90 00:19:34

Distance: internal 90 external 170

**R8#show ipv6 route**

IPv6 Routing Table - default - 15 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 [90/15]

via FE80::B6A8:B9FF:FE01:AE50, GigabitEthernet0/0/0

D 2001:DB8:ACAD:2::/64 [90/14]

via FE80::B6A8:B9FF:FE01:AE50, GigabitEthernet0/0/0

D 2001:DB8:ACAD:3::/64 [90/24]

via FE80::B6A8:B9FF:FE01:AE50, GigabitEthernet0/0/0

D 2001:DB8:ACAD:4::/64 [90/13]

via FE80::B6A8:B9FF:FE01:AE50, GigabitEthernet0/0/0

D 2001:DB8:ACAD:5::/64 [90/12]

via FE80::B6A8:B9FF:FE01:AE50, 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

D 2001:DB8:ACAD:A::/64 [90/515]

via FE80::B6A8:B9FF:FE01:AE50, GigabitEthernet0/0/0

D 2001:DB8:ACAD:B::/64 [90/514]

via FE80::B6A8:B9FF:FE01:AE50, GigabitEthernet0/0/0

D 2001:DB8:ACAD:C::/64 [90/513]

via FE80::B6A8:B9FF:FE01:AE50, GigabitEthernet0/0/0

D 2001:DB8:ACAD:D::/64 [90/512]

via FE80::B6A8:B9FF:FE01:AE50, GigabitEthernet0/0/0

D 2001:DB8:ACAD:E::/64 [90/511]

via FE80::B6A8:B9FF:FE01:AE50, GigabitEthernet0/0/0

C 2001:DB8:ACAD:F::/64 [0/0]

via Loopback0, directly connected

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

via Loopback0, receive

L FF00::/8 [0/0]

via Null0, receive

**R8#show ipv6 eigrp topology**

EIGRP-IPv6 Topology Table for AS(1)/ID(192.168.0.21)

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 515

via FE80::B6A8:B9FF:FE01:AE50 (515/514), GigabitEthernet0/0/0

P 2001:DB8:ACAD:1::/64, 1 successors, FD is 15

via FE80::B6A8:B9FF:FE01:AE50 (15/14), GigabitEthernet0/0/0

P 2001:DB8:ACAD:6::/64, 1 successors, FD is 11

via Connected, GigabitEthernet0/0/0

P 2001:DB8:ACAD:C::/64, 1 successors, FD is 513

via FE80::B6A8:B9FF:FE01:AE50 (513/512), GigabitEthernet0/0/0

P 2001:DB8:ACAD:5::/64, 1 successors, FD is 12

via FE80::B6A8:B9FF:FE01:AE50 (12/11), GigabitEthernet0/0/0

P 2001:DB8:ACAD:F::/64, 1 successors, FD is 501

via Connected, Loopback0

P 2001:DB8:ACAD:B::/64, 1 successors, FD is 514

via FE80::B6A8:B9FF:FE01:AE50 (514/513), GigabitEthernet0/0/0

P 2001:DB8:ACAD:2::/64, 1 successors, FD is 14

via FE80::B6A8:B9FF:FE01:AE50 (14/13), GigabitEthernet0/0/0

P 2001:DB8:ACAD:D::/64, 1 successors, FD is 512

via FE80::B6A8:B9FF:FE01:AE50 (512/511), GigabitEthernet0/0/0

P 2001:DB8:ACAD:4::/64, 1 successors, FD is 13

via FE80::B6A8:B9FF:FE01:AE50 (13/12), GigabitEthernet0/0/0

P 2001:DB8:ACAD:3::/64, 1 successors, FD is 24

via FE80::B6A8:B9FF:FE01:AE50 (24/23), GigabitEthernet0/0/0

P 2001:DB8:ACAD:E::/64, 1 successors, FD is 511

via FE80::B6A8:B9FF:FE01:AE50 (511/501), GigabitEthernet0/0/0

**R8#show ipv6 protocols**

IPv6 Routing Protocol is "connected"

IPv6 Routing Protocol is "application"

IPv6 Routing Protocol is "ND"

IPv6 Routing Protocol is "eigrp 1"

EIGRP-IPv6 Protocol for AS(1)

Metric weight K1=1, K2=1, K3=1, K4=1, K5=1

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: 192.168.0.21

Topology : 0 (base)

Active Timer: 3 min

Distance: internal 90 external 170

Maximum path: 16

Maximum hopcount 100

Maximum metric variance 3

Interfaces:

Loopback0

GigabitEthernet0/0/0

Redistribution:

None

**Connectivity Tests**

**IPv4**

R7#ping 192.168.0.45

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 192.168.0.45, timeout is 2 seconds:

!!!!!

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

R7#ping 192.168.0.46

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 192.168.0.46, timeout is 2 seconds:

!!!!!

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

R7#ping 192.168.0.41

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 192.168.0.41, timeout is 2 seconds:

!!!!!

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

R7#ping 192.168.0.42

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 192.168.0.42, timeout is 2 seconds:

!!!!!

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

R7#ping 192.168.0.37

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 192.168.0.37, timeout is 2 seconds:

!!!!!

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

R7#ping 192.168.0.38

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 192.168.0.38, timeout is 2 seconds:

!!!!!

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

R7#ping 192.168.0.33

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 192.168.0.33, timeout is 2 seconds:

!!!!!

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

R7#ping 192.168.0.34

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 192.168.0.34, timeout is 2 seconds:

!!!!!

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

R7#ping 192.168.0.29

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 192.168.0.29, timeout is 2 seconds:

!!!!!

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

R7#ping 192.168.0.30

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 192.168.0.30, timeout is 2 seconds:

!!!!!

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

R7#ping 192.168.0.25

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 192.168.0.25, timeout is 2 seconds:

!!!!!

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

R7#ping 192.168.0.26

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 192.168.0.26, timeout is 2 seconds:

!!!!!

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

R7#ping 192.168.0.1

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 192.168.0.1, timeout is 2 seconds:

!!!!!

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

R7#ping 192.168.0.5

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 192.168.0.5, timeout is 2 seconds:

!!!!!

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

R7#ping 192.168.0.9

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 192.168.0.9, timeout is 2 seconds:

!!!!!

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

R7#ping 192.168.0.13

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 192.168.0.13, timeout is 2 seconds:

!!!!!

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

R7#ping 192.168.0.17

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 192.168.0.17, timeout is 2 seconds:

!!!!!

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

R7#ping 192.168.0.21

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 192.168.0.21, timeout is 2 seconds:

!!!!!

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

**IPv6**

R3#ping 2001:db8:acad:1::1

Type escape sequence to abort.

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

!!!!!

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

R3#ping 2001:db8:acad:1::2

Type escape sequence to abort.

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

!!!!!

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

R3#ping 2001:db8:acad:2::2

Type escape sequence to abort.

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

!!!!!

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

R3#ping 2001:db8:acad:2::1

Type escape sequence to abort.

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

!!!!!

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

R3#ping 2001:db8:acad:3::1

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 2001:DB8:ACAD:3::1, timeout is 2 seconds:

!!!!!

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

R3#ping 2001:db8:acad:3::2

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 2001:DB8:ACAD:3::2, timeout is 2 seconds:

!!!!!

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

R3#ping 2001:db8:acad:4::2

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 2001:DB8:ACAD:4::2, timeout is 2 seconds:

!!!!!

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

R3#ping 2001:db8:acad:4::1

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 2001:DB8:ACAD:4::1, timeout is 2 seconds:

!!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/2 ms

R3#ping 2001:db8:acad:5::1

Type escape sequence to abort.

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

!!!!!

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

R3#ping 2001:db8:acad:5::2

Type escape sequence to abort.

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

!!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/7 ms

R3#ping 2001:db8:acad:6::2

Type escape sequence to abort.

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

!!!!!

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

R3#ping 2001:db8:acad:6::1

Type escape sequence to abort.

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

!!!!!

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

R3#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 = 1/1/1 ms

R3#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 = 1/1/1 ms

R3#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 = 1/1/1 ms

R3#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 = 1/1/1 ms

R3#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 = 1/1/2 ms

R3#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 = 1/1/1 ms

**Problems**

There were two problems when configuring the routers for the first time. First, a local connection between router 3 and router 4 failed to work. Using **show ip interface brief** command, we verified that the IPv4 and IPv6 addressing were correct, being in the same sub-network with valid IP addresses. The command also showed that we had entered the **no shutdown** interface configuration command because the line protocol was Up/Up. Then, **show interface <interface>** was used to verify both were running full-duplex at 1 Gb/s bandwidth. The first attempt was that the wires between the two routers were not correctly plugged in so the wire was unplugged and plugged back into the ports. The same error occurred. After switching to a different cross-over cable, the pings started working. The cross-over cable in question was reported and subject to further cable testing.

The second problem when configuring the routers was that router 3’s **show ip route** did not show any of the ipv6 EIGRP routes. Every other router had full connectivity with the rest of the network except for Router 3. After checking with **show ipv6 protocols** that all EIGRP configured networks were correct, IPv6 addressing was verified. After a quick check with **show running-config**, it was found that the **ipv6 unicast-routing** had not been configured on that router. A quick reconfiguration of this command restored connectivity and filled the routing table with EIGRP routes.

The last problem was one another group had with a single EIGRP route not appearing on a single router. Every router could ping the destination network except a single router. That router was verified to have been configured with all of the correct EIGRP routes, IP addressing. All the IPv6 EIGRP routes worked. However, the EIGRP route to that destination network between two routers just didn’t exist in that faulty router’s routing table. That single faulty router could ping every other destination network, even the respective loopback addresses of the two routers directly connected to the destination network. But it couldn’t reach that single network. When running a traceroute, it was found that the two directly connected routers could reach the faulty router, but the faulty router was unable to return a reply. The temporary solution was installing a static route into the faulty router to the destination network and its connectivity to that destination network was restored. However, the root cause of a single missing EIGRP route on a single router when every other router in the EIGRP network had connectivity is unsolved.

**Conclusion**

This lab demonstrates the usage of simple EIGRP configurations to create full connectivity between a routed network. With just a set of commands on each router, they are able to establish routes for all destination networks without the need of manually configuring each route. EIGRP makes it easier to configure, troubleshoot, and customize network design. This lab shows the unique flavor of unequal cost load balancing EIGRP brings and the usage of load, reliability, bandwidth, and delay to calculate the best paths. EIGRP’s shortcoming is that it is Cisco proprietary, making it more difficult to scale into larger networks with multi-vendor equipment. However, its simplicity and robustness make it a solid choice for small to medium networks.