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

Purpose

The objective of the lab was to use 6 routers to configure a BGP (Border Gateway Protocol) system with three routers configured with OSPF and another Three routers configured with EIGRP connected on router 3 and router 4 through EBGP. Also, require ipv4 and ipv6 with full dual stack and loopbacks (optional on router 3 and router 4).

Background information

BGP is a standardized exterior gateway protocol that is designed to exchange routing and path vector information between autonomous systems on the network and is used on the Internet. It is used to determine the best route to an address in the network. Each BGP peer manages a table with all the routes it knows for each network exchanges routing information with its neighboring peers in the form of network prefix announcements. Then the peer analyzes the data and sets one of its peers as the next stop to forward packets. Through this an AS to collect all the routing information from its neighboring autonomous systems and advertise that information further to determine the best route.

Lab summary

Before I started to configure the lab equipment, I first opened a notepad to create a topology with the configurations for the routers. I created six subnet masks with the correct IP address for the router interfaces and networks. Next, we connected the 6 routers with a copper cross-over cable through the gigabit ethernet and connected the routers to the computer with the console cable. In the configuration we 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, I would give the correct Ipv4 and Ipv6 address according to the topology for the gigabit ethernet interfaces that I created. After that I then applied a separate set of Ip addresses for the loopback on each of the 6 routers. Then I would configure OSPF on routers 1-3 and configure EIGRP on routers 4-6. On routers 4 and 5 we would set up we would then enter BGP router config mode and set the AS number with the router bgp command. Then associate network with BGP through network command, next I would add the Ip address of the neighbor to the BGP with the neighbor remote-as command. Finally, I would need to configure a router id with bgp router-id and enable neighbor to exchange prefixes with the neighbor activate command.

To show that BGP was working we used the show run command to show the configuration, used the show ip bgp command to display entries in the BGP routing table, show ip neighbors command to display information about BGP and TCP connections to neighbors, show ip bgp summary command to display the status of all BGP, show bgp ipv6 neighbor command to display information about ipv6 BGP and TCP connections to neighbors, show bgp ipv6 summary command to display the status of all ipv6 BGP connection and finally show ip route command to show the routing table.

Lab commands

**router bgp [*autonomous-system-number*]**: Enters router configuration mode for the specified routing process.

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

**neighbor [ip address] remote-as [*autonomous-system-number*]**: Adds the IP address or peer group name of the neighbor in the specified autonomous system to the IPv4 or IPv6 multiprotocol BGP neighbor table of the local router.

**bgp** **router-id [ip address]**: Configures a fixed router ID for the local BGP routing process.

**neighbor [ip address] activate**: Enables the neighbor to exchange prefixes for the IPv4 unicast address family with the local router.

**show ip bgp [ip address]**: To display entries in the Border Gateway Protocol (BGP) routing table.

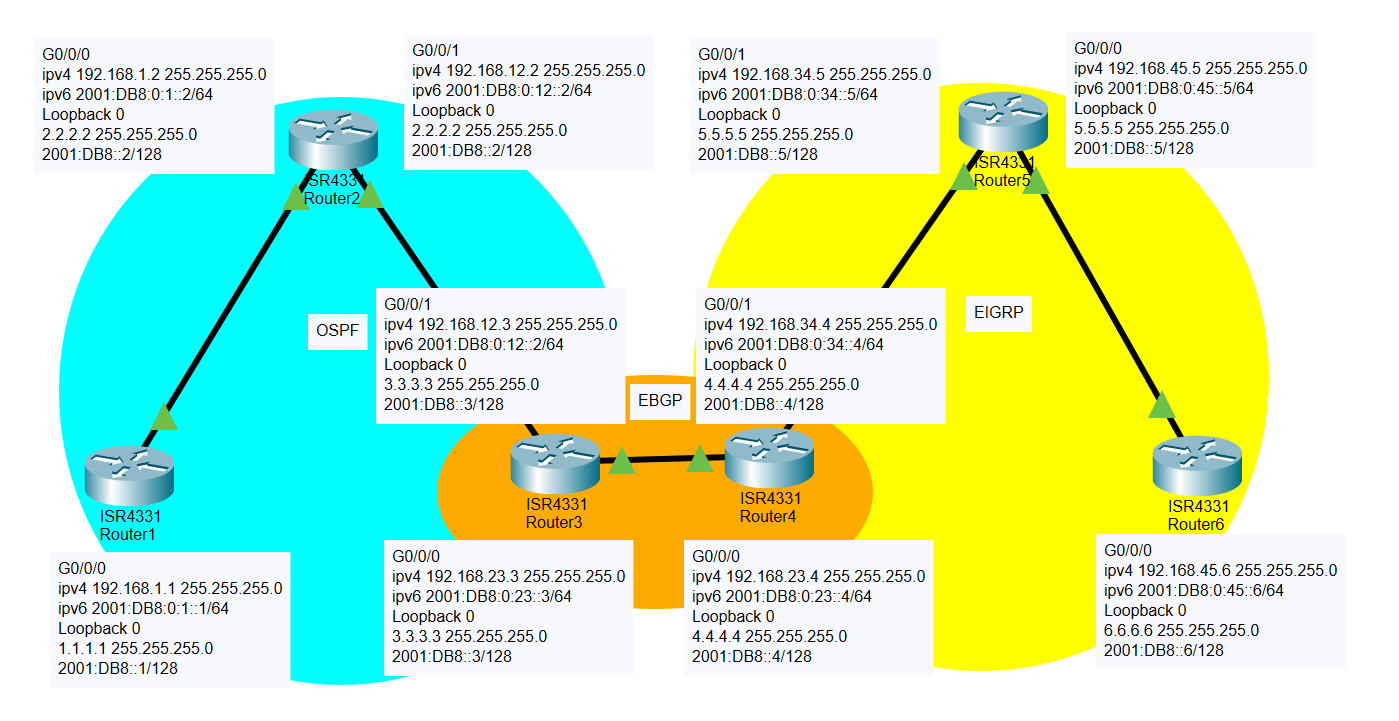
**show ip bgp [ip address] neighbors**: To display information about Border Gateway Protocol (BGP) and TCP connections to neighbors.

**show ip bgp [ip address] summary**: To display the status of all Border Gateway Protocol (BGP) connections.

**show bgp ipv6 [ip address] neighbors**: To display information about IPv6 Border Gateway Protocol (BGP) and TCP connections to neighbors.

**show bgp ipv6 [ip address] summary**: To display the status of all IPv6 Border Gateway Protocol (BGP) connections.

Network diagram



|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Router** | **Interface** | **Ipv4** | **Ipv6** | **Subnet Mask** | **Subnet** | **Linked- Device** | **Protocol** | **Loopback** |
| Router 1 | G 0/0/0 | 192.168.1.1 | 2001:DB8:0:1::1/64 | 255.255.255.0 | /64 | R2 G0/0/0 | OSPF 1 | 1.1.1.1 |
| Router 2 | G 0/0/0 | 192.168.1.2 | 2001:DB8:0:1::2/64 | 255.255.255.0 | /64 | R1 G0/0/0 | OSPF 1 | 2.2.2.2 |
| Router 2 | G 0/0/1 | 192.168.12.2 | 2001:DB8:0:12::2/64 | 255.255.255.0 | /64 | R3 G0/0/1 | OSPF 1 | 2.2.2.2 |
| Router 3 | G 0/0/1 | 192.168.12.3 | 2001:DB8:0:12::3/64 | 255.255.255.0 | /64 | R2 G0/0/1 | OSPF 1 | 3.3.3.3 |
| Router 3 | G 0/0/0 | 192.168.23.3 | 2001:DB8:0:23::3/64 | 255.255.255.0 | /64 | R4 G0/0/0 | BGP 1 | 3.3.3.3 |
|  |  |  |  |  |  |  |  |  |
| Router 4 | G 0/0/0 | 192.168.23.4 | 2001:DB8:0:23::4/64 | 255.255.255.0 | /64 | R3 G0/0/0 | BGP 2 | 4.4.4.4 |
| Router 4 | G 0/0/1 | 192.168.34.4 | 2001:DB8:0:34::4/64 | 255.255.255.0 | /64 | R5 G0/0/1 | EIGRP 1 | 4.4.4.4 |
| Router 5 | G 0/0/1 | 192.168.34.5 | 2001:DB8:0:34::5/64 | 255.255.255.0 | /64 | R4 G0/0/1 | EIGRP 1 | 5.5.5.5 |
| Router 5 | G 0/0/0 | 192.168.45.5 | 2001:DB8:0:45::5/64 | 255.255.255.0 | /64 | R6 G0/0/0 | EIGRP 1 | 5.5.5.5 |
| Router 6 | G 0/0/0 | 192.168.45.6 | 001:DB8:0:45::6/64 | 2255.255.255.0 | /64 | R5 G0/0/0 | EIGRP 1 | 6.6.6.6 |

Configurations

**Router 1:**

R1#Show run

Building configuration...

Current configuration : 1594 bytes

Last configuration change at 18:09:15 UTC Wed Jan 12 2022

version 15.5

service timestamps debug datetime msec

service timestamps log datetime msec

no platform punt-keepalive disable-kernel-core

hostname R1

boot-start-marker

boot-end-marker

vrf definition Mgmt-intf

address-family ipv4

exit-address-family

address-family ipv6

exit-address-family

no aaa new-model

ipv6 unicast-routing

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 1.1.1.1 255.255.255.0

ipv6 address 2001:DB8::1/128

ipv6 ospf 1 area 0

interface GigabitEthernet0/0/0

ip address 192.168.1.1 255.255.255.0

negotiation auto

ipv6 address 2001:DB8:0:1::1/64

ipv6 enable

ipv6 ospf 1 area 0

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 ospf 1

network 1.1.1.1 0.0.0.0 area 0

network 192.168.1.0 0.0.0.255 area 0

ip forward-protocol nd

no ip http server

no ip http secure-server

ip tftp source-interface GigabitEthernet0

ipv6 router ospf 1

router-id 1.1.1.1

control-plane

line con 0

stopbits 1

line aux 0

stopbits 1

line vty 0 4

login

End

R1#Show ip route

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

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

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

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

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

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

C 1.1.1.0/24 is directly connected, Loopback0

L 1.1.1.1/32 is directly connected, Loopback0

2.0.0.0/32 is subnetted, 1 subnets

O 2.2.2.2 [110/2] via 192.168.1.2, 00:13:48, GigabitEthernet0/0/0

3.0.0.0/32 is subnetted, 1 subnets

O 3.3.3.3 [110/3] via 192.168.1.2, 00:13:01, GigabitEthernet0/0/0

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

C 192.168.1.0/24 is directly connected, GigabitEthernet0/0/0

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

O 192.168.12.0/24 [110/2] via 192.168.1.2, 00:13:11, GigabitEthernet0/0/0

R1#Show ip ospf

Routing Process "ospf 1" with ID 1.1.1.1

Start time: 02:31:05.099, Time elapsed: 00:15:47.986

Supports only single TOS(TOS0) routes

Supports opaque LSA

Supports Link-local Signaling (LLS)

Supports area transit capability

Supports NSSA (compatible with RFC 3101)

Supports Database Exchange Summary List Optimization (RFC 5243)

Event-log enabled, Maximum number of events: 1000, Mode: cyclic

Router is not originating router-LSAs with maximum metric

Initial SPF schedule delay 5000 msecs

Minimum hold time between two consecutive SPFs 10000 msecs

Maximum wait time between two consecutive SPFs 10000 msecs

Incremental-SPF disabled

Minimum LSA interval 5 secs

Minimum LSA arrival 1000 msecs

LSA group pacing timer 240 secs

Interface flood pacing timer 33 msecs

Retransmission pacing timer 66 msecs

EXCHANGE/LOADING adjacency limit: initial 300, process maximum 300

Number of external LSA 0. Checksum Sum 0x000000

Number of opaque AS LSA 0. Checksum Sum 0x000000

Number of DCbitless external and opaque AS LSA 0

Number of DoNotAge external and opaque AS LSA 0

Number of areas in this router is 1. 1 normal 0 stub 0 nssa

Number of areas transit capable is 0

External flood list length 0

IETF NSF helper support enabled

Cisco NSF helper support enabled

Reference bandwidth unit is 100 mbps

Area BACKBONE(0)

Number of interfaces in this area is 2 (1 loopback)

Area has no authentication

SPF algorithm last executed 00:13:20.196 ago

SPF algorithm executed 5 times

Area ranges are

Number of LSA 5. Checksum Sum 0x01943A

Number of opaque link LSA 0. Checksum Sum 0x000000

Number of DCbitless LSA 0

Number of indication LSA 0

Number of DoNotAge LSA 0

Flood list length 0

R1#Show ip ospf interface

Loopback0 is up, line protocol is up

Internet Address 1.1.1.1/24, Area 0, Attached via Network Statement

Process ID 1, Router ID 1.1.1.1, Network Type LOOPBACK, Cost: 1

Topology-MTID Cost Disabled Shutdown Topology Name

0 1 no no Base

Loopback interface is treated as a stub Host

GigabitEthernet0/0/0 is up, line protocol is up

Internet Address 192.168.1.1/24, Area 0, Attached via Network Statement

Process ID 1, Router ID 1.1.1.1, Network Type BROADCAST, Cost: 1

Topology-MTID Cost Disabled Shutdown Topology Name

0 1 no no Base

Transmit Delay is 1 sec, State BDR, Priority 1

Designated Router (ID) 2.2.2.2, Interface address 192.168.1.2

Backup Designated router (ID) 1.1.1.1, Interface address 192.168.1.1

Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5

oob-resync timeout 40

Hello due in 00:00:07

Supports Link-local Signaling (LLS)

Cisco NSF helper support enabled

IETF NSF helper support enabled

Index 1/2/2, flood queue length 0

Next 0x0(0)/0x0(0)/0x0(0)

Last flood scan length is 1, maximum is 1

Last flood scan time is 0 msec, maximum is 0 msec

Neighbor Count is 1, Adjacent neighbor count is 1

Adjacent with neighbor 2.2.2.2 (Designated Router)

Suppress hello for 0 neighbor(s)

R1#show ip ospf neighbor

Neighbor ID Pri State Dead Time Address Interface

2.2.2.2 1 FULL/DR 00:00:37 192.168.1.2 GigabitEthernet0/0/0

R1#show ip ospf border-routers

OSPF Router with ID (1.1.1.1) (Process ID 1)

Base Topology (MTID 0)

Internal Router Routing Table

Codes: i - Intra-area route, I - Inter-area route

R1#Show ipv6 ospf

Routing Process "ospfv3 1" with ID 1.1.1.1

Supports NSSA (compatible with RFC 3101)

Supports Database Exchange Summary List Optimization (RFC 5243)

Event-log enabled, Maximum number of events: 1000, Mode: cyclic

Router is not originating router-LSAs with maximum metric

Initial SPF schedule delay 5000 msecs

Minimum hold time between two consecutive SPFs 10000 msecs

Maximum wait time between two consecutive SPFs 10000 msecs

Minimum LSA interval 5 secs

Minimum LSA arrival 1000 msecs

LSA group pacing timer 240 secs

Interface flood pacing timer 33 msecs

Retransmission pacing timer 66 msecs

Retransmission limit dc 24 non-dc 24

EXCHANGE/LOADING adjacency limit: initial 300, process maximum 300

Number of external LSA 0. Checksum Sum 0x000000

Number of areas in this router is 1. 1 normal 0 stub 0 nssa

Graceful restart helper support enabled

Reference bandwidth unit is 100 mbps

RFC1583 compatibility enabled

Area BACKBONE(0)

Number of interfaces in this area is 2

SPF algorithm executed 4 times

Number of LSA 12. Checksum Sum 0x074D14

Number of DCbitless LSA 0

Number of indication LSA 0

Number of DoNotAge LSA 0

Flood list length 0

R1#Show ipv6 ospf interface

Loopback0 is up, line protocol is up

Link Local Address FE80::267E:12FF:FE4D:F6E0, Interface ID 12

Area 0, Process ID 1, Instance ID 0, Router ID 1.1.1.1

Network Type LOOPBACK, Cost: 1

Loopback interface is treated as a stub Host

GigabitEthernet0/0/0 is up, line protocol is up

Link Local Address FE80::267E:12FF:FE4D:F6E0, Interface ID 6

Area 0, Process ID 1, Instance ID 0, Router ID 1.1.1.1

Network Type BROADCAST, Cost: 1

Transmit Delay is 1 sec, State BDR, Priority 1

Designated Router (ID) 2.2.2.2, local address FE80::267E:12FF:FE4D:F770

Backup Designated router (ID) 1.1.1.1, local address FE80::267E:12FF:FE4D:F6E0

Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5

Hello due in 00:00:03

Graceful restart helper support enabled

Index 1/1/1, flood queue length 0

Next 0x0(0)/0x0(0)/0x0(0)

Last flood scan length is 2, maximum is 2

Last flood scan time is 0 msec, maximum is 0 msec

Neighbor Count is 1, Adjacent neighbor count is 1

Adjacent with neighbor 2.2.2.2 (Designated Router)

Suppress hello for 0 neighbor(s)

R1#Show ipv6 route

IPv6 Routing Table - default - 7 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

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

via Loopback0, receive

O 2001:DB8::2/128 [110/1]

via FE80::267E:12FF:FE4D:F770, GigabitEthernet0/0/0

O 2001:DB8::3/128 [110/2]

via FE80::267E:12FF:FE4D:F770, GigabitEthernet0/0/0

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

via GigabitEthernet0/0/0, directly connected

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

via GigabitEthernet0/0/0, receive

O 2001:DB8:0:12::/64 [110/2]

via FE80::267E:12FF:FE4D:F770, GigabitEthernet0/0/0

L FF00::/8 [0/0]

via Null0, receive

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 "ospf 1"

Outgoing update filter list for all interfaces is not set

Incoming update filter list for all interfaces is not set

Router ID 1.1.1.1

Number of areas in this router is 1. 1 normal 0 stub 0 nssa

Maximum path: 4

Routing for Networks:

1.1.1.1 0.0.0.0 area 0

192.168.1.0 0.0.0.255 area 0

Routing Information Sources:

Gateway Distance Last Update

3.3.3.3 110 00:15:15

2.2.2.2 110 00:16:02

Distance: (default is 110)

R1#show ipv6 protocols

IPv6 Routing Protocol is "connected"

IPv6 Routing Protocol is "application"

IPv6 Routing Protocol is "ND"

IPv6 Routing Protocol is "ospf 1"

Router ID 1.1.1.1

Number of areas: 1 normal, 0 stub, 0 nssa

Interfaces (Area 0):

Loopback0

GigabitEthernet0/0/0

Redistribution:

None

**Router 2:**

R2#Show run

Building configuration...

Current configuration : 1714 bytes

Last configuration change at 18:21:30 UTC Wed Jan 12 2022

version 15.5

service timestamps debug datetime msec

service timestamps log datetime msec

no platform punt-keepalive disable-kernel-core

hostname R2

boot-start-marker

boot-end-marker

vrf definition Mgmt-intf

address-family ipv4

exit-address-family

address-family ipv6

exit-address-family

no aaa new-model

ipv6 unicast-routing

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 2.2.2.2 255.255.255.0

ipv6 address 2001:DB8::2/128

ipv6 ospf 1 area 0

interface GigabitEthernet0/0/0

ip address 192.168.1.2 255.255.255.0

negotiation auto

ipv6 address 2001:DB8:0:1::2/64

ipv6 enable

ipv6 ospf 1 area 0

interface GigabitEthernet0/0/1

ip address 192.168.12.2 255.255.255.0

negotiation auto

ipv6 address 2001:DB8:0:12::2/64

ipv6 enable

ipv6 ospf 1 area 0

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 ospf 1

network 2.2.2.2 0.0.0.0 area 0

network 192.168.1.0 0.0.0.255 area 0

network 192.168.12.0 0.0.0.255 area 0

ip forward-protocol nd

no ip http server

no ip http secure-server

ip tftp source-interface GigabitEthernet0

ipv6 router ospf 1

router-id 2.2.2.2

control-plane

line con 0

stopbits 1

line aux 0

stopbits 1

line vty 0 4

login

End

R2#Show ip route

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

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

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

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

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

1.0.0.0/32 is subnetted, 1 subnets

O 1.1.1.1 [110/2] via 192.168.1.1, 00:21:49, GigabitEthernet0/0/0

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

C 2.2.2.0/24 is directly connected, Loopback0

L 2.2.2.2/32 is directly connected, Loopback0

3.0.0.0/32 is subnetted, 1 subnets

O 3.3.3.3 [110/2] via 192.168.12.3, 00:21:15, GigabitEthernet0/0/1

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

C 192.168.1.0/24 is directly connected, GigabitEthernet0/0/0

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

192.168.12.0/24 is variably subnetted, 2 subnets, 2 masks

C 192.168.12.0/24 is directly connected, GigabitEthernet0/0/1

L 192.168.12.2/32 is directly connected, GigabitEthernet0/0/1

R2#Show ip ospf

Routing Process "ospf 1" with ID 2.2.2.2

Start time: 02:31:49.450, Time elapsed: 00:23:01.298

Supports only single TOS(TOS0) routes

Supports opaque LSA

Supports Link-local Signaling (LLS)

Supports area transit capability

Supports NSSA (compatible with RFC 3101)

Supports Database Exchange Summary List Optimization (RFC 5243)

Event-log enabled, Maximum number of events: 1000, Mode: cyclic

Router is not originating router-LSAs with maximum metric

Initial SPF schedule delay 5000 msecs

Minimum hold time between two consecutive SPFs 10000 msecs

Maximum wait time between two consecutive SPFs 10000 msecs

Incremental-SPF disabled

Minimum LSA interval 5 secs

Minimum LSA arrival 1000 msecs

LSA group pacing timer 240 secs

Interface flood pacing timer 33 msecs

Retransmission pacing timer 66 msecs

EXCHANGE/LOADING adjacency limit: initial 300, process maximum 300

Number of external LSA 0. Checksum Sum 0x000000

Number of opaque AS LSA 0. Checksum Sum 0x000000

Number of DCbitless external and opaque AS LSA 0

Number of DoNotAge external and opaque AS LSA 0

Number of areas in this router is 1. 1 normal 0 stub 0 nssa

Number of areas transit capable is 0

External flood list length 0

IETF NSF helper support enabled

Cisco NSF helper support enabled

Reference bandwidth unit is 100 mbps

Area BACKBONE(0)

Number of interfaces in this area is 3 (1 loopback)

Area has no authentication

SPF algorithm last executed 00:21:28.108 ago

SPF algorithm executed 5 times

Area ranges are

Number of LSA 5. Checksum Sum 0x01943A

Number of opaque link LSA 0. Checksum Sum 0x000000

Number of DCbitless LSA 0

Number of indication LSA 0

Number of DoNotAge LSA 0

Flood list length 0

R2#Show ip ospf interface

Loopback0 is up, line protocol is up

Internet Address 2.2.2.2/24, Area 0, Attached via Network Statement

Process ID 1, Router ID 2.2.2.2, Network Type LOOPBACK, Cost: 1

Topology-MTID Cost Disabled Shutdown Topology Name

0 1 no no Base

Loopback interface is treated as a stub Host

GigabitEthernet0/0/1 is up, line protocol is up

Internet Address 192.168.12.2/24, Area 0, Attached via Network Statement

Process ID 1, Router ID 2.2.2.2, Network Type BROADCAST, Cost: 1

Topology-MTID Cost Disabled Shutdown Topology Name

0 1 no no Base

Transmit Delay is 1 sec, State BDR, Priority 1

Designated Router (ID) 3.3.3.3, Interface address 192.168.12.3

Backup Designated router (ID) 2.2.2.2, Interface address 192.168.12.2

Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5

oob-resync timeout 40

Hello due in 00:00:03

Supports Link-local Signaling (LLS)

Cisco NSF helper support enabled

IETF NSF helper support enabled

Index 1/3/3, flood queue length 0

Next 0x0(0)/0x0(0)/0x0(0)

Last flood scan length is 1, maximum is 1

Last flood scan time is 0 msec, maximum is 0 msec

Neighbor Count is 1, Adjacent neighbor count is 1

Adjacent with neighbor 3.3.3.3 (Designated Router)

Suppress hello for 0 neighbor(s)

GigabitEthernet0/0/0 is up, line protocol is up

Internet Address 192.168.1.2/24, Area 0, Attached via Network Statement

Process ID 1, Router ID 2.2.2.2, Network Type BROADCAST, Cost: 1

Topology-MTID Cost Disabled Shutdown Topology Name

0 1 no no Base

Transmit Delay is 1 sec, State DR, Priority 1

Designated Router (ID) 2.2.2.2, Interface address 192.168.1.2

Backup Designated router (ID) 1.1.1.1, Interface address 192.168.1.1

Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5

oob-resync timeout 40

Hello due in 00:00:03

Supports Link-local Signaling (LLS)

Cisco NSF helper support enabled

IETF NSF helper support enabled

Index 1/2/2, flood queue length 0

Next 0x0(0)/0x0(0)/0x0(0)

Last flood scan length is 2, maximum is 3

Last flood scan time is 0 msec, maximum is 0 msec

Neighbor Count is 1, Adjacent neighbor count is 1

Adjacent with neighbor 1.1.1.1 (Backup Designated Router)

Suppress hello for 0 neighbor(s)

R2#show ip ospf neighbor

Neighbor ID Pri State Dead Time Address Interface

3.3.3.3 1 FULL/DR 00:00:35 192.168.12.3 GigabitEthernet0/0/1

1.1.1.1 1 FULL/BDR 00:00:37 192.168.1.1 GigabitEthernet0/0/0

R2#show ip ospf border-routers

OSPF Router with ID (2.2.2.2) (Process ID 1)

Base Topology (MTID 0)

Internal Router Routing Table

Codes: i - Intra-area route, I - Inter-area route

R2#Show ipv6 ospf

Routing Process "ospfv3 1" with ID 2.2.2.2

Supports NSSA (compatible with RFC 3101)

Supports Database Exchange Summary List Optimization (RFC 5243)

Event-log enabled, Maximum number of events: 1000, Mode: cyclic

Router is not originating router-LSAs with maximum metric

Initial SPF schedule delay 5000 msecs

Minimum hold time between two consecutive SPFs 10000 msecs

Maximum wait time between two consecutive SPFs 10000 msecs

Minimum LSA interval 5 secs

Minimum LSA arrival 1000 msecs

LSA group pacing timer 240 secs

Interface flood pacing timer 33 msecs

Retransmission pacing timer 66 msecs

Retransmission limit dc 24 non-dc 24

EXCHANGE/LOADING adjacency limit: initial 300, process maximum 300

Number of external LSA 0. Checksum Sum 0x000000

Number of areas in this router is 1. 1 normal 0 stub 0 nssa

Graceful restart helper support enabled

Reference bandwidth unit is 100 mbps

RFC1583 compatibility enabled

Area BACKBONE(0)

Number of interfaces in this area is 3

SPF algorithm executed 3 times

Number of LSA 14. Checksum Sum 0x07E92C

Number of DCbitless LSA 0

Number of indication LSA 0

Number of DoNotAge LSA 0

Flood list length 0

R2#Show ipv6 ospf interface

Loopback0 is up, line protocol is up

Link Local Address FE80::267E:12FF:FE4D:F770, Interface ID 12

Area 0, Process ID 1, Instance ID 0, Router ID 2.2.2.2

Network Type LOOPBACK, Cost: 1

Loopback interface is treated as a stub Host

GigabitEthernet0/0/1 is up, line protocol is up

Link Local Address FE80::267E:12FF:FE4D:F771, Interface ID 7

Area 0, Process ID 1, Instance ID 0, Router ID 2.2.2.2

Network Type BROADCAST, Cost: 1

Transmit Delay is 1 sec, State BDR, Priority 1

Designated Router (ID) 3.3.3.3, local address FE80::227:90FF:FED5:FAD1

Backup Designated router (ID) 2.2.2.2, local address FE80::267E:12FF:FE4D:F771

Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5

Hello due in 00:00:06

Graceful restart helper support enabled

Index 1/2/2, flood queue length 0

Next 0x0(0)/0x0(0)/0x0(0)

Last flood scan length is 2, maximum is 2

Last flood scan time is 0 msec, maximum is 0 msec

Neighbor Count is 1, Adjacent neighbor count is 1

Adjacent with neighbor 3.3.3.3 (Designated Router)

Suppress hello for 0 neighbor(s)

GigabitEthernet0/0/0 is up, line protocol is up

Link Local Address FE80::267E:12FF:FE4D:F770, Interface ID 6

Area 0, Process ID 1, Instance ID 0, Router ID 2.2.2.2

Network Type BROADCAST, Cost: 1

Transmit Delay is 1 sec, State DR, Priority 1

Designated Router (ID) 2.2.2.2, local address FE80::267E:12FF:FE4D:F770

Backup Designated router (ID) 1.1.1.1, local address FE80::267E:12FF:FE4D:F6E0

Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5

Hello due in 00:00:07

Graceful restart helper support enabled

Index 1/1/1, flood queue length 0

Next 0x0(0)/0x0(0)/0x0(0)

Last flood scan length is 4, maximum is 4

Last flood scan time is 0 msec, maximum is 1 msec

Neighbor Count is 1, Adjacent neighbor count is 1

Adjacent with neighbor 1.1.1.1 (Backup Designated Router)

Suppress hello for 0 neighbor(s)

R2#Show ipv6 route

IPv6 Routing Table - default - 8 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

O 2001:DB8::1/128 [110/1]

via FE80::267E:12FF:FE4D:F6E0, GigabitEthernet0/0/0

LC 2001:DB8::2/128 [0/0]

via Loopback0, receive

O 2001:DB8::3/128 [110/1]

via FE80::227:90FF:FED5:FAD1, GigabitEthernet0/0/1

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

via GigabitEthernet0/0/0, directly connected

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

via GigabitEthernet0/0/0, receive

C 2001:DB8:0:12::/64 [0/0]

via GigabitEthernet0/0/1, directly connected

L 2001:DB8:0:12::2/128 [0/0]

via GigabitEthernet0/0/1, receive

L FF00::/8 [0/0]

via Null0, receive

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 "ospf 1"

Outgoing update filter list for all interfaces is not set

Incoming update filter list for all interfaces is not set

Router ID 2.2.2.2

Number of areas in this router is 1. 1 normal 0 stub 0 nssa

Maximum path: 4

Routing for Networks:

2.2.2.2 0.0.0.0 area 0

192.168.1.0 0.0.0.255 area 0

192.168.12.0 0.0.0.255 area 0

Routing Information Sources:

Gateway Distance Last Update

3.3.3.3 110 00:25:06

1.1.1.1 110 00:25:40

Distance: (default is 110)

R2#show ipv6 protocols

IPv6 Routing Protocol is "connected"

IPv6 Routing Protocol is "application"

IPv6 Routing Protocol is "ND"

IPv6 Routing Protocol is "ospf 1"

Router ID 2.2.2.2

Number of areas: 1 normal, 0 stub, 0 nssa

Interfaces (Area 0):

Loopback0

GigabitEthernet0/0/1

GigabitEthernet0/0/0

Redistribution:

None

**Router 3:**

R3#Show run

Building configuration...

Current configuration : 2084 bytes

Last configuration change at 18:08:10 UTC Wed Jan 12 2022

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

vtp domain cisco

vtp mode transparent

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 3.3.3.3 255.255.255.0

ipv6 address 2001:DB8::3/128

ipv6 enable

ipv6 ospf 1 area 0

interface GigabitEthernet0/0/0

ip address 192.168.23.3 255.255.255.0

negotiation auto

ipv6 address 2001:DB8:0:23::3/64

ipv6 enable

interface GigabitEthernet0/0/1

ip address 192.168.12.3 255.255.255.0

negotiation auto

ipv6 address 2001:DB8:0:12::3/64

ipv6 enable

ipv6 ospf 1 area 0

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 ospf 1

network 3.3.3.3 0.0.0.0 area 0

network 192.168.12.0 0.0.0.255 area 0

router bgp 1

bgp router-id 3.3.3.3

bgp log-neighbor-changes

neighbor 2001:DB8:0:23::4 remote-as 2

neighbor 192.168.23.4 remote-as 2

address-family ipv4

network 3.3.3.0 mask 255.255.255.0

no neighbor 2001:DB8:0:23::4 activate

neighbor 192.168.23.4 activate

exit-address-family

address-family ipv6

neighbor 2001:DB8:0:23::4 activate

exit-address-family

ip forward-protocol nd

no ip http server

no ip http secure-server

ip tftp source-interface GigabitEthernet0

ipv6 router ospf 1

router-id 3.3.3.3

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

1.0.0.0/32 is subnetted, 1 subnets

O 1.1.1.1 [110/3] via 192.168.12.2, 00:26:29, GigabitEthernet0/0/1

2.0.0.0/32 is subnetted, 1 subnets

O 2.2.2.2 [110/2] via 192.168.12.2, 00:26:29, GigabitEthernet0/0/1

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

C 3.3.3.0/24 is directly connected, Loopback0

L 3.3.3.3/32 is directly connected, Loopback0

4.0.0.0/24 is subnetted, 1 subnets

B 4.4.4.0 [20/0] via 192.168.23.4, 00:25:44

O 192.168.1.0/24 [110/2] via 192.168.12.2, 00:26:29, GigabitEthernet0/0/1

192.168.12.0/24 is variably subnetted, 2 subnets, 2 masks

C 192.168.12.0/24 is directly connected, GigabitEthernet0/0/1

L 192.168.12.3/32 is directly connected, GigabitEthernet0/0/1

192.168.23.0/24 is variably subnetted, 2 subnets, 2 masks

C 192.168.23.0/24 is directly connected, GigabitEthernet0/0/0

L 192.168.23.3/32 is directly connected, GigabitEthernet0/0/0

R3#Show ip ospf

Routing Process "ospf 1" with ID 3.3.3.3

Start time: 02:32:26.734, Time elapsed: 00:27:44.905

Supports only single TOS(TOS0) routes

Supports opaque LSA

Supports Link-local Signaling (LLS)

Supports area transit capability

Supports NSSA (compatible with RFC 3101)

Supports Database Exchange Summary List Optimization (RFC 5243)

Event-log enabled, Maximum number of events: 1000, Mode: cyclic

Router is not originating router-LSAs with maximum metric

Initial SPF schedule delay 5000 msecs

Minimum hold time between two consecutive SPFs 10000 msecs

Maximum wait time between two consecutive SPFs 10000 msecs

Incremental-SPF disabled

Minimum LSA interval 5 secs

Minimum LSA arrival 1000 msecs

LSA group pacing timer 240 secs

Interface flood pacing timer 33 msecs

Retransmission pacing timer 66 msecs

EXCHANGE/LOADING adjacency limit: initial 300, process maximum 300

Number of external LSA 0. Checksum Sum 0x000000

Number of opaque AS LSA 0. Checksum Sum 0x000000

Number of DCbitless external and opaque AS LSA 0

Number of DoNotAge external and opaque AS LSA 0

Number of areas in this router is 1. 1 normal 0 stub 0 nssa

Number of areas transit capable is 0

External flood list length 0

IETF NSF helper support enabled

Cisco NSF helper support enabled

Reference bandwidth unit is 100 mbps

Area BACKBONE(0)

Number of interfaces in this area is 2 (1 loopback)

Area has no authentication

SPF algorithm last executed 00:26:48.792 ago

SPF algorithm executed 3 times

Area ranges are

Number of LSA 5. Checksum Sum 0x01943A

Number of opaque link LSA 0. Checksum Sum 0x000000

Number of DCbitless LSA 0

Number of indication LSA 0

Number of DoNotAge LSA 0

Flood list length 0

R3#Show ip ospf interface

Loopback0 is up, line protocol is up

Internet Address 3.3.3.3/24, Area 0, Attached via Network Statement

Process ID 1, Router ID 3.3.3.3, Network Type LOOPBACK, Cost: 1

Topology-MTID Cost Disabled Shutdown Topology Name

0 1 no no Base

Loopback interface is treated as a stub Host

GigabitEthernet0/0/1 is up, line protocol is up

Internet Address 192.168.12.3/24, Area 0, Attached via Network Statement

Process ID 1, Router ID 3.3.3.3, Network Type BROADCAST, Cost: 1

Topology-MTID Cost Disabled Shutdown Topology Name

0 1 no no Base

Transmit Delay is 1 sec, State DR, Priority 1

Designated Router (ID) 3.3.3.3, Interface address 192.168.12.3

Backup Designated router (ID) 2.2.2.2, Interface address 192.168.12.2

Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5

oob-resync timeout 40

Hello due in 00:00:05

Supports Link-local Signaling (LLS)

Cisco NSF helper support enabled

IETF NSF helper support enabled

Index 1/2/2, flood queue length 0

Next 0x0(0)/0x0(0)/0x0(0)

Last flood scan length is 1, maximum is 2

Last flood scan time is 0 msec, maximum is 0 msec

Neighbor Count is 1, Adjacent neighbor count is 1

Adjacent with neighbor 2.2.2.2 (Backup Designated Router)

Suppress hello for 0 neighbor(s)

R3#show ip ospf neighbor

Neighbor ID Pri State Dead Time Address Interface

2.2.2.2 1 FULL/BDR 00:00:35 192.168.12.2 GigabitEthernet0/0/1

R3#show ip ospf border-routers

OSPF Router with ID (3.3.3.3) (Process ID 1)

Base Topology (MTID 0)

Internal Router Routing Table

Codes: i - Intra-area route, I - Inter-area route

#Show ipv6 ospf interface

Loopback0 is up, line protocol is up

Link Local Address FE80::227:90FF:FED5:FAD0, Interface ID 12

Area 0, Process ID 1, Instance ID 0, Router ID 3.3.3.3

Network Type LOOPBACK, Cost: 1

Loopback interface is treated as a stub Host

GigabitEthernet0/0/1 is up, line protocol is up

Link Local Address FE80::227:90FF:FED5:FAD1, Interface ID 7

Area 0, Process ID 1, Instance ID 0, Router ID 3.3.3.3

Network Type BROADCAST, Cost: 1

Transmit Delay is 1 sec, State DR, Priority 1

Designated Router (ID) 3.3.3.3, local address FE80::227:90FF:FED5:FAD1

Backup Designated router (ID) 2.2.2.2, local address FE80::267E:12FF:FE4D:F771

Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5

Hello due in 00:00:06

Graceful restart helper support enabled

Index 1/1/1, flood queue length 0

Next 0x0(0)/0x0(0)/0x0(0)

Last flood scan length is 2, maximum is 4

Last flood scan time is 0 msec, maximum is 0 msec

Neighbor Count is 1, Adjacent neighbor count is 1

Adjacent with neighbor 2.2.2.2 (Backup Designated Router)

Suppress hello for 0 neighbor(s)

R3#Show ipv6 route

IPv6 Routing Table - default - 9 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

O 2001:DB8::1/128 [110/2]

via FE80::267E:12FF:FE4D:F771, GigabitEthernet0/0/1

O 2001:DB8::2/128 [110/1]

via FE80::267E:12FF:FE4D:F771, GigabitEthernet0/0/1

LC 2001:DB8::3/128 [0/0]

via Loopback0, receive

O 2001:DB8:0:1::/64 [110/2]

via FE80::267E:12FF:FE4D:F771, GigabitEthernet0/0/1

C 2001:DB8:0:12::/64 [0/0]

via GigabitEthernet0/0/1, directly connected

L 2001:DB8:0:12::3/128 [0/0]

via GigabitEthernet0/0/1, receive

C 2001:DB8:0:23::/64 [0/0]

via GigabitEthernet0/0/0, directly connected

L 2001:DB8:0:23::3/128 [0/0]

via GigabitEthernet0/0/0, receive

L FF00::/8 [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 "bgp 1"

Outgoing update filter list for all interfaces is not set

Incoming update filter list for all interfaces is not set

IGP synchronization is disabled

Automatic route summarization is disabled

Neighbor(s):

Address FiltIn FiltOut DistIn DistOut Weight RouteMap

192.168.23.4

Maximum path: 1

Routing Information Sources:

Gateway Distance Last Update

192.168.23.4 20 00:27:45

Distance: external 20 internal 200 local 200

Routing Protocol is "ospf 1"

Outgoing update filter list for all interfaces is not set

Incoming update filter list for all interfaces is not set

Router ID 3.3.3.3

Number of areas in this router is 1. 1 normal 0 stub 0 nssa

Maximum path: 4

Routing for Networks:

3.3.3.3 0.0.0.0 area 0

192.168.12.0 0.0.0.255 area 0

Routing Information Sources:

Gateway Distance Last Update

1.1.1.1 110 00:28:30

2.2.2.2 110 00:28:30

Distance: (default is 110)

R3#show ipv6 protocols

IPv6 Routing Protocol is "connected"

IPv6 Routing Protocol is "application"

IPv6 Routing Protocol is "ND"

IPv6 Routing Protocol is "ospf 1"

Router ID 3.3.3.3

Number of areas: 1 normal, 0 stub, 0 nssa

Interfaces (Area 0):

Loopback0

GigabitEthernet0/0/1

Redistribution:

None

IPv6 Routing Protocol is "bgp 1"

IGP synchronization is disabled

Redistribution:

None

Neighbor(s):

Address FiltIn FiltOut Weight RoutemapIn RoutemapOut

2001:DB8:0:23::4

R3#show ip bgp

BGP table version is 3, local router ID is 3.3.3.3

Status codes: s suppressed, d damped, h history, \* valid, > best, i - internal,

r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,

x best-external, a additional-path, c RIB-compressed,

Origin codes: i - IGP, e - EGP, ? - incomplete

RPKI validation codes: V valid, I invalid, N Not found

Network Next Hop Metric LocPrf Weight Path

\*> 3.3.3.0/24 0.0.0.0 0 32768 i

\*> 4.4.4.0/24 192.168.23.4 0 0 2 i

R3#show ip bgp neighbor

BGP neighbor is 192.168.23.4, remote AS 2, external link

BGP version 4, remote router ID 4.4.4.4

BGP state = Established, up for 00:28:34

Last read 00:00:46, last write 00:00:33, hold time is 180, keepalive interval is 60 seconds

Neighbor sessions:

1 active, is not multisession capable (disabled)

Neighbor capabilities:

Route refresh: advertised and received(new)

Four-octets ASN Capability: advertised and received

Address family IPv4 Unicast: advertised and received

Enhanced Refresh Capability: advertised and received

Multisession Capability:

Stateful switchover support enabled: NO for session 1

Message statistics:

InQ depth is 0

OutQ depth is 0

Sent Rcvd

Opens: 1 1

Notifications: 0 0

Updates: 2 2

Keepalives: 33 33

Route Refresh: 0 0

Total: 36 36

Do log neighbor state changes (via global configuration)

Default minimum time between advertisement runs is 30 seconds

For address family: IPv4 Unicast

Session: 192.168.23.4

BGP table version 3, neighbor version 3/0

Output queue size : 0

Index 1, Advertise bit 0

1 update-group member

Slow-peer detection is disabled

Slow-peer split-update-group dynamic is disabled

Sent Rcvd

Prefix activity: ---- ----

Prefixes Current: 1 1 (Consumes 120 bytes)

Prefixes Total: 1 1

Implicit Withdraw: 0 0

Explicit Withdraw: 0 0

Used as bestpath: n/a 1

Used as multipath: n/a 0

Outbound Inbound

Local Policy Denied Prefixes: -------- -------

Bestpath from this peer: 1 n/a

Total: 1 0

Number of NLRIs in the update sent: max 1, min 0

Last detected as dynamic slow peer: never

Dynamic slow peer recovered: never

Refresh Epoch: 1

Last Sent Refresh Start-of-rib: never

Last Sent Refresh End-of-rib: never

Last Received Refresh Start-of-rib: never

Last Received Refresh End-of-rib: never

Sent Rcvd

Refresh activity: ---- ----

Refresh Start-of-RIB 0 0

Refresh End-of-RIB 0 0

Address tracking is enabled, the RIB does have a route to 192.168.23.4

Connections established 1; dropped 0

Last reset never

External BGP neighbor configured for connected checks (single-hop no-disable-connected-check)

Interface associated: GigabitEthernet0/0/0 (peering address in same link)

Transport(tcp) path-mtu-discovery is enabled

Graceful-Restart is disabled

SSO is disabled

Connection state is ESTAB, I/O status: 1, unread input bytes: 0

Connection is ECN Disabled, Mininum incoming TTL 0, Outgoing TTL 1

Local host: 192.168.23.3, Local port: 179

Foreign host: 192.168.23.4, Foreign port: 63829

Connection tableid (VRF): 0

Maximum output segment queue size: 50

Enqueued packets for retransmit: 0, input: 0 mis-ordered: 0 (0 bytes)

Event Timers (current time is 0xA746A0):

Timer Starts Wakeups Next

Retrans 34 0 0x0

TimeWait 0 0 0x0

AckHold 34 31 0x0

SendWnd 0 0 0x0

KeepAlive 0 0 0x0

GiveUp 0 0 0x0

PmtuAger 0 0 0x0

DeadWait 0 0 0x0

Linger 0 0 0x0

ProcessQ 0 0 0x0

iss: 1246783069 snduna: 1246783831 sndnxt: 1246783831

irs: 1254439687 rcvnxt: 1254440449

sndwnd: 15623 scale: 0 maxrcvwnd: 16384

rcvwnd: 15623 scale: 0 delrcvwnd: 761

SRTT: 989 ms, RTTO: 1076 ms, RTV: 87 ms, KRTT: 0 ms

minRTT: 1 ms, maxRTT: 1000 ms, ACK hold: 200 ms

uptime: 1714961 ms, Sent idletime: 33122 ms, Receive idletime: 32920 ms

Status Flags: passive open, gen tcbs

Option Flags: nagle, path mtu capable

IP Precedence value : 6

Datagrams (max data segment is 1460 bytes):

Rcvd: 70 (out of order: 0), with data: 35, total data bytes: 761

Sent: 69 (retransmit: 0, fastretransmit: 0, partialack: 0, Second Congestion: 0), with data: 35, total data bytes: 761

Packets received in fast path: 0, fast processed: 0, slow path: 0

fast lock acquisition failures: 0, slow path: 0

TCP Semaphore 0x7FF5B7F348C8 FREE

R3#show ip bgp summary

BGP router identifier 3.3.3.3, local AS number 1

BGP table version is 3, main routing table version 3

2 network entries using 496 bytes of memory

2 path entries using 240 bytes of memory

2/2 BGP path/bestpath attribute entries using 496 bytes of memory

1 BGP AS-PATH entries using 24 bytes of memory

0 BGP route-map cache entries using 0 bytes of memory

0 BGP filter-list cache entries using 0 bytes of memory

BGP using 1256 total bytes of memory

BGP activity 2/0 prefixes, 2/0 paths, scan interval 60 secs

Neighbor V AS MsgRcvd MsgSent TblVer InQ OutQ Up/Down State/PfxRcd

192.168.23.4 4 2 37 37 3 0 0 00:29:09 1

R3#show bgp ipv6 neighbor

BGP neighbor is 2001:DB8:0:23::4, remote AS 2, external link

BGP version 4, remote router ID 4.4.4.4

BGP state = Established, up for 00:29:51

Last read 00:00:33, last write 00:00:45, hold time is 180, keepalive interval is 60 seconds

Neighbor sessions:

1 active, is not multisession capable (disabled)

Neighbor capabilities:

Route refresh: advertised and received(new)

Four-octets ASN Capability: advertised and received

Address family IPv6 Unicast: advertised and received

Enhanced Refresh Capability: advertised and received

Multisession Capability:

Stateful switchover support enabled: NO for session 1

Message statistics:

InQ depth is 0

OutQ depth is 0

Sent Rcvd

Opens: 1 1

Notifications: 0 0

Updates: 1 1

Keepalives: 33 34

Route Refresh: 0 0

Total: 35 36

Do log neighbor state changes (via global configuration)

Default minimum time between advertisement runs is 30 seconds

For address family: IPv6 Unicast

Session: 2001:DB8:0:23::4

BGP table version 1, neighbor version 1/0

Output queue size : 0

Index 1, Advertise bit 0

1 update-group member

Slow-peer detection is disabled

Slow-peer split-update-group dynamic is disabled

Sent Rcvd

Prefix activity: ---- ----

Prefixes Current: 0 0

Prefixes Total: 0 0

Implicit Withdraw: 0 0

Explicit Withdraw: 0 0

Used as bestpath: n/a 0

Used as multipath: n/a 0

Outbound Inbound

Local Policy Denied Prefixes: -------- -------

Total: 0 0

Number of NLRIs in the update sent: max 0, min 0

Last detected as dynamic slow peer: never

Dynamic slow peer recovered: never

Refresh Epoch: 1

Last Sent Refresh Start-of-rib: never

Last Sent Refresh End-of-rib: never

Last Received Refresh Start-of-rib: never

Last Received Refresh End-of-rib: never

Sent Rcvd

Refresh activity: ---- ----

Refresh Start-of-RIB 0 0

Refresh End-of-RIB 0 0

Address tracking is enabled, the RIB does have a route to 2001:DB8:0:23::4

Connections established 1; dropped 0

Last reset never

External BGP neighbor configured for connected checks (single-hop no-disable-connected-check)

Interface associated: GigabitEthernet0/0/0 (peering address in same link)

Transport(tcp) path-mtu-discovery is enabled

Graceful-Restart is disabled

SSO is disabled

Connection state is ESTAB, I/O status: 1, unread input bytes: 0

Connection is ECN Disabled, Mininum incoming TTL 0, Outgoing TTL 1

Local host: 2001:DB8:0:23::3, Local port: 179

Foreign host: 2001:DB8:0:23::4, Foreign port: 59108

Connection tableid (VRF): 0

Maximum output segment queue size: 50

Enqueued packets for retransmit: 0, input: 0 mis-ordered: 0 (0 bytes)

Event Timers (current time is 0xA85B94):

Timer Starts Wakeups Next

Retrans 35 0 0x0

TimeWait 0 0 0x0

AckHold 36 35 0x0

SendWnd 0 0 0x0

KeepAlive 0 0 0x0

GiveUp 0 0 0x0

PmtuAger 0 0 0x0

DeadWait 0 0 0x0

Linger 0 0 0x0

ProcessQ 0 0 0x0

iss: 3412840678 snduna: 3412841392 sndnxt: 3412841392

irs: 3186117548 rcvnxt: 3186118281

sndwnd: 15671 scale: 0 maxrcvwnd: 16384

rcvwnd: 15652 scale: 0 delrcvwnd: 732

SRTT: 991 ms, RTTO: 1068 ms, RTV: 77 ms, KRTT: 0 ms

minRTT: 1 ms, maxRTT: 1000 ms, ACK hold: 200 ms

uptime: 1791949 ms, Sent idletime: 33387 ms, Receive idletime: 33587 ms

Status Flags: passive open, gen tcbs

Option Flags: nagle, path mtu capable

IP Precedence value : 6

Datagrams (max data segment is 1440 bytes):

Rcvd: 71 (out of order: 0), with data: 36, total data bytes: 732

Sent: 72 (retransmit: 0, fastretransmit: 0, partialack: 0, Second Congestion: 0), with data: 72, total data bytes: 3601

Packets received in fast path: 0, fast processed: 0, slow path: 0

fast lock acquisition failures: 0, slow path: 0

TCP Semaphore 0x7FF5B7F34808 FREE

R3#show bgp ipv6 summary

BGP router identifier 3.3.3.3, local AS number 1

BGP table version is 1, main routing table version 1

Neighbor V AS MsgRcvd MsgSent TblVer InQ OutQ Up/Down State/PfxRcd

2001:DB8:0:23::4

4 2 37 36 1 0 0 00:30:24 0

**Router 4:**

R4#Show run

Building configuration...

Current configuration : 2034 bytes

Last configuration change at 18:14:10 UTC Wed Jan 12 2022

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

vtp domain cisco

vtp mode transparent

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 4.4.4.4 255.255.255.0

ipv6 address 2001:DB8::4/128

ipv6 eigrp 1

interface GigabitEthernet0/0/0

ip address 192.168.23.4 255.255.255.0

negotiation auto

ipv6 address 2001:DB8:0:23::4/64

ipv6 enable

interface GigabitEthernet0/0/1

ip address 192.168.34.4 255.255.255.0

negotiation auto

ipv6 address 2001:DB8:0:34::4/64

ipv6 enable

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

variance 128

network 192.168.34.0

router bgp 2

bgp router-id 4.4.4.4

bgp log-neighbor-changes

neighbor 2001:DB8:0:23::3 remote-as 1

neighbor 192.168.23.3 remote-as 1

address-family ipv4

network 4.4.4.0 mask 255.255.255.0

no neighbor 2001:DB8:0:23::3 activate

neighbor 192.168.23.3 activate

exit-address-family

address-family ipv6

neighbor 2001:DB8:0:23::3 activate

exit-address-family

ip forward-protocol nd

no ip http server

no ip http secure-server

ip tftp source-interface GigabitEthernet0

ipv6 router eigrp 1

eigrp router-id 4.4.4.4

control-plane

line con 0

stopbits 1

line aux 0

stopbits 1

line vty 0 4

login

End

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

3.0.0.0/24 is subnetted, 1 subnets

B 3.3.3.0 [20/0] via 192.168.23.3, 00:32:33

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

C 4.4.4.0/24 is directly connected, Loopback0

L 4.4.4.4/32 is directly connected, Loopback0

192.168.23.0/24 is variably subnetted, 2 subnets, 2 masks

C 192.168.23.0/24 is directly connected, GigabitEthernet0/0/0

L 192.168.23.4/32 is directly connected, GigabitEthernet0/0/0

192.168.34.0/24 is variably subnetted, 2 subnets, 2 masks

C 192.168.34.0/24 is directly connected, GigabitEthernet0/0/1

L 192.168.34.4/32 is directly connected, GigabitEthernet0/0/1

D 192.168.45.0/24

[90/3072] via 192.168.34.5, 00:30:22, GigabitEthernet0/0/1

R4#Show ip eigrp interface

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 1 0/0 0/0 2 0/0 50 0

R4#show ip eigrp neighbor

EIGRP-IPv4 Neighbors for AS(1)

H Address Interface Hold Uptime SRTT RTO Q Seq

(sec) (ms) Cnt Num

0 192.168.34.5 Gi0/0/1 13 00:31:24 2 100 0 3

R4#show ip eigrp topology

EIGRP-IPv4 Topology Table for AS(1)/ID(4.4.4.4)

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

r - reply Status, s - sia Status

P 192.168.34.0/24, 1 successors, FD is 2816

via Connected, GigabitEthernet0/0/1

P 192.168.45.0/24, 1 successors, FD is 3072

via 192.168.34.5 (3072/2816), GigabitEthernet0/0/1

R4#Show ipv6 eigrp interface

EIGRP-IPv6 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 1 0/0 0/0 1 0/0 50 0

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

R4#Show ipv6 eigrp neighbor

EIGRP-IPv6 Neighbors for AS(1)

H Address Interface Hold Uptime SRTT RTO Q Seq

(sec) (ms) Cnt Num

0 Link-local address: Gi0/0/1 14 00:32:01 1 100 0 8

FE80::CE7F:76FF:FECE:9BF1

R4#show ipv6 eigrp topology

EIGRP-IPv6 Topology Table for AS(1)/ID(4.4.4.4)

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

r - reply Status, s - sia Status

P 2001:DB8::5/128, 1 successors, FD is 130816

via FE80::CE7F:76FF:FECE:9BF1 (130816/128256), GigabitEthernet0/0/1

P 2001:DB8:0:45::/64, 1 successors, FD is 3072

via FE80::CE7F:76FF:FECE:9BF1 (3072/2816), GigabitEthernet0/0/1

P 2001:DB8::4/128, 1 successors, FD is 128256

via Connected, Loopback0

P 2001:DB8::6/128, 1 successors, FD is 131072

via FE80::CE7F:76FF:FECE:9BF1 (131072/130816), GigabitEthernet0/0/1

P 2001:DB8:0:34::/64, 1 successors, FD is 2816

via Connected, GigabitEthernet0/0/1

R4#Show ipv6 route

IPv6 Routing Table - default - 9 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

LC 2001:DB8::4/128 [0/0]

via Loopback0, receive

D 2001:DB8::5/128 [90/130816]

via FE80::CE7F:76FF:FECE:9BF1, GigabitEthernet0/0/1

D 2001:DB8::6/128 [90/131072]

via FE80::CE7F:76FF:FECE:9BF1, GigabitEthernet0/0/1

C 2001:DB8:0:23::/64 [0/0]

via GigabitEthernet0/0/0, directly connected

L 2001:DB8:0:23::4/128 [0/0]

via GigabitEthernet0/0/0, receive

C 2001:DB8:0:34::/64 [0/0]

via GigabitEthernet0/0/1, directly connected

L 2001:DB8:0:34::4/128 [0/0]

via GigabitEthernet0/0/1, receive

D 2001:DB8:0:45::/64 [90/3072]

via FE80::CE7F:76FF:FECE:9BF1, GigabitEthernet0/0/1

L FF00::/8 [0/0]

via Null0, receive

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 "bgp 2"

Outgoing update filter list for all interfaces is not set

Incoming update filter list for all interfaces is not set

IGP synchronization is disabled

Automatic route summarization is disabled

Neighbor(s):

Address FiltIn FiltOut DistIn DistOut Weight RouteMap

192.168.23.3

Maximum path: 1

Routing Information Sources:

Gateway Distance Last Update

192.168.23.3 20 00:34:16

Distance: external 20 internal 200 local 200

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=0, K3=1, K4=0, K5=0

Soft SIA disabled

NSF-aware route hold timer is 240

EIGRP NSF disabled

NSF signal timer is 20s

NSF converge timer is 120s

Router-ID: 4.4.4.4

Topology : 0 (base)

Active Timer: 3 min

Distance: internal 90 external 170

Maximum path: 4

Maximum hopcount 100

Maximum metric variance 128

Automatic Summarization: disabled

Maximum path: 4

Routing for Networks:

192.168.34.0

Routing Information Sources:

Gateway Distance Last Update

192.168.34.5 90 00:32:06

Distance: internal 90 external 170

R4#show ipv6 protocols

IPv6 Routing Protocol is "connected"

IPv6 Routing Protocol is "application"

IPv6 Routing Protocol is "ND"

IPv6 Routing Protocol is "bgp 2"

IGP synchronization is disabled

Redistribution:

None

Neighbor(s):

Address FiltIn FiltOut Weight RoutemapIn RoutemapOut

2001:DB8:0:23::3

IPv6 Routing Protocol is "eigrp 1"

EIGRP-IPv6 Protocol for AS(1)

Metric weight K1=1, K2=0, K3=1, K4=0, K5=0

Soft SIA disabled

NSF-aware route hold timer is 240

EIGRP NSF disabled

NSF signal timer is 20s

NSF converge timer is 120s

Router-ID: 4.4.4.4

Topology : 0 (base)

Active Timer: 3 min

Distance: internal 90 external 170

Maximum path: 16

Maximum hopcount 100

Maximum metric variance 1

Interfaces:

GigabitEthernet0/0/1

Loopback0

Redistribution:

None

R4#show ip bgp

BGP table version is 3, local router ID is 4.4.4.4

Status codes: s suppressed, d damped, h history, \* valid, > best, i - internal,

r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,

x best-external, a additional-path, c RIB-compressed,

Origin codes: i - IGP, e - EGP, ? - incomplete

RPKI validation codes: V valid, I invalid, N Not found

Network Next Hop Metric LocPrf Weight Path

\*> 3.3.3.0/24 192.168.23.3 0 0 1 i

\*> 4.4.4.0/24 0.0.0.0 0 32768 i

R4#show ip bgp neighbor

BGP neighbor is 192.168.23.3, remote AS 1, external link

BGP version 4, remote router ID 3.3.3.3

BGP state = Established, up for 00:34:57

Last read 00:00:20, last write 00:00:01, hold time is 180, keepalive interval is 60 seconds

Neighbor sessions:

1 active, is not multisession capable (disabled)

Neighbor capabilities:

Route refresh: advertised and received(new)

Four-octets ASN Capability: advertised and received

Address family IPv4 Unicast: advertised and received

Enhanced Refresh Capability: advertised and received

Multisession Capability:

Stateful switchover support enabled: NO for session 1

Message statistics:

InQ depth is 0

OutQ depth is 0

Sent Rcvd

Opens: 1 1

Notifications: 0 0

Updates: 2 2

Keepalives: 41 40

Route Refresh: 0 0

Total: 44 43

Do log neighbor state changes (via global configuration)

Default minimum time between advertisement runs is 30 seconds

For address family: IPv4 Unicast

Session: 192.168.23.3

BGP table version 3, neighbor version 3/0

Output queue size : 0

Index 1, Advertise bit 0

1 update-group member

Slow-peer detection is disabled

Slow-peer split-update-group dynamic is disabled

Sent Rcvd

Prefix activity: ---- ----

Prefixes Current: 1 1 (Consumes 120 bytes)

Prefixes Total: 1 1

Implicit Withdraw: 0 0

Explicit Withdraw: 0 0

Used as bestpath: n/a 1

Used as multipath: n/a 0

Outbound Inbound

Local Policy Denied Prefixes: -------- -------

Bestpath from this peer: 1 n/a

Total: 1 0

Number of NLRIs in the update sent: max 1, min 0

Last detected as dynamic slow peer: never

Dynamic slow peer recovered: never

Refresh Epoch: 1

Last Sent Refresh Start-of-rib: never

Last Sent Refresh End-of-rib: never

Last Received Refresh Start-of-rib: never

Last Received Refresh End-of-rib: never

Sent Rcvd

Refresh activity: ---- ----

Refresh Start-of-RIB 0 0

Refresh End-of-RIB 0 0

Address tracking is enabled, the RIB does have a route to 192.168.23.3

Connections established 1; dropped 0

Last reset never

External BGP neighbor configured for connected checks (single-hop no-disable-connected-check)

Interface associated: GigabitEthernet0/0/0 (peering address in same link)

Transport(tcp) path-mtu-discovery is enabled

Graceful-Restart is disabled

SSO is disabled

Connection state is ESTAB, I/O status: 1, unread input bytes: 0

Connection is ECN Disabled, Mininum incoming TTL 0, Outgoing TTL 1

Local host: 192.168.23.4, Local port: 63829

Foreign host: 192.168.23.3, Foreign port: 179

Connection tableid (VRF): 0

Maximum output segment queue size: 50

Enqueued packets for retransmit: 0, input: 0 mis-ordered: 0 (0 bytes)

Event Timers (current time is 0x26E5D6):

Timer Starts Wakeups Next

Retrans 44 1 0x0

TimeWait 0 0 0x0

AckHold 41 38 0x0

SendWnd 0 0 0x0

KeepAlive 0 0 0x0

GiveUp 0 0 0x0

PmtuAger 1208 1207 0x26E6B0

DeadWait 0 0 0x0

Linger 0 0 0x0

ProcessQ 0 0 0x0

iss: 1254439687 snduna: 1254440601 sndnxt: 1254440601

irs: 1246783069 rcvnxt: 1246783964

sndwnd: 15471 scale: 0 maxrcvwnd: 16384

rcvwnd: 15490 scale: 0 delrcvwnd: 894

SRTT: 996 ms, RTTO: 1027 ms, RTV: 31 ms, KRTT: 0 ms

minRTT: 1 ms, maxRTT: 1000 ms, ACK hold: 200 ms

uptime: 2099907 ms, Sent idletime: 1551 ms, Receive idletime: 1349 ms

Status Flags: active open

Option Flags: nagle, path mtu capable

IP Precedence value : 6

Datagrams (max data segment is 1460 bytes):

Rcvd: 84 (out of order: 0), with data: 42, total data bytes: 894

Sent: 85 (retransmit: 1, fastretransmit: 0, partialack: 0, Second Congestion: 0), with data: 43, total data bytes: 913

Packets received in fast path: 0, fast processed: 0, slow path: 0

fast lock acquisition failures: 0, slow path: 0

TCP Semaphore 0x7F3CAA715BC8 FREE

R4#show ip bgp summary

BGP router identifier 4.4.4.4, local AS number 2

BGP table version is 3, main routing table version 3

2 network entries using 496 bytes of memory

2 path entries using 240 bytes of memory

2/2 BGP path/bestpath attribute entries using 496 bytes of memory

1 BGP AS-PATH entries using 24 bytes of memory

0 BGP route-map cache entries using 0 bytes of memory

0 BGP filter-list cache entries using 0 bytes of memory

BGP using 1256 total bytes of memory

BGP activity 2/0 prefixes, 2/0 paths, scan interval 60 secs

Neighbor V AS MsgRcvd MsgSent TblVer InQ OutQ Up/Down State/PfxRcd

192.168.23.3 4 1 43 44 3 0 0 00:35:16 1

R4#show bgp ipv6 neighbor

BGP neighbor is 2001:DB8:0:23::3, remote AS 1, external link

BGP version 4, remote router ID 3.3.3.3

BGP state = Established, up for 00:35:37

Last read 00:00:14, last write 00:00:51, hold time is 180, keepalive interval is 60 seconds

Neighbor sessions:

1 active, is not multisession capable (disabled)

Neighbor capabilities:

Route refresh: advertised and received(new)

Four-octets ASN Capability: advertised and received

Address family IPv6 Unicast: advertised and received

Enhanced Refresh Capability: advertised and received

Multisession Capability:

Stateful switchover support enabled: NO for session 1

Message statistics:

InQ depth is 0

OutQ depth is 0

Sent Rcvd

Opens: 1 1

Notifications: 0 0

Updates: 1 1

Keepalives: 40 40

Route Refresh: 0 0

Total: 42 42

Do log neighbor state changes (via global configuration)

Default minimum time between advertisement runs is 30 seconds

For address family: IPv6 Unicast

Session: 2001:DB8:0:23::3

BGP table version 1, neighbor version 1/0

Output queue size : 0

Index 1, Advertise bit 0

1 update-group member

Slow-peer detection is disabled

Slow-peer split-update-group dynamic is disabled

Sent Rcvd

Prefix activity: ---- ----

Prefixes Current: 0 0

Prefixes Total: 0 0

Implicit Withdraw: 0 0

Explicit Withdraw: 0 0

Used as bestpath: n/a 0

Used as multipath: n/a 0

Outbound Inbound

Local Policy Denied Prefixes: -------- -------

Total: 0 0

Number of NLRIs in the update sent: max 0, min 0

Last detected as dynamic slow peer: never

Dynamic slow peer recovered: never

Refresh Epoch: 1

Last Sent Refresh Start-of-rib: never

Last Sent Refresh End-of-rib: never

Last Received Refresh Start-of-rib: never

Last Received Refresh End-of-rib: never

Sent Rcvd

Refresh activity: ---- ----

Refresh Start-of-RIB 0 0

Refresh End-of-RIB 0 0

Address tracking is enabled, the RIB does have a route to 2001:DB8:0:23::3

Connections established 1; dropped 0

Last reset never

External BGP neighbor configured for connected checks (single-hop no-disable-connected-check)

Interface associated: GigabitEthernet0/0/0 (peering address in same link)

Transport(tcp) path-mtu-discovery is enabled

Graceful-Restart is disabled

SSO is disabled

Connection state is ESTAB, I/O status: 1, unread input bytes: 0

Connection is ECN Disabled, Mininum incoming TTL 0, Outgoing TTL 1

Local host: 2001:DB8:0:23::4, Local port: 59108

Foreign host: 2001:DB8:0:23::3, Foreign port: 179

Connection tableid (VRF): 0

Maximum output segment queue size: 50

Enqueued packets for retransmit: 0, input: 0 mis-ordered: 0 (0 bytes)

Event Timers (current time is 0x276878):

Timer Starts Wakeups Next

Retrans 43 0 0x0

TimeWait 0 0 0x0

AckHold 42 39 0x0

SendWnd 0 0 0x0

KeepAlive 0 0 0x0

GiveUp 0 0 0x0

PmtuAger 1278 1277 0x276B16

DeadWait 0 0 0x0

Linger 0 0 0x0

ProcessQ 0 0 0x0

iss: 3186117548 snduna: 3186118395 sndnxt: 3186118395

irs: 3412840678 rcvnxt: 3412841525

sndwnd: 15538 scale: 0 maxrcvwnd: 16384

rcvwnd: 15538 scale: 0 delrcvwnd: 846

SRTT: 997 ms, RTTO: 1025 ms, RTV: 28 ms, KRTT: 0 ms

minRTT: 2 ms, maxRTT: 1000 ms, ACK hold: 200 ms

uptime: 2137445 ms, Sent idletime: 14073 ms, Receive idletime: 14273 ms

Status Flags: active open

Option Flags: nagle, path mtu capable

IP Precedence value : 6

Datagrams (max data segment is 1440 bytes):

Rcvd: 85 (out of order: 0), with data: 42, total data bytes: 846

Sent: 84 (retransmit: 0, fastretransmit: 0, partialack: 0, Second Congestion: 0), with data: 84, total data bytes: 4214

Packets received in fast path: 0, fast processed: 0, slow path: 0

fast lock acquisition failures: 0, slow path: 0

TCP Semaphore 0x7F3CAA715C88 FREE

R4#show bgp ipv6 summary

BGP router identifier 4.4.4.4, local AS number 2

BGP table version is 1, main routing table version 1

Neighbor V AS MsgRcvd MsgSent TblVer InQ OutQ Up/Down State/PfxRcd

2001:DB8:0:23::3

4 1 42 43 1 0 0 00:36:11 0

**Router 5:**

R5#Show run

Building configuration...

Current configuration : 3974 bytes

Last configuration change at 18:14:26 UTC Wed Jan 12 2022

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 R5

boot-start-marker

boot-end-marker

vrf definition Mgmt-intf

address-family ipv4

exit-address-family

address-family ipv6

exit-address-family

no aaa new-model

login on-success log

subscriber templating

ipv6 unicast-routing

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 0D323230 31313231 37353331

345A170D 33303031 30313030 30303030 5A303031 2E302C06 03550403 1325494F

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

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

82010100 B4B59B9B 283DC014 36F56CDA 2CAF0825 4468B2D9 2BBD09BE 6103873D

5D7AB063 E6C02DEC C05C79E2 363DC934 FB8BD71F BF3C81DF C227DE85 20388C8E

B44941F7 25C7CCF4 B7081E1C 06D1DA17 FBA5FAA1 43326A16 B7101FD1 3D220170

1F4BF5F6 041F445A D773005A A7A0063E 36E95004 D759ACA7 AD63FF88 27816238

3B2D583F E462C3BB 375FF30E 6A412EBC E50DBA49 95FED621 9F60BCD6 5FBCAC37

96BEFAF3 D6DF31CB 12601DEC BB0F45C9 29FBCFD3 90846589 509A3E51 343D5854

EA19E8C1 09678133 1CCBB5EF 4D79CFA6 2B84C09B A05315B8 6C542F8C 35CCDA80

3E7E1CC6 9269B28D 1B5780E6 66A45835 122F7D20 884E5D55 2C302C57 D760FB2E

8B67AD7D 02030100 01A35330 51300F06 03551D13 0101FF04 05300301 01FF301F

0603551D 23041830 16801486 70DA6437 F74F59EF 6C465F9C EAB0A452 C458F630

1D060355 1D0E0416 04148670 DA6437F7 4F59EF6C 465F9CEA B0A452C4 58F6300D

06092A86 4886F70D 01010505 00038201 01008141 6462E161 2E3D64AF ADD67CE2

26A15811 AA905240 E73292A1 705FD67F 4EA7E098 4431E21A D5F76C58 77B6ADA2

115BA795 B0C18069 F1B7AAA3 7CCADA38 5BB08840 82A74A09 407F8E6E F6555710

4FE3B81E 2DC4C724 8A39CA81 BA6E9A03 D98D07E4 B0C0411C 7539CDF5 69216F25

EAED271D E94A4B9F 34BE5800 8F3CC2D4 0C25461E E017985A 4803F15C A693C041

999605BA C9A658BD BEE48C12 8E78634F 50BC7D20 0E002F97 AA1987F3 D2196AD1

3A0E1E32 431B1BFF D8A9406F B1EF2752 7B904ECB 1F3BD644 62168D15 505F9962

E88508CB 6FB22059 A02F5D31 126D2502 33CEAE7E FF510101 617B753C DFF089FC

A22D06B9 BBDD128F BFE9495C 23149FE1 550B

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 5.5.5.5 255.255.255.0

ipv6 address 2001:DB8::5/128

ipv6 eigrp 1

interface GigabitEthernet0/0/0

ip address 192.168.45.5 255.255.255.0

negotiation auto

ipv6 address 2001:DB8:0:45::5/64

ipv6 enable

ipv6 eigrp 1

interface GigabitEthernet0/0/1

ip address 192.168.34.5 255.255.255.0

negotiation auto

ipv6 address 2001:DB8:0:34::5/64

ipv6 enable

ipv6 eigrp 1

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

variance 128

network 192.168.34.0

network 192.168.45.0

ip forward-protocol nd

ip http server

ip http authentication local

ip http secure-server

ip tftp source-interface GigabitEthernet0

ipv6 router eigrp 1

eigrp router-id 5.5.5.5

control-plane

line con 0

transport input none

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

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

C 5.5.5.0/24 is directly connected, Loopback0

L 5.5.5.5/32 is directly connected, Loopback0

192.168.34.0/24 is variably subnetted, 2 subnets, 2 masks

C 192.168.34.0/24 is directly connected, GigabitEthernet0/0/1

L 192.168.34.5/32 is directly connected, GigabitEthernet0/0/1

192.168.45.0/24 is variably subnetted, 2 subnets, 2 masks

C 192.168.45.0/24 is directly connected, GigabitEthernet0/0/0

L 192.168.45.5/32 is directly connected, GigabitEthernet0/0/0

R5#Show ip eigrp interface

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 1 0/0 0/0 1 0/0 50 0

Gi0/0/0 1 0/0 0/0 1 0/0 50 0

R5#show ip eigrp neighbor

EIGRP-IPv4 Neighbors for AS(1)

H Address Interface Hold Uptime SRTT RTO Q Seq

(sec) (ms) Cnt Num

1 192.168.45.6 Gi0/0/0 12 00:35:27 1 100 0 3

0 192.168.34.4 Gi0/0/1 13 00:35:59 1 100 0 3

R5#show ip eigrp topology

EIGRP-IPv4 Topology Table for AS(1)/ID(5.5.5.5)

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

r - reply Status, s - sia Status

P 192.168.34.0/24, 1 successors, FD is 2816

via Connected, GigabitEthernet0/0/1

P 192.168.45.0/24, 1 successors, FD is 2816

via Connected, GigabitEthernet0/0/0

R5#Show ipv6 eigrp interface

EIGRP-IPv6 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 1 0/0 0/0 1021 0/0 5108 0

Gi0/0/0 1 0/0 0/0 1 0/0 50 0

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

R5#Show ipv6 eigrp neighbor

EIGRP-IPv6 Neighbors for AS(1)

H Address Interface Hold Uptime SRTT RTO Q Seq

(sec) (ms) Cnt Num

1 Link-local address: Gi0/0/0 12 00:35:56 1 100 0 3

FE80::CE7F:76FF:FEC8:A1F0

0 Link-local address: Gi0/0/1 14 00:36:28 1021 5000 0 6

FE80::B6A8:B9FF:FE01:B991

R5#show ipv6 eigrp topology

EIGRP-IPv6 Topology Table for AS(1)/ID(5.5.5.5)

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

r - reply Status, s - sia Status

P 2001:DB8::5/128, 1 successors, FD is 128256

via Connected, Loopback0

P 2001:DB8:0:45::/64, 1 successors, FD is 2816

via Connected, GigabitEthernet0/0/0

P 2001:DB8::4/128, 1 successors, FD is 130816

via FE80::B6A8:B9FF:FE01:B991 (130816/128256), GigabitEthernet0/0/1

P 2001:DB8::6/128, 1 successors, FD is 130816

via FE80::CE7F:76FF:FEC8:A1F0 (130816/128256), GigabitEthernet0/0/0

P 2001:DB8:0:34::/64, 1 successors, FD is 2816

via Connected, GigabitEthernet0/0/1

R5#Show ipv6 route

IPv6 Routing Table - default - 8 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::4/128 [90/130816]

via FE80::B6A8:B9FF:FE01:B991, GigabitEthernet0/0/1

LC 2001:DB8::5/128 [0/0]

via Loopback0, receive

D 2001:DB8::6/128 [90/130816]

via FE80::CE7F:76FF:FEC8:A1F0, GigabitEthernet0/0/0

C 2001:DB8:0:34::/64 [0/0]

via GigabitEthernet0/0/1, directly connected

L 2001:DB8:0:34::5/128 [0/0]

via GigabitEthernet0/0/1, receive

C 2001:DB8:0:45::/64 [0/0]

via GigabitEthernet0/0/0, directly connected

L 2001:DB8:0:45::5/128 [0/0]

via GigabitEthernet0/0/0, receive

L FF00::/8 [0/0]

via Null0, receive

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=0, K3=1, K4=0, K5=0

Soft SIA disabled

NSF-aware route hold timer is 240

EIGRP NSF disabled

NSF signal timer is 20s

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=0, K3=1, K4=0, K5=0

Soft SIA disabled

NSF-aware route hold timer is 240

EIGRP NSF disabled

NSF signal timer is 20s

NSF converge timer is 120s

Router-ID: 5.5.5.5

Topology : 0 (base)

Active Timer: 3 min

Distance: internal 90 external 170

Maximum path: 16

Maximum hopcount 100

Maximum metric variance 1

Interfaces:

GigabitEthernet0/0/1

GigabitEthernet0/0/0

Loopback0

Redistribution:

None

**Router 6:**

R6#Show run

Building configuration...

Current configuration : 3885 bytes

Last configuration change at 18:24:41 UTC Wed Jan 12 2022

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 R6

boot-start-marker

boot-end-marker

vrf definition Mgmt-intf

address-family ipv4

exit-address-family

address-family ipv6

exit-address-family

no aaa new-model

login on-success log

subscriber templating

ipv6 unicast-routing

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 170D3232 30313132 31373533

34395A17 0D333030 31303130 30303030 305A3031 312F302D 06035504 03132649

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

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

0A028201 0100B991 7506EC55 E5FF2A89 3372D431 F07BDB39 0B119FD7 997341EF

E9234B76 0CB901A4 1B657585 FA448E4A A0451B9E 76CE9843 FBFC82E4 C7CA0352

4039D2B7 242FE8DE D8D7C091 E444C9FA 5E58BF3C 39A9AB72 C5552E54 DB352E77

0EC83308 652CBF7A C61BBD8D 0D4F23F5 C1A4D157 80F4DB6B 35A6DCB8 51795427

0063E0BB 8CECCD62 24F3A809 C51389AC 4FFA5868 23262F6D 2C7E1251 956E5A4B

57B4DDA9 7B7F7E72 8CE3D05F 56BBD46C 057E8696 0154EF31 72AC496F 34CCEB7B

695B78CF 01DCBE32 241D7DDD 45DBAD72 A48FADD2 0A216370 0C882BD6 E7D25E43

BF70AECE 85D4C078 CC43ABAB 34AB56F9 47B62F53 B87BFA0F 177D8736 536294DB

00791944 82D10203 010001A3 53305130 0F060355 1D130101 FF040530 030101FF

301F0603 551D2304 18301680 1441EFDE ABB3EB1D 9C848E94 0C6D1725 36258BE6

86301D06 03551D0E 04160414 41EFDEAB B3EB1D9C 848E940C 6D172536 258BE686

300D0609 2A864886 F70D0101 05050003 82010100 3242F843 16A97590 C8313B99

2ACCB02D CBBC8321 51CF67C0 E3A6E5EF 54EE28B4 3EAF3345 CF385E12 D2D0C7EF

EB86369D 5D6B8347 4FA56B4B F76F3C50 1C4C7767 4CE351AE C028DF6C 59968AF0

0EFEDAC2 E77F5570 1D5FC04F BCF62261 58234080 C1B3BB26 DBE651D3 EB59B516

FA706FE2 AC8BFDDF 6E18A760 70492C71 0EF35BDC 7E0B8294 187E8422 79082B8C

F7F0BD79 135FE388 1F37A0B8 7E4A508F 6DFE7275 70011C48 C749951B A50581F4

04EAEEC0 2BF80387 E176E9A9 4283655D D4755360 0B0110A6 3A51E9E7 64EE2EA3

131B8FF9 A3E027DC 651C607E 76D5D691 86676421 98C083EF F24E1E31 7FB8D5BF

710B9914 979A2F9F 1448ED34 21379F4D EC54A1B0

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 6.6.6.6 255.255.255.0

ipv6 address 2001:DB8::6/128

ipv6 eigrp 1

interface GigabitEthernet0/0/0

ip address 192.168.45.6 255.255.255.0

negotiation auto

ipv6 address 2001:DB8:0:45::6/64

ipv6 enable

ipv6 eigrp 1

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

variance 128

network 192.168.45.0

ip forward-protocol nd

ip http server

ip http authentication local

ip http secure-server

ip tftp source-interface GigabitEthernet0

ipv6 router eigrp 1

eigrp router-id 6.6.6.6

control-plane

line con 0

transport input none

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

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

C 6.6.6.0/24 is directly connected, Loopback0

L 6.6.6.6/32 is directly connected, Loopback0

D 192.168.34.0/24

[90/3072] via 192.168.45.5, 00:38:08, GigabitEthernet0/0/0

192.168.45.0/24 is variably subnetted, 2 subnets, 2 masks

C 192.168.45.0/24 is directly connected, GigabitEthernet0/0/0

L 192.168.45.6/32 is directly connected, GigabitEthernet0/0/0

R6#Show ip eigrp interface

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 1 0/0 0/0 1598 0/0 7992 0

R6#show ip eigrp neighbor

EIGRP-IPv4 Neighbors for AS(1)

H Address Interface Hold Uptime SRTT RTO Q Seq

(sec) (ms) Cnt Num

0 192.168.45.5 Gi0/0/0 13 00:38:29 1598 5000 0 5

R6#show ip eigrp topology

EIGRP-IPv4 Topology Table for AS(1)/ID(6.6.6.6)

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

r - reply Status, s - sia Status

P 192.168.34.0/24, 1 successors, FD is 3072

via 192.168.45.5 (3072/2816), GigabitEthernet0/0/0

P 192.168.45.0/24, 1 successors, FD is 2816

via Connected, GigabitEthernet0/0/0

R6#Show ipv6 eigrp neighbor

EIGRP-IPv6 Neighbors for AS(1)

H Address Interface Hold Uptime SRTT RTO Q Seq

(sec) (ms) Cnt Num

0 Link-local address: Gi0/0/0 14 00:38:53 1599 5000 0 7

FE80::CE7F:76FF:FECE:9BF0

R6#show ipv6 eigrp topology

EIGRP-IPv6 Topology Table for AS(1)/ID(6.6.6.6)

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

r - reply Status, s - sia Status

P 2001:DB8::5/128, 1 successors, FD is 130816

via FE80::CE7F:76FF:FECE:9BF0 (130816/128256), GigabitEthernet0/0/0

P 2001:DB8:0:45::/64, 1 successors, FD is 2816

via Connected, GigabitEthernet0/0/0

P 2001:DB8::4/128, 1 successors, FD is 131072

via FE80::CE7F:76FF:FECE:9BF0 (131072/130816), GigabitEthernet0/0/0

P 2001:DB8::6/128, 1 successors, FD is 128256

via Connected, Loopback0

P 2001:DB8:0:34::/64, 1 successors, FD is 3072

via FE80::CE7F:76FF:FECE:9BF0 (3072/2816), GigabitEthernet0/0/0

R6#Show ipv6 route

IPv6 Routing Table - default - 7 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::4/128 [90/131072]

via FE80::CE7F:76FF:FECE:9BF0, GigabitEthernet0/0/0

D 2001:DB8::5/128 [90/130816]

via FE80::CE7F:76FF:FECE:9BF0, GigabitEthernet0/0/0

LC 2001:DB8::6/128 [0/0]

via Loopback0, receive

D 2001:DB8:0:34::/64 [90/3072]

via FE80::CE7F:76FF:FECE:9BF0, GigabitEthernet0/0/0

C 2001:DB8:0:45::/64 [0/0]

via GigabitEthernet0/0/0, directly connected

L 2001:DB8:0:45::6/128 [0/0]

via GigabitEthernet0/0/0, receive

L FF00::/8 [0/0]

via Null0, receive

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=0, K3=1, K4=0, K5=0

Soft SIA disabled

NSF-aware route hold timer is 240

EIGRP NSF disabled

NSF signal timer is 20s

NSF converge timer is 120s

Router-ID: 6.6.6.6

Topology : 0 (base)

Active Timer: 3 min

Distance: internal 90 external 170

Maximum path: 4

Maximum hopcount 100

Maximum metric variance 128

Automatic Summarization: disabled

Maximum path: 4

Routing for Networks:

192.168.45.0

Routing Information Sources:

Gateway Distance Last Update

192.168.45.5 90 00:39:23

Distance: internal 90 external 170

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=0, K3=1, K4=0, K5=0

Soft SIA disabled

NSF-aware route hold timer is 240

EIGRP NSF disabled

NSF signal timer is 20s

NSF converge timer is 120s

Router-ID: 6.6.6.6

Topology : 0 (base)

Active Timer: 3 min

Distance: internal 90 external 170

Maximum path: 16

Maximum hopcount 100

Maximum metric variance 1

Interfaces:

GigabitEthernet0/0/0

Loopback0

Redistribution:

None

Problems

One of the biggest problems that I faced in the lab was that I wasn’t familiar with how to configure a Border Gateway protocol (BGP) system, so I looked at the cisco book along with the cisco website on BGP configuration to understand how to properly configure an EBGP system. During the process of creating a BGP, I did encounter some minor problems in not properly using the BGP commands, one example was setting up the wrong networks and setting the wrong AS number for the neighbor as commands. Another minor command problem would be not enabling prefixes with the neighbor activate command. These problems were easily fixed by researching BGP commands.

Conclusion

The objective of the lab was to use 6 routers to configure a BGP (Border Gateway Protocol) system with three routers configured with OSPF and another Three routers configured with EIGRP connected on router 3 and router 4 through EBGP. In the lab I was able to learn how to correctly configure BGP systems that could be applied to real networks. I was also able to learn about how BGP routing worked in an network. 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 BGP and improving my general knowledge of cisco networking.