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|  | | EIGRP | | | | |  | |
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|  | | | |  |  | | | |
|  | | | | Weizhen Chen |  | | | |
|  | | | | —CCNP—Jeffery Mason &Michael Hansen |  | | | |
|  | | |  | | |  | | |

Purpose

The objective of the lab was to use 6 routers to configure an EIGRP (Enhanced Interior Gateway Routing Protocol) system with three routers connected to another three routers through Fast Ethernet. The routers also require load balancing with changes to metric weights, variance, and bandwidth

Background information

EIGRP is a Cisco interior gateway protocol that is designed to be used within a single autonomous system. It is also an advanced distance vector that uses distance vector and link state features. The goal of EIGRP is to learn the best route to any given subnet in the network. It does by sending updates from one router to the next and each router can only discover their neighbors. If a router wants to know a subnet it could only exchange information of the metrics from their neighbors that have a route to that subnet, then the router would determine which route is the best and would pass this information to their neighbors and that neighbor would also pass this information to their neighbors to create the best path towards that subnet.

Lab summary

Before I started to configure the lab equipment, I first opened a notepad to create a topology with the EIGRP configuration for the routers. I created one subnet mask with the correct IP address of the six routers for the router interfaces and networks. Next, I connected the 6 routers with a copper cross-over cable through the gigabit ethernet, I also connected routers 3 and 4 with the fast ethernet cable and connected the routers to the computer with the console cable. In the configuration, I would first enter user exec mode through the enable command and then enter global configuration mode through the config terminal command. In the global configuration mode, we would give the correct IP address according to the topology for the gigabit ethernet interfaces that I created, in the interface who then need to use ip authentication key-chain eigrp, ip authentication mode eigrp, ip authentication mode eigrp, and ip hello-interval eigrp commands to configure EIGRP, finally set the bandwidth of the interface with the bandwidth command. After that, I would then apply a separate set of Ip addresses for the loopback on each of the 6 routers. Finally, we would then enter EIGRP router config mode with the router EIGRP command with the autonomous system number of 1. In EIGRP router configuration mode we would use the network command with the Ip address of all the interfaces and loopback along with the wildcard mask to associate the network with the EIGRP routing process, next I would need to set up the metric weight and variance multiplier value.

To show that EIGRP was working we used the show run command to show the configuration we did, used the show Ip eigrp neighbor command to show the router discovered by EIGRP, show Ip eigrp protocols to show general information about EIGRP protocol, show Ip eigrp interface to display interface information, show Ip eigrp topology to display EIGRP topology table entries and finally an show ip route command to show the routing table.

Lab commands

**router eigrp [*autonomous-system-number*]**: Configures an EIGRP routing process and enters router configuration mode.

**network [ip address] [*wildcard mask*]**: Associates a network with an EIGRP routing process.

**ip** **authentication** **key-chain** **eigrp [*autonomous-system*] [*key-chain*]**: Enables authentication of EIGRP packets.

**ip** **authentication** **mode** **eigrp [*autonomous system*] md5***:* Enables MD5 authentication in EIGRP packets.

**ip bandwidth-percent eigrp [*as-number*] [*percent-value*]**: Sets the bandwidth percentage that EIGRP is allowed to use.

**ip** **hello-interval** **eigrp [*as-number*] [*seconds*]**: To configure the hello interval for an EIGRP process.

**metric** **weights** **[*k1*] [*k2*] [*k3*] [*k4*] [*k5*] [*k6*]**: To tune the EIGRP metric calculations.

**variance [*multipler-value*]**: To specify a multiplier-value for use in load balancing with IGRP and EIGRP.

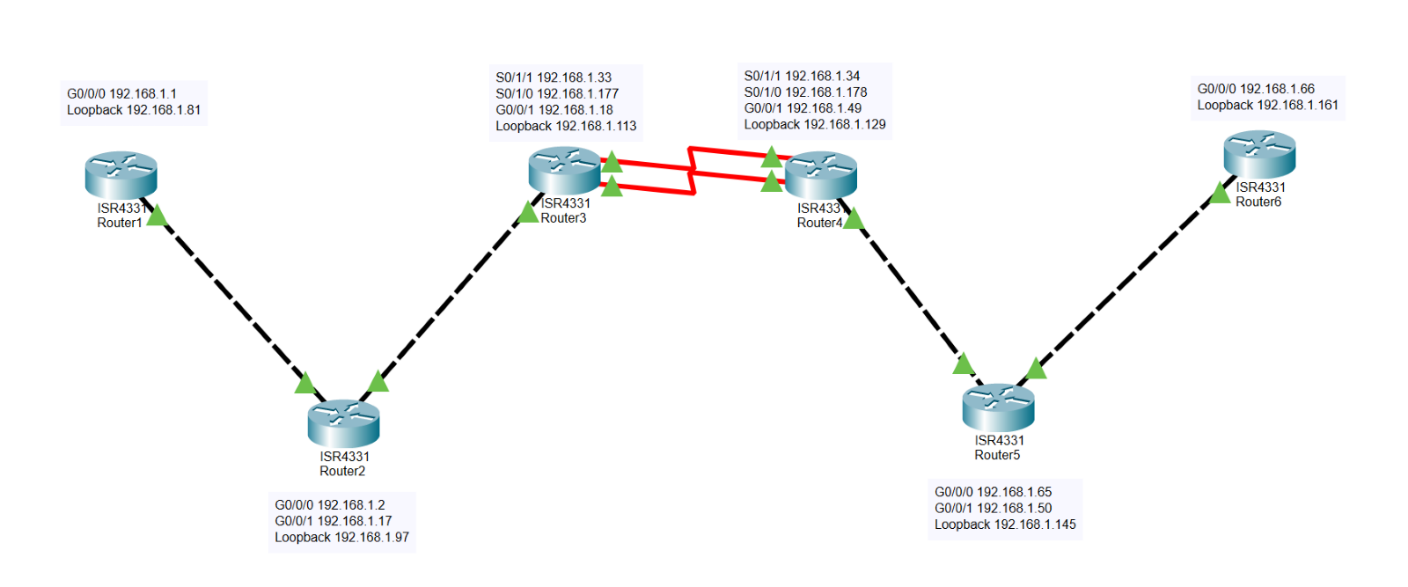
**show** **eigrp** **protocols** **[*vrf vrf-name*]**: To display general information about EIGRP protocols that are currently running.

**show ip eigrp topology** **[*vrf vrf-name*]**: To display EIGRP topology table entries.

**show ip eigrp neighbor [*vrf vrf-name*]**: To display neighbors discovered by the EIGRP.

**show ip eigrp [*vrf vrf-name*] interface****[*autonomous-system-number*]**: To display information about interfaces that carry VPN routing and forwarding (VRF) information and that are configured for EIGRP.

Network diagram



|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *Router* | *Interface* | *Ipv4* | *Subnet Mask* | *Linked- Device* | *Loopback* |
| *Router 1* | G 0/0/0 | *192.168.1.1* | *255.255.255.240* | G 0/0/0 | *192.168.1.81 0.0.0.15* |
| *Router 2* | G 0/0/0 | *192.168.1.2* | *255.255.255.240* | G 0/0/0 | *192.168.1.97 0.0.0.15* |
| *Router 2* | G 0/0/1 | *192.168.1.17* | *255.255.255.240* | G 0/0/1 | *192.168.1.97 0.0.0.15* |
| *Router 3* | G 0/0/1 | *192.168.1.18* | *255.255.255.240* | G 0/0/0 | *192.168.1.113 0.0.0.15* |
| *Router 3* | S 0/1/1 | 192.168.1.33 | *255.255.255.240* | S 0/1/1 | *192.168.1.113 0.0.0.15* |
| *Router 3* | S 0/1/0 | *192.168.1.177* | *255.255.255.240* | S 0/1/0 | *192.168.1.113 0.0.0.15* |
| *Router 4* | S 0/1/1 | *192.168.1.34* | *255.255.255.240* | S 0/1/1 | *192.168.1.129 0.0.0.15* |
| *Router 4* | S 0/1/0 | *192.168.1.178* | *255.255.255.240* | S 0/1/0 | *192.168.1.129 0.0.0.15* |
| *Router 4* | G 0/0/1 | *192.168.1.49* | *255.255.255.240* | G 0/0/1 | *192.168.1.129 0.0.0.15* |
| *Router 5* | G 0/0/0 | *192.168.1.65* | *255.255.255.240* | G 0/0/0 | *192.168.1.145 0.0.0.15* |
| *Router 5* | G 0/0/1 | *192.168.1.50* | *255.255.255.240* | G 0/0/1 | *192.168.1.145 0.0.0.15* |
| *Router 6* | G 0/0/0 | *192.168.1.66* | *255.255.255.240* | G 0/0/0 | *192.168.1.161 0.0.0.15* |

Configurations

**Router 1:**

R1#show run

Building configuration...

Current configuration : 2017 bytes

! Last configuration change at 17:25:26 UTC Wed Oct 20 2021

version 15.5

service timestamps debug datetime msec

service timestamps log datetime msec

no platform punt-keepalive disable-kernel-core

hostname Router

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

subscriber templating

multilink bundle-name authenticated

license udi pid ISR4321/K9 sn FDO21482HZX

spanning-tree extend system-id

redundancy

mode none

vlan internal allocation policy ascending

interface Loopback0

ip address 192.168.1.81 255.255.255.240

interface GigabitEthernet0/0/0

bandwidth 2000

ip address 192.168.1.1 255.255.255.240

ip authentication mode eigrp 1 md5

ip authentication key-chain eigrp 1 cisco

ip bandwidth-percent eigrp 1 75

ip hello-interval eigrp 1 10

negotiation auto

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 0 200 250 100 100 100

variance 128

network 192.168.1.0 0.0.0.15

network 192.168.1.16 0.0.0.15

network 192.168.1.32 0.0.0.15

network 192.168.1.48 0.0.0.15

network 192.168.1.64 0.0.0.15

network 192.168.1.80 0.0.0.15

network 192.168.1.96 0.0.0.15

network 192.168.1.112 0.0.0.15

network 192.168.1.128 0.0.0.15

network 192.168.1.144 0.0.0.15

network 192.168.1.160 0.0.0.15

network 192.168.1.176 0.0.0.15

offset-list 1 in 10 GigabitEthernet0/0/0

ip forward-protocol nd

no ip http server

no ip http secure-server

ip tftp source-interface GigabitEthernet0

access-list 1 permit any

control-plane

line con 0

stopbits 1

line aux 0

stopbits 1

line vty 0 4

login

end

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 1"

Outgoing update filter list for all interfaces is not set

Incoming update filter list for all interfaces is not set

Incoming routes in GigabitEthernet0/0/0 will have 10 added to metric if on list 1

Default networks flagged in outgoing updates

Default networks accepted from incoming updates

EIGRP-IPv4 Protocol for AS(1)

Metric weight K1=200, K2=250, K3=100, K4=100, K5=100

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: 192.168.1.81

Topology : 0 (base)

Active Timer: 3 min

Distance: internal 90 external 170

Maximum path: 4

Maximum hopcount 100

Maximum metric variance 128

Automatic Summarization: disabled

Maximum path: 4

Routing for Networks:

192.168.1.0/28

192.168.1.16/28

192.168.1.32/28

192.168.1.48/28

192.168.1.64/28

192.168.1.80/28

192.168.1.96/28

192.168.1.112/28

192.168.1.128/28

192.168.1.144/28

192.168.1.160/28

192.168.1.176/28

Routing Information Sources:

Gateway Distance Last Update

Distance: internal 90 external 170

R1#show eigrp protocol

EIGRP-IPv4 Protocol for AS(1)

Metric weight K1=200, K2=250, K3=100, K4=100, K5=100

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: 192.168.1.81

Topology : 0 (base)

Active Timer: 3 min

Distance: internal 90 external 170

Maximum path: 4

Maximum hopcount 100

Maximum metric variance 128

R1#show ip eigrp topology

EIGRP-IPv4 Topology Table for AS(1)/ID(192.168.1.81)

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

r - reply Status, s - sia Status

P 192.168.1.0/28, 1 successors, FD is 72473380

via Connected, GigabitEthernet0/0/0

P 192.168.1.80/28, 1 successors, FD is 3620126

via Connected, Loopback0

R1#show ip eigrp neighbors

EIGRP-IPv4 Neighbors for AS(1)

R1#show ip eigrp interfaces

EIGRP-IPv4 Interfaces for AS(1)

Xmit Queue PeerQ Mean Pacing Time Multicast Pending

Interface Peers Un/Reliable Un/Reliable SRTT Un/Reliable Flow Timer Routes

Gi0/0/0 0 0/0 0/0 0 0/8 0 0

Lo0 0 0/0 0/0 0 0/0 0 0

R1#show ip route

Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP

D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area

N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2

E1 - OSPF external type 1, E2 - OSPF external type 2

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

192.168.1.0/24 is variably subnetted, 4 subnets, 2 masks

C 192.168.1.0/28 is directly connected, GigabitEthernet0/0/0

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

C 192.168.1.80/28 is directly connected, Loopback0

L 192.168.1.81/32 is directly connected, Loopback0

R1#show ip route eigrp

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

**Router 2:**

R2#show run

Building configuration...

Current configuration : 2234 bytes

! Last configuration change at 17:28:40 UTC Wed Oct 20 2021

version 15.5

service timestamps debug datetime msec

service timestamps log datetime msec

no platform punt-keepalive disable-kernel-core

hostname Router

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

subscriber templating

multilink bundle-name authenticated

license udi pid ISR4321/K9 sn FDO21482DWJ

spanning-tree extend system-id

redundancy

mode none

vlan internal allocation policy ascending

interface Loopback0

ip address 192.168.1.97 255.255.255.240

interface GigabitEthernet0/0/0

bandwidth 2000

ip address 192.168.1.2 255.255.255.240

ip authentication mode eigrp 1 md5

ip authentication key-chain eigrp 1 cisco

ip bandwidth-percent eigrp 1 75

ip hello-interval eigrp 1 10

negotiation auto

interface GigabitEthernet0/0/1

bandwidth 2000

ip address 192.168.1.17 255.255.255.240

ip authentication mode eigrp 1 md5

ip authentication key-chain eigrp 1 cisco

ip bandwidth-percent eigrp 1 75

ip hello-interval eigrp 1 10

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 0 200 250 100 100 100

variance 128

network 192.168.1.0 0.0.0.15

network 192.168.1.16 0.0.0.15

network 192.168.1.32 0.0.0.15

network 192.168.1.48 0.0.0.15

network 192.168.1.64 0.0.0.15

network 192.168.1.80 0.0.0.15

network 192.168.1.96 0.0.0.15

network 192.168.1.112 0.0.0.15

network 192.168.1.128 0.0.0.15

network 192.168.1.144 0.0.0.15

network 192.168.1.160 0.0.0.15

network 192.168.1.176 0.0.0.15

offset-list 1 in 10 GigabitEthernet0/0/0

offset-list 1 in 10 GigabitEthernet0/0/1

ip forward-protocol nd

no ip http server

no ip http secure-server

ip tftp source-interface GigabitEthernet0

access-list 1 permit any

control-plane

line con 0

stopbits 1

line aux 0

stopbits 1

line vty 0 4

login

end

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 1"

Outgoing update filter list for all interfaces is not set

Incoming update filter list for all interfaces is not set

Incoming routes in GigabitEthernet0/0/0 will have 10 added to metric if on list 1

Incoming routes in GigabitEthernet0/0/1 will have 10 added to metric if on list 1

Default networks flagged in outgoing updates

Default networks accepted from incoming updates

EIGRP-IPv4 Protocol for AS(1)

Metric weight K1=200, K2=250, K3=100, K4=100, K5=100

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: 192.168.1.97

Topology : 0 (base)

Active Timer: 3 min

Distance: internal 90 external 170

Maximum path: 4

Maximum hopcount 100

Maximum metric variance 128

Automatic Summarization: disabled

Maximum path: 4

Routing for Networks:

192.168.1.0/28

192.168.1.16/28

192.168.1.32/28

192.168.1.48/28

192.168.1.64/28

192.168.1.80/28

192.168.1.96/28

192.168.1.112/28

192.168.1.128/28

192.168.1.144/28

192.168.1.160/28

192.168.1.176/28

Routing Information Sources:

Gateway Distance Last Update

Distance: internal 90 external 170

R2#show eigrp protocol

EIGRP-IPv4 Protocol for AS(1)

Metric weight K1=200, K2=250, K3=100, K4=100, K5=100

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: 192.168.1.97

Topology : 0 (base)

Active Timer: 3 min

Distance: internal 90 external 170

Maximum path: 4

Maximum hopcount 100

Maximum metric variance 128

R2#show ip eigrp topology

EIGRP-IPv4 Topology Table for AS(1)/ID(192.168.1.97)

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

r - reply Status, s - sia Status

P 192.168.1.0/28, 1 successors, FD is 72473380

via Connected, GigabitEthernet0/0/0

P 192.168.1.16/28, 1 successors, FD is 72473380

via Connected, GigabitEthernet0/0/1

P 192.168.1.96/28, 1 successors, FD is 3620126

via Connected, Loopback0

R2#show ip eigrp neighbors

EIGRP-IPv4 Neighbors for AS(1)

R2#show ip eigrp interfaces

EIGRP-IPv4 Interfaces for AS(1)

Xmit Queue PeerQ Mean Pacing Time Multicast Pending

Interface Peers Un/Reliable Un/Reliable SRTT Un/Reliable Flow Timer Routes

Gi0/0/0 0 0/0 0/0 0 0/8 0 0

Gi0/0/1 0 0/0 0/0 0 0/8 0 0

Lo0 0 0/0 0/0 0 0/0 0 0

R2#show ip route

Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP

D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area

N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2

E1 - OSPF external type 1, E2 - OSPF external type 2

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

192.168.1.0/24 is variably subnetted, 6 subnets, 2 masks

C 192.168.1.0/28 is directly connected, GigabitEthernet0/0/0

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

C 192.168.1.16/28 is directly connected, GigabitEthernet0/0/1

L 192.168.1.17/32 is directly connected, GigabitEthernet0/0/1

C 192.168.1.96/28 is directly connected, Loopback0

L 192.168.1.97/32 is directly connected, Loopback0

R2#show ip route eigrp

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

**Router 3:**

R3#show run

Building configuration...

Current configuration : 2236 bytes

! Last configuration change at 17:29:16 UTC Thu Oct 21 2021

version 15.5

service timestamps debug datetime msec

service timestamps log datetime msec

no platform punt-keepalive disable-kernel-core

hostname Router

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

subscriber templating

multilink bundle-name authenticated

license udi pid ISR4321/K9 sn FDO214420HW

spanning-tree extend system-id

redundancy

mode none

vlan internal allocation policy ascending

interface Loopback0

ip address 192.168.1.113 255.255.255.240

interface GigabitEthernet0/0/0

bandwidth 2000

ip address 192.168.1.33 255.255.255.240

ip authentication mode eigrp 1 md5

ip authentication key-chain eigrp 1 cisco

ip bandwidth-percent eigrp 1 75

ip hello-interval eigrp 1 10

negotiation auto

interface GigabitEthernet0/0/1

bandwidth 2000

ip address 192.168.1.18 255.255.255.240

ip authentication mode eigrp 1 md5

ip authentication key-chain eigrp 1 cisco

ip bandwidth-percent eigrp 1 75

ip hello-interval eigrp 1 10

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 0 200 250 100 100 100

variance 128

network 192.168.1.0 0.0.0.15

network 192.168.1.16 0.0.0.15

network 192.168.1.32 0.0.0.15

network 192.168.1.48 0.0.0.15

network 192.168.1.64 0.0.0.15

network 192.168.1.80 0.0.0.15

network 192.168.1.96 0.0.0.15

network 192.168.1.112 0.0.0.15

network 192.168.1.128 0.0.0.15

network 192.168.1.144 0.0.0.15

network 192.168.1.160 0.0.0.15

network 192.168.1.176 0.0.0.15

offset-list 1 in 10 GigabitEthernet0/0/0

offset-list 1 in 10 GigabitEthernet0/0/1

ip forward-protocol nd

no ip http server

no ip http secure-server

ip tftp source-interface GigabitEthernet0

access-list 1 permit any

control-plane

line con 0

stopbits 1

line aux 0

stopbits 1

line vty 0 4

login

end

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

Incoming routes in GigabitEthernet0/0/1 will have 10 added to metric if on list 1

Incoming routes in GigabitEthernet0/0/0 will have 10 added to metric if on list 1

Default networks flagged in outgoing updates

Default networks accepted from incoming updates

EIGRP-IPv4 Protocol for AS(1)

Metric weight K1=200, K2=250, K3=100, K4=100, K5=100

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: 192.168.1.113

Topology : 0 (base)

Active Timer: 3 min

Distance: internal 90 external 170

Maximum path: 4

Maximum hopcount 100

Maximum metric variance 128

Automatic Summarization: disabled

Maximum path: 4

Routing for Networks:

192.168.1.0/28

192.168.1.16/28

192.168.1.32/28

192.168.1.48/28

192.168.1.64/28

192.168.1.80/28

192.168.1.96/28

192.168.1.112/28

192.168.1.128/28

192.168.1.144/28

192.168.1.160/28

192.168.1.176/28

Routing Information Sources:

Gateway Distance Last Update

Distance: internal 90 external 170

R3#show eigrp protocol

EIGRP-IPv4 Protocol for AS(1)

Metric weight K1=200, K2=250, K3=100, K4=100, K5=100

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: 192.168.1.113

Topology : 0 (base)

Active Timer: 3 min

Distance: internal 90 external 170

Maximum path: 4

Maximum hopcount 100

Maximum metric variance 128

R3#show ip eigrp topology

EIGRP-IPv4 Topology Table for AS(1)/ID(192.168.1.113)

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

r - reply Status, s - sia Status

P 192.168.1.112/28, 1 successors, FD is 3620126

via Connected, Loopback0

P 192.168.1.16/28, 1 successors, FD is 72473380

via Connected, GigabitEthernet0/0/1

P 192.168.1.32/28, 1 successors, FD is 72473380

via Connected, GigabitEthernet0/0/0

R3#show ip eigrp neighbors

EIGRP-IPv4 Neighbors for AS(1)

R3#show ip eigrp interfaces

EIGRP-IPv4 Interfaces for AS(1)

Xmit Queue PeerQ Mean Pacing Time Multicast Pending

Interface Peers Un/Reliable Un/Reliable SRTT Un/Reliable Flow Timer Routes

Gi0/0/1 0 0/0 0/0 0 0/8 0 0

Gi0/0/0 0 0/0 0/0 0 0/8 0 0

Lo0 0 0/0 0/0 0 0/0 0 0

R3#show ip route

Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP

D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area

N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2

E1 - OSPF external type 1, E2 - OSPF external type 2

i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2

ia - IS-IS inter area, \* - candidate default, U - per-user static route

o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP

a - application route

+ - replicated route, % - next hop override, p - overrides from PfR

Gateway of last resort is not set

192.168.1.0/24 is variably subnetted, 6 subnets, 2 masks

C 192.168.1.16/28 is directly connected, GigabitEthernet0/0/1

L 192.168.1.18/32 is directly connected, GigabitEthernet0/0/1

C 192.168.1.32/28 is directly connected, GigabitEthernet0/0/0

L 192.168.1.33/32 is directly connected, GigabitEthernet0/0/0

C 192.168.1.112/28 is directly connected, Loopback0

L 192.168.1.113/32 is directly connected, Loopback0

R3#show ip route eigrp

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

**Router 4:**

R4#show run

Building configuration...

Current configuration : 2236 bytes

! Last configuration change at 17:18:41 UTC Thu Oct 21 2021

version 15.5

service timestamps debug datetime msec

service timestamps log datetime msec

no platform punt-keepalive disable-kernel-core

hostname Router

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

subscriber templating

multilink bundle-name authenticated

license udi pid ISR4321/K9 sn FDO214421D1

spanning-tree extend system-id

redundancy

mode none

vlan internal allocation policy ascending

interface Loopback0

ip address 192.168.1.129 255.255.255.240

interface GigabitEthernet0/0/0

bandwidth 2000

ip address 192.168.1.34 255.255.255.240

ip authentication mode eigrp 1 md5

ip authentication key-chain eigrp 1 cisco

ip bandwidth-percent eigrp 1 75

ip hello-interval eigrp 1 10

negotiation auto

interface GigabitEthernet0/0/1

bandwidth 2000

ip address 192.168.1.49 255.255.255.240

ip authentication mode eigrp 1 md5

ip authentication key-chain eigrp 1 cisco

ip bandwidth-percent eigrp 1 75

ip hello-interval eigrp 1 10

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 0 200 250 100 100 100

variance 128

network 192.168.1.0 0.0.0.15

network 192.168.1.16 0.0.0.15

network 192.168.1.32 0.0.0.15

network 192.168.1.48 0.0.0.15

network 192.168.1.64 0.0.0.15

network 192.168.1.80 0.0.0.15

network 192.168.1.96 0.0.0.15

network 192.168.1.112 0.0.0.15

network 192.168.1.128 0.0.0.15

network 192.168.1.144 0.0.0.15

network 192.168.1.160 0.0.0.15

network 192.168.1.176 0.0.0.15

offset-list 1 in 10 GigabitEthernet0/0/0

offset-list 1 in 10 GigabitEthernet0/0/1

ip forward-protocol nd

no ip http server

no ip http secure-server

ip tftp source-interface GigabitEthernet0

access-list 1 permit any

control-plane

line con 0

stopbits 1

line aux 0

stopbits 1

line vty 0 4

login

end

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

Incoming routes in GigabitEthernet0/0/0 will have 10 added to metric if on list 1

Incoming routes in GigabitEthernet0/0/1 will have 10 added to metric if on list 1

Default networks flagged in outgoing updates

Default networks accepted from incoming updates

EIGRP-IPv4 Protocol for AS(1)

Metric weight K1=200, K2=250, K3=100, K4=100, K5=100

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: 192.168.1.129

Topology : 0 (base)

Active Timer: 3 min

Distance: internal 90 external 170

Maximum path: 4

Maximum hopcount 100

Maximum metric variance 128

Automatic Summarization: disabled

Maximum path: 4

Routing for Networks:

192.168.1.0/28

192.168.1.16/28

192.168.1.32/28

192.168.1.48/28

192.168.1.64/28

192.168.1.80/28

192.168.1.96/28

192.168.1.112/28

192.168.1.128/28

192.168.1.144/28

192.168.1.160/28

192.168.1.176/28

Routing Information Sources:

Gateway Distance Last Update

Distance: internal 90 external 170

R4#show eigrp protocol

EIGRP-IPv4 Protocol for AS(1)

Metric weight K1=200, K2=250, K3=100, K4=100, K5=100

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: 192.168.1.129

Topology : 0 (base)

Active Timer: 3 min

Distance: internal 90 external 170

Maximum path: 4

Maximum hopcount 100

Maximum metric variance 128

R4#show ip eigrp topology

EIGRP-IPv4 Topology Table for AS(1)/ID(192.168.1.129)

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

r - reply Status, s - sia Status

P 192.168.1.48/28, 1 successors, FD is 72473380

via Connected, GigabitEthernet0/0/1

P 192.168.1.128/28, 1 successors, FD is 3620126

via Connected, Loopback0

P 192.168.1.32/28, 1 successors, FD is 72473380

via Connected, GigabitEthernet0/0/0

R4#show ip eigrp neighbors

EIGRP-IPv4 Neighbors for AS(1)

R4show ip eigrp interfaces

EIGRP-IPv4 Interfaces for AS(1)

Xmit Queue PeerQ Mean Pacing Time Multicast Pending

Interface Peers Un/Reliable Un/Reliable SRTT Un/Reliable Flow Timer Routes

Gi0/0/0 0 0/0 0/0 0 0/8 0 0

Gi0/0/1 0 0/0 0/0 0 0/8 0 0

Lo0 0 0/0 0/0 0 0/0 0 0

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

192.168.1.0/24 is variably subnetted, 6 subnets, 2 masks

C 192.168.1.32/28 is directly connected, GigabitEthernet0/0/0

L 192.168.1.34/32 is directly connected, GigabitEthernet0/0/0

C 192.168.1.48/28 is directly connected, GigabitEthernet0/0/1

L 192.168.1.49/32 is directly connected, GigabitEthernet0/0/1

C 192.168.1.128/28 is directly connected, Loopback0

L 192.168.1.129/32 is directly connected, Loopback0

R4#show ip route eigrp

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

**Router 5:**

R5#show run

Building configuration...

Current configuration : 4553 bytes

! Last configuration change at 17:19:29 UTC Thu Oct 21 2021

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 Router

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

multilink bundle-name authenticated

crypto pki trustpoint TP-self-signed-859896477

enrollment selfsigned

subject-name cn=IOS-Self-Signed-Certificate-859896477

revocation-check none

rsakeypair TP-self-signed-859896477

crypto pki certificate chain TP-self-signed-859896477

certificate self-signed 01

3082032E 30820216 A0030201 02020101 300D0609 2A864886 F70D0101 05050030

30312E30 2C060355 04031325 494F532D 53656C66 2D536967 6E65642D 43657274

69666963 6174652D 38353938 39363437 37301E17 0D323131 30323131 37313835

365A170D 33303031 30313030 30303030 5A303031 2E302C06 03550403 1325494F

532D5365 6C662D53 69676E65 642D4365 72746966 69636174 652D3835 39383936

34373730 82012230 0D06092A 864886F7 0D010101 05000382 010F0030 82010A02

82010100 E7635DFC 1EEC911B EA68C070 C405C2BD B31B1CE8 C44AD0D6 2DE7A060

3E726A51 0CB9DA39 7E97D2BA BC8B3BA4 A097BA1E F679999A 73EAFE10 B0EAB292

0F40512B 3197E092 B52B9C29 BF6F1CA8 55324FC6 AF522434 6E04AD1B 366F29A1

1EEAE19A 9F166918 AD737A58 7A9968B5 E97237D8 B0C37AF1 8E736360 4B50B02E

5C8453AD 90B39A8C 80F58059 0B6239EF 9721EAAB EDB7B066 46503F13 07C8A737

19239C08 191D105D 9DC09B7D 307F53F3 9013FC3F 1516CEBB 1F42B7FA 6AAA329C

EF43ABB4 3A4DA45F D1294FD1 3A3C01B6 E5229CE3 9F7167E9 843897E1 30EF5F89

B22907B9 6097A409 20B97FB1 81EE956C B5253FD3 952B2F6C FBB03B71 EBD5CB71

603A9931 02030100 01A35330 51300F06 03551D13 0101FF04 05300301 01FF301F

0603551D 23041830 16801403 F1B7CD29 2F3D5BC0 0D5DC4C0 6F552236 3E04B730

1D060355 1D0E0416 041403F1 B7CD292F 3D5BC00D 5DC4C06F 5522363E 04B7300D

06092A86 4886F70D 01010505 00038201 0100DEFF 841C63F7 E1F0B5AC AA3EFABE

6D4202C4 8875FB9E 02DA8F6A 984A556F 36C737F9 4500729B 8F5DE6D9 13936811

9C469240 28E54320 9E5849E0 B87647B2 24BE46C6 735DA893 8F64EA22 3FD5198D

73FE3A9A 9DCCF42C 00F29A00 84185C7F 5EE297DF 8CE184AA 8F34B5A3 C04290AE

58DB4256 35B75932 8112EF87 3DF76525 7DE7C2DC DD40B2AB 7C1E5A2D F10B8F2D

211CE5F6 DDD39D87 DB8904C5 80B2B147 CB3105DF 45A495BB FC3D9BFA 02F59A73

BBAF9C59 34D458F6 D21E4E12 28381FC2 4B43E97C 3390CB74 4C450405 862D1BD8

F8424996 2DB11759 66E433AF 5DE39D49 858B45D2 45A08444 D9A3F506 C6FEC848

3A65E52B ACCB7170 3579ADCF 85DACE00 CB38

quit

license udi pid ISR4321/K9 sn FLM240608PJ

no license smart enable

diagnostic bootup level minimal

spanning-tree extend system-id

redundancy

mode none

interface Loopback0

ip address 192.168.1.145 255.255.255.240

interface GigabitEthernet0/0/0

bandwidth 2000

ip address 192.168.1.65 255.255.255.240

ip authentication mode eigrp 1 md5

ip authentication key-chain eigrp 1 cisco

ip bandwidth-percent eigrp 1 75

ip hello-interval eigrp 1 10

negotiation auto

interface GigabitEthernet0/0/1

bandwidth 2000

ip address 192.168.1.50 255.255.255.240

ip authentication mode eigrp 1 md5

ip authentication key-chain eigrp 1 cisco

ip bandwidth-percent eigrp 1 75

ip hello-interval eigrp 1 10

negotiation auto

interface GigabitEthernet0/1/0

no ip address

shutdown

negotiation auto

interface GigabitEthernet0/1/1

no ip address

shutdown

negotiation auto

interface GigabitEthernet0

vrf forwarding Mgmt-intf

no ip address

shutdown

negotiation auto

router eigrp 1

metric weights 0 200 250 100 100 100

variance 128

network 192.168.1.0 0.0.0.15

network 192.168.1.16 0.0.0.15

network 192.168.1.32 0.0.0.15

network 192.168.1.48 0.0.0.15

network 192.168.1.64 0.0.0.15

network 192.168.1.80 0.0.0.15

network 192.168.1.96 0.0.0.15

network 192.168.1.112 0.0.0.15

network 192.168.1.128 0.0.0.15

network 192.168.1.144 0.0.0.15

network 192.168.1.160 0.0.0.15

network 192.168.1.176 0.0.0.15

offset-list 1 in 10 GigabitEthernet0/0/0

offset-list 1 in 10 GigabitEthernet0/0/1

ip forward-protocol nd

ip http server

ip http authentication local

ip http secure-server

ip tftp source-interface GigabitEthernet0

access-list 1 permit any

control-plane

line con 0

transport input none

stopbits 1

line aux 0

stopbits 1

line vty 0 4

login

end

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

Incoming routes in GigabitEthernet0/0/1 will have 10 added to metric if on list 1

Incoming routes in GigabitEthernet0/0/0 will have 10 added to metric if on list 1

Default networks flagged in outgoing updates

Default networks accepted from incoming updates

EIGRP-IPv4 Protocol for AS(1)

Metric weight K1=200, K2=250, K3=100, K4=100, K5=100

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: 192.168.1.145

Topology : 0 (base)

Active Timer: 3 min

Distance: internal 90 external 170

Maximum path: 4

Maximum hopcount 100

Maximum metric variance 128

Automatic Summarization: disabled

Maximum path: 4

Routing for Networks:

192.168.1.0/28

192.168.1.16/28

192.168.1.32/28

192.168.1.48/28

192.168.1.64/28

192.168.1.80/28

192.168.1.96/28

192.168.1.112/28

192.168.1.128/28

192.168.1.144/28

192.168.1.160/28

192.168.1.176/28

Routing Information Sources:

Gateway Distance Last Update

Distance: internal 90 external 170

R5#show eigrp protocol

EIGRP-IPv4 Protocol for AS(1)

Metric weight K1=200, K2=250, K3=100, K4=100, K5=100

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: 192.168.1.145

Topology : 0 (base)

Active Timer: 3 min

Distance: internal 90 external 170

Maximum path: 4

Maximum hopcount 100

Maximum metric variance 128

R5#show ip eigrp topology

EIGRP-IPv4 Topology Table for AS(1)/ID(192.168.1.145)

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

r - reply Status, s - sia Status

P 192.168.1.144/28, 1 successors, FD is 3620126

via Connected, Loopback0

P 192.168.1.48/28, 1 successors, FD is 72473380

via Connected, GigabitEthernet0/0/1

P 192.168.1.64/28, 1 successors, FD is 72473380

via Connected, GigabitEthernet0/0/0

R5#show ip eigrp neighbors

EIGRP-IPv4 Neighbors for AS(1)

R5#show ip eigrp interfaces

EIGRP-IPv4 Interfaces for AS(1)

Xmit Queue PeerQ Mean Pacing Time Multicast Pending

Interface Peers Un/Reliable Un/Reliable SRTT Un/Reliable Flow Timer Routes

Gi0/0/1 0 0/0 0/0 0 0/8 0 0

Gi0/0/0 0 0/0 0/0 0 0/8 0 0

Lo0 0 0/0 0/0 0 0/0 0 0

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

192.168.1.0/24 is variably subnetted, 6 subnets, 2 masks

C 192.168.1.48/28 is directly connected, GigabitEthernet0/0/1

L 192.168.1.50/32 is directly connected, GigabitEthernet0/0/1

C 192.168.1.64/28 is directly connected, GigabitEthernet0/0/0

L 192.168.1.65/32 is directly connected, GigabitEthernet0/0/0

C 192.168.1.144/28 is directly connected, Loopback0

L 192.168.1.145/32 is directly connected, Loopback0

R5#show ip route eigrp

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

**Router 6:**

R6#show run

Building configuration...

Current configuration : 4351 bytes

! Last configuration change at 17:22:24 UTC Thu Oct 21 2021

version 16.9

service timestamps debug datetime msec

service timestamps log datetime msec

platform qfp utilization monitor load 80

no platform punt-keepalive disable-kernel-core

hostname Router

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

ip dhcp pool webuidhcp

subscriber templating

multilink bundle-name authenticated

crypto pki trustpoint TP-self-signed-4288135047

enrollment selfsigned

subject-name cn=IOS-Self-Signed-Certificate-4288135047

revocation-check none

rsakeypair TP-self-signed-4288135047

crypto pki certificate chain TP-self-signed-4288135047

certificate self-signed 01

30820330 30820218 A0030201 02020101 300D0609 2A864886 F70D0101 05050030

31312F30 2D060355 04031326 494F532D 53656C66 2D536967 6E65642D 43657274

69666963 6174652D 34323838 31333530 3437301E 170D3231 31303231 31373230

33335A17 0D333030 31303130 30303030 305A3031 312F302D 06035504 03132649

4F532D53 656C662D 5369676E 65642D43 65727469 66696361 74652D34 32383831

33353034 37308201 22300D06 092A8648 86F70D01 01010500 0382010F 00308201

0A028201 0100B739 7378F68A AA22271E 8333DE82 4688D76D 30042A10 0A2DFBE6

4929A2E3 A5D3D78D 3253E971 B32508C1 E33CE5F9 5605E86D D64CE2CC 50B3808F

59AB705A C444007D E2AF6FA6 496CC1CB AC12E55B 8D8F7266 FEF39ED9 5E46AA89

261B580C EDBF4051 1C2FCA15 725DE900 D425BD47 1B5DFEE9 211DEE9C 566FE840

4CF4B486 DB11C217 90FEBBC5 30EB06F1 0874A07F AE44C691 9F4FD17C C4D8355E

84CBDDA3 F691FCE8 7A04E0DD D709F43B B4753439 1F3C9582 1236D355 99385A22

F7459B4C EC05F8B0 AD2D7D1B EB8F4492 876CA2CC 95AD6FEA 1867C80F 7339B695

C5B553F4 7CF9DF64 95B829C3 4732232D DDED8FBB 6B71DEF8 397F2384 AFF9A026

56D3AA5C 50510203 010001A3 53305130 0F060355 1D130101 FF040530 030101FF

301F0603 551D2304 18301680 145A703C F6CA97A4 811FE327 62C2EEAF 8027964B

34301D06 03551D0E 04160414 5A703CF6 CA97A481 1FE32762 C2EEAF80 27964B34

300D0609 2A864886 F70D0101 05050003 82010100 3B59AF54 25FE0CE7 3C5CD1A6

3565AB53 56FB742E 3F464132 5CDE5436 EA0967B7 AD03CFA4 3D73E4D0 165E2DF7

7B3A7938 7315A52E E69BD8D8 0A51C5B2 48FCFED5 E50C34CC 7799066F 8213442A

889CDD49 DF929979 DF6C4B5F 6F7CBCF0 C215F02E 84067DC9 43A25390 37D7B535

07A4AA4E A6D181F9 A66ED5B0 7E5F3456 44421533 78DB3809 61532494 0AD0F38E

E1AD0E00 32108321 104566C0 55B7882E 7F298345 D1D0EF85 35AAF0FE BA8898DA

6E70B385 45B26B3B 14E0054B 8FBCF433 D3CB126F AD978C36 B1FA69FF 4EFC834B

B4845EC1 211BAED0 67504843 ABCADAA1 34FAC2BA 95463CFD D9B8F001 3E410A95

96CB222E 8BD3E165 887E054E CD0C00DE 4AA2CEE4

quit

license udi pid ISR4321/K9 sn FLM2406090M

no license smart enable

diagnostic bootup level minimal

spanning-tree extend system-id

redundancy

mode none

interface Loopback0

ip address 192.168.1.161 255.255.255.240

interface GigabitEthernet0/0/0

bandwidth 2000

ip address 192.168.1.66 255.255.255.240

ip authentication mode eigrp 1 md5

ip authentication key-chain eigrp 1 cisco

ip bandwidth-percent eigrp 1 75

ip hello-interval eigrp 1 10

negotiation auto

interface GigabitEthernet0/0/1

no ip address

shutdown

negotiation auto

interface GigabitEthernet0/1/0

no ip address

shutdown

negotiation auto

interface GigabitEthernet0/1/1

no ip address

shutdown

negotiation auto

interface GigabitEthernet0

vrf forwarding Mgmt-intf

no ip address

shutdown

negotiation auto

router eigrp 1

metric weights 0 200 250 100 100 100

variance 128

network 192.168.1.0 0.0.0.15

network 192.168.1.16 0.0.0.15

network 192.168.1.32 0.0.0.15

network 192.168.1.48 0.0.0.15

network 192.168.1.64 0.0.0.15

network 192.168.1.80 0.0.0.15

network 192.168.1.96 0.0.0.15

network 192.168.1.112 0.0.0.15

network 192.168.1.128 0.0.0.15

network 192.168.1.144 0.0.0.15

network 192.168.1.160 0.0.0.15

network 192.168.1.176 0.0.0.15

offset-list 1 in 10 GigabitEthernet0/0/0

ip forward-protocol nd

ip http server

ip http authentication local

ip http secure-server

ip tftp source-interface GigabitEthernet0

access-list 1 permit any

control-plane

line con 0

transport input none

stopbits 1

line aux 0

stopbits 1

line vty 0 4

login

end

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

Incoming routes in GigabitEthernet0/0/0 will have 10 added to metric if on list 1

Default networks flagged in outgoing updates

Default networks accepted from incoming updates

EIGRP-IPv4 Protocol for AS(1)

Metric weight K1=200, K2=250, K3=100, K4=100, K5=100

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: 192.168.1.161

Topology : 0 (base)

Active Timer: 3 min

Distance: internal 90 external 170

Maximum path: 4

Maximum hopcount 100

Maximum metric variance 128

Automatic Summarization: disabled

Maximum path: 4

Routing for Networks:

192.168.1.0/28

192.168.1.16/28

192.168.1.32/28

192.168.1.48/28

192.168.1.64/28

192.168.1.80/28

192.168.1.96/28

192.168.1.112/28

192.168.1.128/28

192.168.1.144/28

192.168.1.160/28

192.168.1.176/28

Routing Information Sources:

Gateway Distance Last Update

Distance: internal 90 external 170

R6#show eigrp protocol

EIGRP-IPv4 Protocol for AS(1)

Metric weight K1=200, K2=250, K3=100, K4=100, K5=100

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: 192.168.1.161

Topology : 0 (base)

Active Timer: 3 min

Distance: internal 90 external 170

Maximum path: 4

Maximum hopcount 100

Maximum metric variance 128

R6#show ip eigrp topology

EIGRP-IPv4 Topology Table for AS(1)/ID(192.168.1.161)

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

r - reply Status, s - sia Status

P 192.168.1.160/28, 1 successors, FD is 3620126

via Connected, Loopback0

P 192.168.1.64/28, 1 successors, FD is 72473380

via Connected, GigabitEthernet0/0/0

R6#show ip eigrp neighbors

EIGRP-IPv4 Neighbors for AS(1)

R6#show ip eigrp interfaces

EIGRP-IPv4 Interfaces for AS(1)

Xmit Queue PeerQ Mean Pacing Time Multicast Pending

Interface Peers Un/Reliable Un/Reliable SRTT Un/Reliable Flow Timer Routes

Gi0/0/0 0 0/0 0/0 0 0/8 0 0

Lo0 0 0/0 0/0 0 0/0 0 0

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

192.168.1.0/24 is variably subnetted, 4 subnets, 2 masks

C 192.168.1.64/28 is directly connected, GigabitEthernet0/0/0

L 192.168.1.66/32 is directly connected, GigabitEthernet0/0/0

C 192.168.1.160/28 is directly connected, Loopback0

L 192.168.1.161/32 is directly connected, Loopback0

Router#show ip route eigrp

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

Problems

One of the biggest problems that I faced in the lab was that I wasn’t familiar with how to configure an Enhanced Interior Gateway Routing Protocol (EIGRP) system, so I looked at the cisco book along with the cisco website on EIGRP configuration to understand how to properly configure an EIGRP system. During the process of creating an EIGRP, I encountered some minor problems in the commands, one example of a minor problem that I encountered was configuring the K values of the Metric weight. Another minor problem would be setting the correct variance multipler value for load balancing, this was easily fixed by setting it to the max value would allow everything to go through

Conclusion

The objective of the lab was to use 6 routers to configure an EIGRP (Enhanced Interior Gateway Routing Protocol) system. In the lab I was able to learn how to correctly configure EIGRP routing protocol that could be applied to real networks. I was also able to learn about the metric and k values that are used to determine the best route and how to tweak those values. One skill that I continued to use in this lab was looking up configurations that are helpful to me then tweaking it to fit my needs. Personally, I thought this lab was helpful in understanding something new like EIGRP and improving my general knowledge of cisco networking.