CCNP ROUTING AND SWITCHING



Configuring

iBGP Routing

Brennen Tse

1/29/2022

**Purpose:**

The purpose of this lab is to configure IBGP on an internal network for IPv4 and IPv6, allowing EBGP configurations for two border networks to be preserved through IBGP.IGBP will run overtop of EIGRP, and EBGP will be used to redistribute routes from OSPF border networks into the internal EIGRP network. Students will learn how to configure IBGP and run two routing protocols simultaneously.

**Background:**

While IGBP is not as widely used as EBGP, it still serves an important purpose in many networks on the internet. IBGP is an interior routing protocol, but not in the traditional sense. Unlike OSPF or EIGRP, IBGP does not use its own routes, instead they provide a way to route EBGP route advertisements overtop of traditional IGP protocols like OSPF. IBGP neighbors or peers do not have to be directly connected, although they do have to be configured through neighbor peer relationships. The commands neighbor and neighbor activate creates this full mesh. IBGP also supports multi-hop connections so as long as there is a path to the router and they are within the same AS they can be IBGP neighbors. IBGP helps provide more information to internal routers and retains the BGP routes through IBGP instead of redistributing them through a routing protocol like EIGRP. If you don’t use synchronization, route recursion is a way to share route lookups. Using the destination network can help determine where the packet gets sent instead of the AS-path.

**Lab Summary:**

When configuring this IBGP lab, I set up seven 4321 Cisco Routers connected with copper crossover cables between their Gig 0/0/0 and 0/0/1 interfaces. Routers used the IPv4 network of 10.0.0.0 with a /30 subnet from 10.0.0-10.0.0.22. They also used the IPv6 network of 2001:db8:acad::/64. Loopback addresses are used in the place of LANs. Loopbacks have the IPv4 addresses in the 192.168.0.0/16 network and are subnetted into /30s. They use IPv6 addresses in the 2001:db8:acad:0::1/64 network. I also configured OSPFv2 and OSPFv3 router 1,2,6,7, EIGRP for router 3,4,5, EBGP for 2,3,5,6 and IBGP for 3,4,5. I set loopback interfaces as passive interfaces and pinged all addresses in the network to ensure routes and IBGP was working. To check that IBGP is working, consult page 25, 31, 45, and 47, the appropriate areas should be highlighted in red.

Lab Commands:

Router(config-router)#**neighbor # update-source #**

Definition: This command specifies that the router should use IBGP peers as the source address.

Router#**show ip bgp summary**

Definition: Displays the BGP path, prefix, and attribute information for all connections to BGP Neighbors.

Router#**show bgp ipv6 unicast summary**

Definition:

Router#**show ip bgp neighbors**

Definition: This command displays information about IPv4 BGP and TCP connections to neighbors. For BGP, this includes detailed neighbor attribute, capability, path, and prefix information. For TCP, this includes statistics related to BGP neighbor session establishment and maintenance.

Router#**show bgp ipv6 neighbors**

Definition: This command displays information about IPv6 BGP and TCP connections to neighbors. For BGP, this includes detailed neighbor attribute, capability, path, and prefix information. For TCP, this includes statistics related to BGP neighbor session establishment and maintenance.

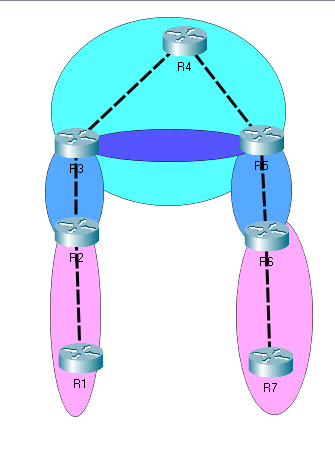
Router#**show ip bgp**

Definition: This command displays the contents of the IPv4 BGP routing table, including prefixes, entries and other BGP entries.

Router#**show bgp ipv6**

Definition: This command displays the contents of the IPv6 BGP routing table, including prefixes, entries and other BGP entries.

Topology Diagram:



Blue: EBGP

Pink: OSPF

Dark Blue: IBGP

Light Blue: EIGRP

Addressing Table:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Device | Interface | IP Address | IPv6 Address | Link-Local Addresses |
| R1 | G 0/0/1 | 10.0.0.1/30 | 2001:db8:acad:1::1/64 | fe80::1 |
| Loopback 0 | 192.168.0.1/24 | 2001:db8:acad:a::1/64 | fe80::1 |
| R2 | G 0/0/0 | 10.0.0.2/30 | 2001:db8:acad:1::2/64 | fe80::2 |
| G 0/0/1 | 10.0.0.5/30 | 2001:db8:acad:2::1/64 | fe80::2 |
| Loopback 0 | 192.168.1.1/24 | 2001:db8:acad:b::1/64 | fe80::2 |
| R3 | G 0/0/0 | 10.0.0.6/30 | 2001:db8:acad:2::2/64 | fe80::3 |
| G 0/0/1 | 10.0.0.9/30 | 2001:db8:acad:3::1/64 | fe80::3 |
| Loopback 0 | 192.168.2.1/24 | 2001:db8:acad:c::1/64 | fe80::3 |
| R4 | G 0/0/0 | 10.0.0.10/30 | 2001:db8:acad:3::2/64 | fe80::4 |
| G 0/0/1 | 10.0.0.13/30 | 2001:db8:acad:4::1/64 | fe80::4 |
| Loopback 0 | 192.168.3.1/24 | 2001:db8:acad:d::1/64 | fe80::4 |
| R5 | G 0/0/0 | 10.0.0.14/30 | 2001:db8:acad:4::2/64 | fe80::5 |
| G 0/0/1 | 10.0.0.17/30 | 2001:db8:acad:5::1/64 | fe80::5 |
| Loopback 0 | 192.168.4.1/32 | 2001:db8:acad:e::1/64 | fe80::5 |
| R6 | G 0/0/0 | 10.0.0.18/30 | 2001:db8:acad:5::2/64 | fe80::6 |
| G 0/0/1 | 10.0.0.21/30 | 2001:db8:acad:6::1/64 | fe80::6 |
| Loopback 0 | 192.168.5.1/32 | 2001:db8:acad:f::1/64 | fe80::6 |
| R7 | G 0/0/0 | 10.0.0.22/30 | 2001:db8:acad:6::2/64 | fe80::7 |
| Loopback 0 | 192.168.6.1/32 | 2001:db8:acad:aa::1/64 | fe80::7 |

**Problems and Troubleshooting:**

The OSPF and EIGRP routing was configured without any problems. The main issues I had was configuring BGP and the redistribution between BGP and the IGPs. First, iBGP routes were not being put into the routing table. Second, iBGP was not redistributing EIGRP or OSPF routes across the link. Third, iBGP was not redistributing directly connected routes of the routers running BGP.

iBGP Routes not visible:

After configuring the IP addressing schemes and enabling OSPF and EIGRP instances, I configured BGP on R2, R3 and R5, R6 using the router bgp asn command and assigned a router-id. I also specified the BGP peers and their remote-as and redistributed either ospf or eigrp in the address-families depending on which router I was on. When I entered the show ip route, I did not see any BGP routes. After researching online, I realized I had to use the update the source loopback in order to start IBGP, and to get it to share BGP routes. After configuring this, I was able to see BGP routes in the autonomous system I was in and the directly connected routes of the BGP router.

When I started pinging, I discovered one final issue. The Loopback interface on R3 was not reachable nor was it in the routing table. When I checked the interface, I realized that I had accidentally entered in the wrong subnet for the interface so after I changed it all routers and networks. were reachable.

**Conclusion:**

While not as widely used, IBGP is still a critical part of major network infrastructures, allowing for configurations in BGP to be preserved while moving over parts of the network without BGP. Routing protocols are designed to solve certain problems. The problem of managing and exchanging huge volume of routes within and between autonomous systems is solved by BGP. The use of BGP as the main routing protocol for the Internet shows its scalability, performance and reliability. iBGP and eBGP can allow for both efficient routing and redistribution of IGPs.

Pings:

R7#ping 10.0.0.1

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 10.0.0.1, timeout is 2 seconds:

!!!!!

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

R7#ping 10.0.0.2

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 10.0.0.2, timeout is 2 seconds:

!!!!!

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

R7#ping 10.0.0.5

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 10.0.0.5, timeout is 2 seconds:

!!!!!

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

R7#ping 10.0.0.6

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 10.0.0.6, timeout is 2 seconds:

!!!!!

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

R7#ping 10.0.0.9

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 10.0.0.9, timeout is 2 seconds:

!!!!!

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

R7#ping 10.0.0.10

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 10.0.0.10, timeout is 2 seconds:

!!!!!

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

R7#ping 10.0.0.13

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 10.0.0.13, timeout is 2 seconds:

!!!!!

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

R7#ping 10.0.0.14

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 10.0.0.14, timeout is 2 seconds:

!!!!!

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

R7#ping 10.0.0.17

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 10.0.0.17, timeout is 2 seconds:

!!!!!

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

R7#ping 10.0.0.18

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 10.0.0.18, timeout is 2 seconds:

!!!!!

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

R7#ping 10.0.0.21

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 10.0.0.21, timeout is 2 seconds:

!!!!!

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

R7#ping 10.0.0.22

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 10.0.0.22, timeout is 2 seconds:

!!!!!

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

R7#ping 192.168.0.1

Type escape sequence to abort.

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

!!!!!

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

R7#ping 192.168.1.1

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 192.168.1.1, timeout is 2 seconds:

!!!!!

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

R7#ping 192.168.2.1

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 192.168.2.1, timeout is 2 seconds:

!!!!!

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

R7#ping 192.168.3.1

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 192.168.3.1, timeout is 2 seconds:

!!!!!

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

R7#ping 192.168.4.1

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 192.168.4.1, timeout is 2 seconds:

!!!!!

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

R7#ping 192.168.5.1

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 192.168.5.1, timeout is 2 seconds:

!!!!!

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

R7#ping 192.168.6.1

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 192.168.6.1, timeout is 2 seconds:

!!!!!

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

R7#ping 2001:db8:acad:1::1

Type escape sequence to abort.

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

!!!!!

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

R7#ping 2001:db8:acad:1::2

Type escape sequence to abort.

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

!!!!!

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

R7#ping 2001:db8:acad:2::1

Type escape sequence to abort.

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

!!!!!

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

R7#ping 2001:db8:acad:2::2

Type escape sequence to abort.

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

!!!!!

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

R7#ping 2001:db8:acad:3::1

Type escape sequence to abort.

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

!!!!!

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

R7#ping 2001:db8:acad:3::2

Type escape sequence to abort.

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

!!!!!

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

R7#ping 2001:db8:acad:4::1

Type escape sequence to abort.

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

!!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/6 ms

R7#ping 2001:db8:acad:4::2

Type escape sequence to abort.

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

!!!!!

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

R7#ping 2001:db8:acad:5::1

Type escape sequence to abort.

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

!!!!!

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

R7#ping 2001:db8:acad:5::2

Type escape sequence to abort.

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

!!!!!

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

R7#ping 2001:db8:acad:6::1

Type escape sequence to abort.

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

!!!!!

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

R7#ping 2001:db8:acad:6::2

Type escape sequence to abort.

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

!!!!!

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

R7#ping 2001:db8:acad:a::1

Type escape sequence to abort.

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

!!!!!

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

R7#ping 2001:db8:acad:b::1

Type escape sequence to abort.

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

!!!!!

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

R7#ping 2001:db8:acad:c::1

Type escape sequence to abort.

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

!!!!!

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

R7#ping 2001:db8:acad:d::1

Type escape sequence to abort.

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

!!!!!

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

R7#ping 2001:db8:acad:f::1

Type escape sequence to abort.

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

!!!!!

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

R7#ping 2001:db8:acad:e::1

Type escape sequence to abort.

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

!!!!!

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

R7# ping 2001:db8:acad:aa::1

Type escape sequence to abort.

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

!!!!!

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

Router 1 Config:

**Show Run:**

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 FDO214811ZM

!

spanning-tree extend system-id

!

redundancy

mode none

!

vlan internal allocation policy ascending

!

interface Loopback0

ip address 192.168.0.1 255.255.255.0

ipv6 address FE80::1 link-local

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

ipv6 ospf 10 area 0

!

interface GigabitEthernet0/0/0

no ip address

negotiation auto

!

interface GigabitEthernet0/0/1

ip address 10.0.0.1 255.255.255.252

negotiation auto

ipv6 address FE80::1 link-local

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

ipv6 ospf 10 area 0

!

interface Serial0/1/0

no ip address

shutdown

!

interface Serial0/1/1

no ip address

shutdown

!

interface GigabitEthernet0/2/0

no ip address

shutdown

negotiation auto

!

interface GigabitEthernet0/2/1

no ip address

shutdown

negotiation auto

!

interface GigabitEthernet0

vrf forwarding Mgmt-intf

no ip address

shutdown

negotiation auto

!

interface Vlan1

no ip address

shutdown

!

router ospf 1

router-id 1.1.1.1

passive-interface Loopback0

network 10.0.0.0 0.0.0.3 area 0

network 192.168.0.0 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 10

router-id 1.1.1.1

passive-interface Loopback0

!

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

10.0.0.0/8 is variably subnetted, 7 subnets, 2 masks

C 10.0.0.0/30 is directly connected, GigabitEthernet0/0/1

L 10.0.0.1/32 is directly connected, GigabitEthernet0/0/1

O 10.0.0.4/30 [110/2] via 10.0.0.2, 00:19:19, GigabitEthernet0/0/1

O E2 10.0.0.8/30

[110/10000000] via 10.0.0.2, 00:17:40, GigabitEthernet0/0/1

O E2 10.0.0.12/30

[110/10000000] via 10.0.0.2, 00:09:04, GigabitEthernet0/0/1

O E2 10.0.0.16/30

[110/10000000] via 10.0.0.2, 00:07:42, GigabitEthernet0/0/1

O E2 10.0.0.20/30

[110/10000000] via 10.0.0.2, 00:05:44, GigabitEthernet0/0/1

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

C 192.168.0.0/24 is directly connected, Loopback0

L 192.168.0.1/32 is directly connected, Loopback0

192.168.1.0/32 is subnetted, 1 subnets

O 192.168.1.1 [110/2] via 10.0.0.2, 00:19:29, GigabitEthernet0/0/1

192.168.2.0/30 is subnetted, 1 subnets

O E2 192.168.2.0

[110/10000000] via 10.0.0.2, 00:18:14, GigabitEthernet0/0/1

192.168.3.0/30 is subnetted, 1 subnets

O E2 192.168.3.0

[110/10000000] via 10.0.0.2, 00:17:09, GigabitEthernet0/0/1

192.168.4.0/30 is subnetted, 1 subnets

O E2 192.168.4.0

[110/10000000] via 10.0.0.2, 00:08:33, GigabitEthernet0/0/1

192.168.5.0/30 is subnetted, 1 subnets

O E2 192.168.5.0

[110/10000000] via 10.0.0.2, 00:06:30, GigabitEthernet0/0/1

192.168.6.0/32 is subnetted, 1 subnets

O E2 192.168.6.1

[110/10000000] via 10.0.0.2, 00:04:59, GigabitEthernet0/0/1

R1#show ipv6 route

IPv6 Routing Table - default - 16 entries

Codes: C - Connected, L - Local, S - Static, U - Per-user Static route

B - BGP, R - RIP, I1 - ISIS L1, I2 - ISIS L2

IA - ISIS interarea, IS - ISIS summary, D - EIGRP, EX - EIGRP external

ND - ND Default, NDp - ND Prefix, DCE - Destination, NDr - Redirect

O - OSPF Intra, OI - OSPF Inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2

ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2, a - Application

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

via GigabitEthernet0/0/1, directly connected

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

via GigabitEthernet0/0/1, receive

O 2001:DB8:ACAD:2::/64 [110/2]

via FE80::2, GigabitEthernet0/0/1

OE2 2001:DB8:ACAD:3::/64 [110/10000000]

via FE80::2, GigabitEthernet0/0/1

OE2 2001:DB8:ACAD:4::/64 [110/10000000]

via FE80::2, GigabitEthernet0/0/1

OE2 2001:DB8:ACAD:5::/64 [110/10000000]

via FE80::2, GigabitEthernet0/0/1

OE2 2001:DB8:ACAD:6::/64 [110/10000000]

via FE80::2, GigabitEthernet0/0/1

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

via Loopback0, directly connected

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

via Loopback0, receive

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

via FE80::2, GigabitEthernet0/0/1

OE2 2001:DB8:ACAD:C::/64 [110/10000000]

via FE80::2, GigabitEthernet0/0/1

OE2 2001:DB8:ACAD:D::/64 [110/10000000]

via FE80::2, GigabitEthernet0/0/1

OE2 2001:DB8:ACAD:E::/64 [110/10000000]

via FE80::2, GigabitEthernet0/0/1

OE2 2001:DB8:ACAD:F::/64 [110/10000000]

via FE80::2, GigabitEthernet0/0/1

OE2 2001:DB8:ACAD:AA::1/128 [110/10000000]

via FE80::2, GigabitEthernet0/0/1

L FF00::/8 [0/0]

via Null0, receive

R1# show ip ospf neighbor

Neighbor ID Pri State Dead Time Address Interface

2.2.2.2 1 FULL/DR 00:00:36 10.0.0.2 GigabitEthernet0/0/1

R1# show ip ospf

Routing Process "ospf 1" with ID 1.1.1.1

Start time: 02:44:16.715, Time elapsed: 00:21:36.848

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 9. Checksum Sum 0x077160

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 00:19:36.831 ago

SPF algorithm executed 6 times

Area ranges are

Number of LSA 3. Checksum Sum 0x00DC40

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 192.168.0.1/24, 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

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

Internet Address 10.0.0.1/30, 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 10.0.0.2

Backup Designated router (ID) 1.1.1.1, Interface address 10.0.0.1

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 1/1/1, 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 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

i 2.2.2.2 [1] via 10.0.0.2, GigabitEthernet0/0/1, ASBR, Area 0, SPF 6

R1#show ipv6 ospf neighbor

OSPFv3 Router with ID (1.1.1.1) (Process ID 10)

Neighbor ID Pri State Dead Time Interface ID Interface

2.2.2.2 1 FULL/DR 00:00:35 6 GigabitEthernet0/0/1

R1#show ipv6 ospf interface

Loopback0 is up, line protocol is up

Link Local Address FE80::1, Interface ID 14

Area 0, Process ID 10, Instance ID 0, Router ID 1.1.1.1

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::1, Interface ID 7

Area 0, Process ID 10, 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::2

Backup Designated router (ID) 1.1.1.1, local address FE80::1

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

Hello due in 00:00:05

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 2.2.2.2 (Designated Router)

Suppress hello for 0 neighbor(s)

R1#show ipv6 ospf border-routers

OSPFv3 Router with ID (1.1.1.1) (Process ID 10)

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

i 2.2.2.2 [1] via FE80::2, GigabitEthernet0/0/1, ASBR, Area 0, SPF 3

R1#show ip protocol

\*\*\* 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:

10.0.0.0 0.0.0.3 area 0

192.168.0.0 0.0.0.255 area 0

Passive Interface(s):

Passive Interface(s):

Loopback0

Routing Information Sources:

Gateway Distance Last Update

2.2.2.2 110 00:05:58

Distance: (default is 110)

R1#show ipv6 protocol

IPv6 Routing Protocol is "connected"

IPv6 Routing Protocol is "application"

IPv6 Routing Protocol is "ND"

IPv6 Routing Protocol is "ospf 10"

Router ID 1.1.1.1

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

Interfaces (Area 0):

Loopback0

GigabitEthernet0/0/1

Redistribution:

None

R2 Config:

R2#show run

Building configuration...

Current configuration : 2524 bytes

!

! Last configuration change at 18:37:08 UTC Wed Jan 5 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 FDO214414TX

!

spanning-tree extend system-id

!

!

redundancy

mode none

!

!

vlan internal allocation policy ascending

!

interface Loopback0

ip address 192.168.1.1 255.255.255.252

ipv6 address FE80::2 link-local

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

ipv6 ospf 10 area 0

!

interface GigabitEthernet0/0/0

ip address 10.0.0.2 255.255.255.252

negotiation auto

ipv6 address FE80::2 link-local

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

ipv6 ospf 10 area 0

!

interface GigabitEthernet0/0/1

ip address 10.0.0.5 255.255.255.252

negotiation auto

ipv6 address FE80::2 link-local

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

ipv6 ospf 10 area 0

!

interface Serial0/1/0

no ip address

shutdown

!

interface Serial0/1/1

no ip address

shutdown

!

interface GigabitEthernet0/2/0

no ip address

shutdown

negotiation auto

!

interface GigabitEthernet0/2/1

no ip address

shutdown

negotiation auto

!

interface GigabitEthernet0

vrf forwarding Mgmt-intf

no ip address

shutdown

negotiation auto

!

interface Vlan1

no ip address

shutdown

!

router ospf 1

router-id 2.2.2.2

redistribute bgp 100 metric 10000000 subnets

passive-interface Loopback0

network 10.0.0.0 0.0.0.3 area 0

network 10.0.0.4 0.0.0.3 area 0

network 192.168.1.0 0.0.0.255 area 0

!

router bgp 100

bgp router-id 2.2.2.2

bgp log-neighbor-changes

neighbor 10.0.0.6 remote-as 200

neighbor 2001:DB8:ACAD:2::2 remote-as 200

!

address-family ipv4

redistribute ospf 1

neighbor 10.0.0.6 activate

no neighbor 2001:DB8:ACAD:2::2 activate

exit-address-family

!

address-family ipv6

redistribute connected

redistribute ospf 10

neighbor 2001:DB8:ACAD:2::2 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 10

router-id 2.2.2.2

passive-interface Loopback0

redistribute bgp 100 metric 10000000

!

!

!

!

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

10.0.0.0/8 is variably subnetted, 8 subnets, 2 masks

C 10.0.0.0/30 is directly connected, GigabitEthernet0/0/0

L 10.0.0.2/32 is directly connected, GigabitEthernet0/0/0

C 10.0.0.4/30 is directly connected, GigabitEthernet0/0/1

L 10.0.0.5/32 is directly connected, GigabitEthernet0/0/1

B 10.0.0.8/30 [20/0] via 10.0.0.6, 00:20:19

B 10.0.0.12/30 [20/3072] via 10.0.0.6, 00:11:43

B 10.0.0.16/30 [20/3328] via 10.0.0.6, 00:10:21

B 10.0.0.20/30 [20/26368] via 10.0.0.6, 00:08:23

192.168.0.0/32 is subnetted, 1 subnets

O 192.168.0.1 [110/2] via 10.0.0.1, 00:22:07, GigabitEthernet0/0/0

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

C 192.168.1.0/30 is directly connected, Loopback0

L 192.168.1.1/32 is directly connected, Loopback0

192.168.2.0/30 is subnetted, 1 subnets

B 192.168.2.0 [20/0] via 10.0.0.6, 00:20:53

192.168.3.0/30 is subnetted, 1 subnets

B 192.168.3.0 [20/130816] via 10.0.0.6, 00:19:48

192.168.4.0/30 is subnetted, 1 subnets

B 192.168.4.0 [20/131072] via 10.0.0.6, 00:11:12

192.168.5.0/30 is subnetted, 1 subnets

B 192.168.5.0 [20/26368] via 10.0.0.6, 00:09:09

192.168.6.0/32 is subnetted, 1 subnets

B 192.168.6.1 [20/26368] via 10.0.0.6, 00:07:38

R2#show ipv6 route

IPv6 Routing Table - default - 17 entries

Codes: C - Connected, L - Local, S - Static, U - Per-user Static route

B - BGP, R - RIP, I1 - ISIS L1, I2 - ISIS L2

IA - ISIS interarea, IS - ISIS summary, D - EIGRP, EX - EIGRP external

ND - ND Default, NDp - ND Prefix, DCE - Destination, NDr - Redirect

O - OSPF Intra, OI - OSPF Inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2

ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2, a - Application

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

via GigabitEthernet0/0/0, directly connected

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

via GigabitEthernet0/0/0, receive

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

via GigabitEthernet0/0/1, directly connected

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

via GigabitEthernet0/0/1, receive

B 2001:DB8:ACAD:3::/64 [20/0]

via FE80::3, GigabitEthernet0/0/1

B 2001:DB8:ACAD:4::/64 [20/3072]

via FE80::3, GigabitEthernet0/0/1

B 2001:DB8:ACAD:5::/64 [20/3328]

via FE80::3, GigabitEthernet0/0/1

B 2001:DB8:ACAD:6::/64 [20/26368]

via FE80::3, GigabitEthernet0/0/1

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

via FE80::1, GigabitEthernet0/0/0

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

via Loopback0, directly connected

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

via Loopback0, receive

B 2001:DB8:ACAD:C::/64 [20/0]

via FE80::3, GigabitEthernet0/0/1

B 2001:DB8:ACAD:D::/64 [20/130816]

via FE80::3, GigabitEthernet0/0/1

B 2001:DB8:ACAD:E::/64 [20/131072]

via FE80::3, GigabitEthernet0/0/1

B 2001:DB8:ACAD:F::/64 [20/26368]

via FE80::3, GigabitEthernet0/0/1

B 2001:DB8:ACAD:AA::1/128 [20/26368]

via FE80::3, GigabitEthernet0/0/1

L FF00::/8 [0/0]

via Null0, receive

R2# show ip bgp

BGP table version is 22, local router ID is 2.2.2.2

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

\*> 10.0.0.0/30 0.0.0.0 0 32768 ?

\* 10.0.0.4/30 10.0.0.6 0 0 200 ?

\*> 0.0.0.0 0 32768 ?

\*> 10.0.0.8/30 10.0.0.6 0 0 200 ?

\*> 10.0.0.12/30 10.0.0.6 3072 0 200 ?

\*> 10.0.0.16/30 10.0.0.6 3328 0 200 ?

\*> 10.0.0.20/30 10.0.0.6 26368 0 200 ?

\*> 192.168.0.1/32 10.0.0.1 2 32768 ?

\*> 192.168.1.0/30 0.0.0.0 0 32768 ?

\*> 192.168.2.0/30 10.0.0.6 0 0 200 ?

\*> 192.168.3.0/30 10.0.0.6 130816 0 200 ?

\*> 192.168.4.0/30 10.0.0.6 131072 0 200 ?

\*> 192.168.5.0/30 10.0.0.6 26368 0 200 ?

\*> 192.168.6.1/32 10.0.0.6 26368 0 200 ?

R2#show bgp ipv6

BGP table version is 26, local router ID is 2.2.2.2

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

\*> 2001:DB8:ACAD:1::/64

:: 0 32768 ?

\* 2001:DB8:ACAD:2::/64

2001:DB8:ACAD:2::2

0 0 200 ?

\*> :: 0 32768 ?

\*> 2001:DB8:ACAD:3::/64

2001:DB8:ACAD:2::2

0 0 200 ?

\*> 2001:DB8:ACAD:4::/64

2001:DB8:ACAD:2::2

3072 0 200 ?

\*> 2001:DB8:ACAD:5::/64

2001:DB8:ACAD:2::2

3328 0 200 ?

Network Next Hop Metric LocPrf Weight Path

\*> 2001:DB8:ACAD:A::1/128

FE80::1 1 32768 ?

\*> 2001:DB8:ACAD:B::/64

:: 0 32768 ?

\*> 2001:DB8:ACAD:C::/64

2001:DB8:ACAD:2::2

0 0 200 ?

\*> 2001:DB8:ACAD:D::/64

2001:DB8:ACAD:2::2

130816 0 200 ?

\*> 2001:DB8:ACAD:E::/64

2001:DB8:ACAD:2::2

131072 0 200 ?

\*> 2001:DB8:ACAD:AA::1/128

2001:DB8:ACAD:2::2

26368 0 200 ?

% NOTE: This command is deprecated. Please use 'show bgp ipv6 unicast'

R2#show bgp ipv6 unicast neighbors

BGP neighbor is 2001:DB8:ACAD:2::2, remote AS 200, external link

BGP version 4, remote router ID 3.3.3.3

BGP state = Established, up for 00:22:20

Last read 00:00:42, last write 00:00:31, 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: 5 16

Keepalives: 25 19

Route Refresh: 0 0

Total: 31 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:ACAD:2::2

BGP table version 26, neighbor version 26/0

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: 4 8 (Consumes 1152 bytes)

Prefixes Total: 8 14

Implicit Withdraw: 4 2

Explicit Withdraw: 0 4

Used as bestpath: n/a 7

Used as multipath: n/a 0

Outbound Inbound

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

Bestpath from this peer: 11 n/a

Total: 11 0

Number of NLRIs in the update sent: max 3, 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:ACAD:2::2

Connections established 1; dropped 0

Last reset never

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

Interface associated: GigabitEthernet0/0/1 (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:ACAD:2::1, Local port: 34359

Foreign host: 2001:DB8:ACAD:2::2, 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 0xACBC40):

Timer Starts Wakeups Next

Retrans 28 0 0x0

TimeWait 0 0 0x0

AckHold 35 30 0x0

SendWnd 0 0 0x0

KeepAlive 0 0 0x0

GiveUp 0 0 0x0

PmtuAger 525 524 0xACBD48

DeadWait 0 0 0x0

Linger 0 0 0x0

ProcessQ 0 0 0x0

iss: 399757082 snduna: 399758064 sndnxt: 399758064

irs: 1014810708 rcvnxt: 1014812409

sndwnd: 15403 scale: 0 maxrcvwnd: 16384

rcvwnd: 16132 scale: 0 delrcvwnd: 252

SRTT: 976 ms, RTTO: 1166 ms, RTV: 190 ms, KRTT: 0 ms

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

uptime: 1340998 ms, Sent idletime: 31207 ms, Receive idletime: 31006 ms

Status Flags: active open

Option Flags: nagle, path mtu capable

IP Precedence value : 6

Datagrams (max data segment is 1440 bytes):

Rcvd: 63 (out of order: 0), with data: 35, total data bytes: 1700

Sent: 62 (retransmit: 0, fastretransmit: 0, partialack: 0, Second Congestion: 0), with data: 62, total data bytes: 3469

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

fast lock acquisition failures: 0, slow path: 0

TCP Semaphore 0x7F32C5A81BA8 FREE

R2# show ip bgp summary

BGP router identifier 2.2.2.2, local AS number 100

BGP table version is 22, main routing table version 22

13 network entries using 3224 bytes of memory

14 path entries using 1680 bytes of memory

8/8 BGP path/bestpath attribute entries using 1984 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 6912 total bytes of memory

BGP activity 30/6 prefixes, 36/10 paths, scan interval 60 secs

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

10.0.0.6 4 200 34 30 22 0 0 00:22:40 10

R2#show bgp ipv6 unicast summary

BGP router identifier 2.2.2.2, local AS number 100

BGP table version is 26, main routing table version 26

11 network entries using 2992 bytes of memory

12 path entries using 1728 bytes of memory

8/8 BGP path/bestpath attribute entries using 1984 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 6728 total bytes of memory

BGP activity 30/6 prefixes, 36/10 paths, scan interval 60 secs

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

2001:DB8:ACAD:2::2

4 200 37 31 26 0 0 00:22:38 8

R2#show ip ospf neighbor

Neighbor ID Pri State Dead Time Address Interface

1.1.1.1 1 FULL/BDR 00:00:35 10.0.0.1 GigabitEthernet0/0/0

R2#show ip ospf

Routing Process "ospf 1" with ID 2.2.2.2

Start time: 02:45:07.103, Time elapsed: 00:23:58.656

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

It is an autonomous system boundary router

Redistributing External Routes from,

bgp 100 with metric mapped to 10000000, includes subnets in redistribution

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 9. Checksum Sum 0x077160

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 00:22:48.757 ago

SPF algorithm executed 5 times

Area ranges are

Number of LSA 3. Checksum Sum 0x00DC40

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 192.168.1.1/30, 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 10.0.0.5/30, 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 10.0.0.5

No backup designated router on this network

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 0, maximum is 0

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

Neighbor Count is 0, Adjacent neighbor count is 0

Suppress hello for 0 neighbor(s)

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

Internet Address 10.0.0.2/30, 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 10.0.0.2

Backup Designated router (ID) 1.1.1.1, Interface address 10.0.0.1

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

oob-resync timeout 40

Hello due in 00:00:01

Supports Link-local Signaling (LLS)

Cisco NSF helper support enabled

IETF NSF helper support enabled

Index 1/1/1, flood queue length 0

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

Last flood scan length is 1, maximum is 3

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 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 interface

Loopback0 is up, line protocol is up

Link Local Address FE80::2, Interface ID 14

Area 0, Process ID 10, 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::2, Interface ID 7

Area 0, Process ID 10, 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::2

No backup designated router on this network

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

Hello due in 00:00:03

Graceful restart helper support enabled

Index 1/3/3, flood queue length 0

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

Last flood scan length is 0, maximum is 0

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

Neighbor Count is 0, Adjacent neighbor count is 0

Suppress hello for 0 neighbor(s)

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

Link Local Address FE80::2, Interface ID 6

Area 0, Process ID 10, 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::2

Backup Designated router (ID) 1.1.1.1, local address FE80::1

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

Hello due in 00:00:08

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 1, maximum is 6

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 ospf neighbor

OSPFv3 Router with ID (2.2.2.2) (Process ID 10)

Neighbor ID Pri State Dead Time Interface ID Interface

1.1.1.1 1 FULL/BDR 00:00:39 7 GigabitEthernet0/0/0

R2#show ipv6 ospf border-router

OSPFv3 Router with ID (2.2.2.2) (Process ID 10)

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

R2#show ip prot

\*\*\* 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

It is an autonomous system boundary router

Redistributing External Routes from,

bgp 100 with metric mapped to 10000000, includes subnets in redistribution

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

Maximum path: 4

Routing for Networks:

10.0.0.0 0.0.0.3 area 0

10.0.0.4 0.0.0.3 area 0

192.168.1.0 0.0.0.255 area 0

Passive Interface(s):

Loopback0

Routing Information Sources:

Gateway Distance Last Update

1.1.1.1 110 00:23:38

Distance: (default is 110)

Routing Protocol is "bgp 100"

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

Redistributing: ospf 1 (internal)

Neighbor(s):

Address FiltIn FiltOut DistIn DistOut Weight RouteMap

10.0.0.6

Maximum path: 1

Routing Information Sources:

Gateway Distance Last Update

Gateway Distance Last Update

10.0.0.6 20 00:09:11

Distance: external 20 internal 200 local 200

R2#show ipv6 prot

IPv6 Routing Protocol is "connected"

IPv6 Routing Protocol is "application"

IPv6 Routing Protocol is "ND"

IPv6 Routing Protocol is "ospf 10"

Router ID 2.2.2.2

Autonomous system boundary router

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

Interfaces (Area 0):

Loopback0

GigabitEthernet0/0/1

GigabitEthernet0/0/0

Redistribution:

Redistributing protocol bgp 100 with metric 10000000

IPv6 Routing Protocol is "bgp 100"

IGP synchronization is disabled

Redistribution:

Redistributing protocol connected

Redistributing protocol ospf 10 (internal)

Neighbor(s):

Address FiltIn FiltOut Weight RoutemapIn RoutemapOut

2001:DB8:ACAD:2::2

R2#show ip bgp neighbor

BGP neighbor is 10.0.0.6, remote AS 200, external link

BGP version 4, remote router ID 3.3.3.3

BGP state = Established, up for 00:30:53

Last read 00:00:56, last write 00:00:15, 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: 3 17

Keepalives: 35 25

Route Refresh: 0 0

Total: 39 43

Do log neighbor state changes (via global configuration)

Default minimum time between advertisement runs is 30 seconds

For address family: IPv4 Unicast

Session: 10.0.0.6

BGP table version 22, neighbor version 22/0

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: 4 10 (Consumes 1200 bytes)

Prefixes Total: 4 14

Implicit Withdraw: 0 0

Explicit Withdraw: 0 4

Used as bestpath: n/a 9

Used as multipath: n/a 0

Outbound Inbound

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

Bestpath from this peer: 13 n/a

Total: 13 0

Number of NLRIs in the update sent: max 3, 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 10.0.0.6

Connections established 1; dropped 0

Last reset never

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

Interface associated: GigabitEthernet0/0/1 (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: 10.0.0.5, Local port: 16694

Foreign host: 10.0.0.6, 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 0xB46FD4):

Timer Starts Wakeups Next

Retrans 39 1 0x0

TimeWait 0 0 0x0

AckHold 42 39 0x0

SendWnd 0 0 0x0

KeepAlive 0 0 0x0

GiveUp 0 0 0x0

PmtuAger 980 979 0xB47024

DeadWait 0 0 0x0

Linger 0 0 0x0

ProcessQ 0 0 0x0

iss: 3641403094 snduna: 3641403960 sndnxt: 3641403960

irs: 2108471956 rcvnxt: 2108473321

sndwnd: 15519 scale: 0 maxrcvwnd: 16384

rcvwnd: 15020 scale: 0 delrcvwnd: 1364

SRTT: 993 ms, RTTO: 1052 ms, RTV: 59 ms, KRTT: 0 ms

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

uptime: 1855962 ms, Sent idletime: 15697 ms, Receive idletime: 15496 ms

Status Flags: active open

Option Flags: nagle, path mtu capable

IP Precedence value : 6

Datagrams (max data segment is 1460 bytes):

Rcvd: 80 (out of order: 0), with data: 42, total data bytes: 1364

Sent: 79 (retransmit: 1, fastretransmit: 0, partialack: 0, Second Congestion: 0), with data: 37, total data bytes: 865

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

fast lock acquisition failures: 0, slow path: 0

TCP Semaphore 0x7F32C5A81AE8 FREE

Router 3 Config:

R3#show run

Building configuration...

Current configuration : 2656 bytes

!

! Last configuration change at 18:30:51 UTC Wed Jan 5 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

multilink bundle-name authenticated

!

!

!

!

license udi pid ISR4321/K9 sn FDO214328EH

!

spanning-tree extend system-id

!

!

redundancy

mode none

!

!

vlan internal allocation policy ascending

!

!

!

!

!

!

interface Loopback0

ip address 192.168.2.1 255.255.255.252

ipv6 address FE80::3 link-local

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

ipv6 eigrp 10

!

interface GigabitEthernet0/0/0

ip address 10.0.0.6 255.255.255.252

negotiation auto

ipv6 address FE80::3 link-local

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

ipv6 eigrp 10

!

interface GigabitEthernet0/0/1

ip address 10.0.0.9 255.255.255.252

negotiation auto

ipv6 address FE80::3 link-local

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

ipv6 eigrp 10

!

interface Serial0/1/0

no ip address

shutdown

!

interface Serial0/1/1

no ip address

shutdown

!

interface Service-Engine0/2/0

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

network 10.0.0.4 0.0.0.3

network 10.0.0.8 0.0.0.3

network 192.168.2.0

redistribute bgp 200 metric 100000 1 255 1 1500

passive-interface Loopback0

eigrp router-id 3.3.3.3

!

router bgp 200

bgp router-id 3.3.3.3

bgp log-neighbor-changes

neighbor 10.0.0.5 remote-as 100

neighbor 10.0.0.14 remote-as 200

neighbor 10.0.0.14 update-source Loopback0

neighbor 2001:DB8:ACAD:2::1 remote-as 100

neighbor 2001:DB8:ACAD:4::2 remote-as 200

neighbor 2001:DB8:ACAD:4::2 update-source Loopback0

!

address-family ipv4

redistribute eigrp 1

neighbor 10.0.0.5 activate

neighbor 10.0.0.14 activate

no neighbor 2001:DB8:ACAD:2::1 activate

neighbor 2001:DB8:ACAD:4::2 activate

exit-address-family

!

address-family ipv6

redistribute connected

redistribute eigrp 10

neighbor 2001:DB8:ACAD:2::1 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 10

passive-interface Loopback0

eigrp router-id 3.3.3.3

redistribute bgp 200 metric 1000000 1 255 1 1500

!

!

!

!

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

10.0.0.0/8 is variably subnetted, 8 subnets, 2 masks

B 10.0.0.0/30 [20/0] via 10.0.0.5, 00:26:44

C 10.0.0.4/30 is directly connected, GigabitEthernet0/0/0

L 10.0.0.6/32 is directly connected, GigabitEthernet0/0/0

C 10.0.0.8/30 is directly connected, GigabitEthernet0/0/1

L 10.0.0.9/32 is directly connected, GigabitEthernet0/0/1

D 10.0.0.12/30 [90/3072] via 10.0.0.10, 00:17:34, GigabitEthernet0/0/1

D 10.0.0.16/30 [90/3328] via 10.0.0.10, 00:16:12, GigabitEthernet0/0/1

D EX 10.0.0.20/30

[170/26368] via 10.0.0.10, 00:14:14, GigabitEthernet0/0/1

192.168.0.0/32 is subnetted, 1 subnets

B 192.168.0.1 [20/2] via 10.0.0.5, 00:26:44

192.168.1.0/30 is subnetted, 1 subnets

B 192.168.1.0 [20/0] via 10.0.0.5, 00:26:44

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

C 192.168.2.0/30 is directly connected, Loopback0

L 192.168.2.1/32 is directly connected, Loopback0

192.168.3.0/30 is subnetted, 1 subnets

D 192.168.3.0 [90/130816] via 10.0.0.10, 00:26:04, GigabitEthernet0/0/1

192.168.4.0/30 is subnetted, 1 subnets

D 192.168.4.0 [90/131072] via 10.0.0.10, 00:17:29, GigabitEthernet0/0/1

192.168.5.0/30 is subnetted, 1 subnets

D EX 192.168.5.0 [170/26368] via 10.0.0.10, 00:15:00, GigabitEthernet0/0/1

192.168.6.0/32 is subnetted, 1 subnets

D EX 192.168.6.1 [170/26368] via 10.0.0.10, 00:13:30, GigabitEthernet0/0/1

R3>show ipv6 route

IPv6 Routing Table - default - 17 entries

Codes: C - Connected, L - Local, S - Static, U - Per-user Static route

B - BGP, R - RIP, I1 - ISIS L1, I2 - ISIS L2

IA - ISIS interarea, IS - ISIS summary, D - EIGRP, EX - EIGRP external

ND - ND Default, NDp - ND Prefix, DCE - Destination, NDr - Redirect

O - OSPF Intra, OI - OSPF Inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2

ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2, a - Application

B 2001:DB8:ACAD:1::/64 [20/0]

via FE80::2, GigabitEthernet0/0/0

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

via GigabitEthernet0/0/0, directly connected

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

via GigabitEthernet0/0/0, receive

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

via GigabitEthernet0/0/1, directly connected

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

via GigabitEthernet0/0/1, receive

D 2001:DB8:ACAD:4::/64 [90/3072]

via FE80::4, GigabitEthernet0/0/1

D 2001:DB8:ACAD:5::/64 [90/3328]

via FE80::4, GigabitEthernet0/0/1

EX 2001:DB8:ACAD:6::/64 [170/26368]

via FE80::4, GigabitEthernet0/0/1

B 2001:DB8:ACAD:A::1/128 [20/1]

via FE80::2, GigabitEthernet0/0/0

B 2001:DB8:ACAD:B::/64 [20/0]

via FE80::2, GigabitEthernet0/0/0

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

via Loopback0, directly connected

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

via Loopback0, receive

D 2001:DB8:ACAD:D::/64 [90/130816]

via FE80::4, GigabitEthernet0/0/1

D 2001:DB8:ACAD:E::/64 [90/131072]

via FE80::4, GigabitEthernet0/0/1

EX 2001:DB8:ACAD:F::/64 [170/26368]

via FE80::4, GigabitEthernet0/0/1

EX 2001:DB8:ACAD:AA::1/128 [170/26368]

via FE80::4, GigabitEthernet0/0/1

L FF00::/8 [0/0]

via Null0, receive

R3#show ip bgp

BGP table version is 22, 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

\*> 10.0.0.0/30 10.0.0.5 0 0 100 ?

\* 10.0.0.4/30 10.0.0.5 0 0 100 ?

\*> 0.0.0.0 0 32768 ?

\*> 10.0.0.8/30 0.0.0.0 0 32768 ?

\*>i 10.0.0.12/30 10.0.0.10 3072 32768 ?

\*>i 10.0.0.16/30 10.0.0.10 3328 32768 ?

\*>i 10.0.0.20/30 10.0.0.10 26368 32768 ?

\*> 192.168.0.1/32 10.0.0.5 2 0 100 ?

\*> 192.168.1.0/30 10.0.0.5 0 0 100 ?

\*> 192.168.2.0/30 0.0.0.0 0 32768 ?

\*>i 192.168.3.0/30 10.0.0.10 130816 32768 ?

\*>i 192.168.4.0/30 10.0.0.10 131072 32768 ?

\*>i 192.168.5.0/30 10.0.0.10 26368 32768 ?

\*>i 192.168.6.1/32 10.0.0.10 26368 32768 ?

R3# show bgp ipv6

BGP table version is 25, 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

\*> 2001:DB8:ACAD:1::/64

2001:DB8:ACAD:2::1

0 0 100 ?

\* 2001:DB8:ACAD:2::/64

2001:DB8:ACAD:2::1

0 0 100 ?

\*> :: 0 32768 ?

\*> 2001:DB8:ACAD:3::/64

:: 0 32768 ?

\*>i 2001:DB8:ACAD:4::/64

FE80::4 3072 32768 ?

\*>i 2001:DB8:ACAD:5::/64

FE80::4 3328 32768 ?

\*>i 2001:DB8:ACAD:6::/64

FE80::4 3650 32768 ?

\*> 2001:DB8:ACAD:A::1/128

2001:DB8:ACAD:2::1

1 0 100 ?

\*> 2001:DB8:ACAD:B::/64

2001:DB8:ACAD:2::1

0 0 100 ?

\*> 2001:DB8:ACAD:C::/64

:: 0 32768 ?

\*>i 2001:DB8:ACAD:D::/64

FE80::4 130816 32768 ?

\*>i 2001:DB8:ACAD:E::/64

FE80::4 131072 32768 ?

\*>i 2001:DB8:ACAD:F::/64

FE80::4 131251 32768 ?

\*>i 2001:DB8:ACAD:AA::1/128

FE80::4 26368 32768 ?

% NOTE: This command is deprecated. Please use 'show bgp ipv6 unicast'

R3#show bgp ipv6 unicast neighbors

BGP neighbor is 2001:DB8:ACAD:2::1, remote AS 100, external link

BGP version 4, remote router ID 2.2.2.2

BGP state = Established, up for 00:28:12

Last read 00:00:09, last write 00:00:55, 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: 16 5

Keepalives: 25 32

Route Refresh: 0 0

Total: 42 38

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:ACAD:2::1

BGP table version 25, neighbor version 25/0

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: 8 4 (Consumes 576 bytes)

Prefixes Total: 14 8

Implicit Withdraw: 2 4

Explicit Withdraw: 4 0

Used as bestpath: n/a 3

Used as multipath: n/a 0

Outbound Inbound

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

Bestpath from this peer: 6 n/a

Total: 6 0

Number of NLRIs in the update sent: max 2, 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:ACAD:2::1

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:ACAD:2::2, Local port: 179

Foreign host: 2001:DB8:ACAD:2::1, Foreign port: 34359

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 0xB20C35):

Timer Starts Wakeups Next

Retrans 41 0 0x0

TimeWait 0 0 0x0

AckHold 34 32 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: 1014810708 snduna: 1014812523 sndnxt: 1014812523

irs: 399757082 rcvnxt: 399758197

sndwnd: 16018 scale: 0 maxrcvwnd: 16384

rcvwnd: 15270 scale: 0 delrcvwnd: 1114

SRTT: 996 ms, RTTO: 1031 ms, RTV: 35 ms, KRTT: 0 ms

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

uptime: 1692616 ms, Sent idletime: 8802 ms, Receive idletime: 9002 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: 75 (out of order: 0), with data: 35, total data bytes: 1114

Sent: 76 (retransmit: 0, fastretransmit: 0, partialack: 0, Second Congestion: 0), with data: 76, total data bytes: 4862

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

fast lock acquisition failures: 0, slow path: 0

TCP Semaphore 0x7FE90517F540 FREE

R3# show ip bgp summary

BGP router identifier 3.3.3.3, local AS number 200

BGP table version is 22, main routing table version 22

13 network entries using 3224 bytes of memory

14 path entries using 1680 bytes of memory

8/8 BGP path/bestpath attribute entries using 1984 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 6912 total bytes of memory

BGP activity 30/6 prefixes, 36/10 paths, scan interval 60 secs

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

10.0.0.5 4 100 36 41 22 0 0 00:28:31 4

10.0.0.14 4 200 0 0 1 0 0 never Idle

2001:DB8:ACAD:4::2

4 200 0 0 1 0 0 never Idle

R3#show bgp ipv6 unicast summary

BGP router identifier 3.3.3.3, local AS number 200

BGP table version is 25, main routing table version 25

11 network entries using 2992 bytes of memory

12 path entries using 1728 bytes of memory

8/8 BGP path/bestpath attribute entries using 1984 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 6728 total bytes of memory

BGP activity 30/6 prefixes, 36/10 paths, scan interval 60 secs

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

2001:DB8:ACAD:2::1

4 100 38 43 25 0 0 00:28:35 4

R3#show ip eigrp neighbor

EIGRP-IPv4 Neighbors for AS(1)

H Address Interface Hold Uptime SRTT RTO Q Seq

(sec) (ms) Cnt Num

0 10.0.0.10 Gi0/0/1 11 00:27:09 1 100 0 26

R3#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 0 0/0 0/0 0 0/0 0 0

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

R3#show ip eigrp border-routers

^

% Invalid input detected at '^' marker.

R3#show ip eigrp border-routers

^

% Invalid input detected at '^' marker.

R3#show ipv6 eigrp neighbor

EIGRP-IPv6 Neighbors for AS(10)

H Address Interface Hold Uptime SRTT RTO Q Seq

(sec) (ms) Cnt Num

0 Link-local address: Gi0/0/1 14 00:27:37 1 100 0 23

FE80::4

R3#show ipv6 interface

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

IPv6 is enabled, link-local address is FE80::3

No Virtual link-local address(es):

Global unicast address(es):

2001:DB8:ACAD:2::2, subnet is 2001:DB8:ACAD:2::/64

Joined group address(es):

FF02::1

FF02::2

FF02::A

FF02::1:FF00:2

FF02::1:FF00:3

MTU is 1500 bytes

ICMP error messages limited to one every 100 milliseconds

ICMP redirects are enabled

ICMP unreachables are sent

ND DAD is enabled, number of DAD attempts: 1

ND reachable time is 30000 milliseconds (using 30000)

ND advertised reachable time is 0 (unspecified)

ND advertised retransmit interval is 0 (unspecified)

ND router advertisements are sent every 200 seconds

ND router advertisements live for 1800 seconds

ND advertised default router preference is Medium

Hosts use stateless autoconfig for addresses.

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

IPv6 is enabled, link-local address is FE80::3

No Virtual link-local address(es):

Global unicast address(es):

2001:DB8:ACAD:3::1, subnet is 2001:DB8:ACAD:3::/64

Joined group address(es):

FF02::1

FF02::2

FF02::A

FF02::1:FF00:1

FF02::1:FF00:3

MTU is 1500 bytes

ICMP error messages limited to one every 100 milliseconds

ICMP redirects are enabled

ICMP unreachables are sent

ND DAD is enabled, number of DAD attempts: 1

ND reachable time is 30000 milliseconds (using 30000)

ND advertised reachable time is 0 (unspecified)

ND advertised retransmit interval is 0 (unspecified)

ND router advertisements are sent every 200 seconds

ND router advertisements live for 1800 seconds

ND advertised default router preference is Medium

Hosts use stateless autoconfig for addresses.

Loopback0 is up, line protocol is up

IPv6 is enabled, link-local address is FE80::3

No Virtual link-local address(es):

Global unicast address(es):

2001:DB8:ACAD:C::1, subnet is 2001:DB8:ACAD:C::/64

Joined group address(es):

FF02::1

FF02::2

FF02::A

FF02::1:FF00:1

FF02::1:FF00:3

MTU is 1514 bytes

ICMP error messages limited to one every 100 milliseconds

ICMP redirects are enabled

ICMP unreachables are sent

ND DAD is not supported

ND reachable time is 30000 milliseconds (using 30000)

ND advertised reachable time is 0 (unspecified)

ND advertised retransmit interval is 0 (unspecified)

ND router advertisements live for 1800 seconds

ND advertised default router preference is Medium

ND RAs are suppressed (periodic)

Hosts use stateless autoconfig for addresses.

R3# show ip prot

\*\*\* 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

Redistributing: bgp 200

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: 3.3.3.3

Topology : 0 (base)

Active Timer: 3 min

Distance: internal 90 external 170

Maximum path: 4

Maximum hopcount 100

Maximum metric variance 1

Automatic Summarization: disabled

Maximum path: 4

Routing for Networks:

10.0.0.4/30

10.0.0.8/30

192.168.2.0

Passive Interface(s):

Loopback0

Routing Information Sources:

Gateway Distance Last Update

10.0.0.10 90 00:15:13

Distance: internal 90 external 170

Routing Protocol is "bgp 200"

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

Redistributing: eigrp 1

Neighbor(s):

Address FiltIn FiltOut DistIn DistOut Weight RouteMap

10.0.0.5

10.0.0.14

2001:DB8:ACAD:4::2

Maximum path: 1

Routing Information Sources:

Gateway Distance Last Update

10.0.0.5 20 00:28:29

Distance: external 20 internal 200 local 200

R3#show ipv6 prot

IPv6 Routing Protocol is "connected"

IPv6 Routing Protocol is "application"

IPv6 Routing Protocol is "ND"

IPv6 Routing Protocol is "bgp 200"

IGP synchronization is disabled

Redistribution:

Redistributing protocol connected

Redistributing protocol eigrp 10

Neighbor(s):

Address FiltIn FiltOut Weight RoutemapIn RoutemapOut

2001:DB8:ACAD:2::1

IPv6 Routing Protocol is "eigrp 10"

EIGRP-IPv6 Protocol for AS(10)

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: 3.3.3.3

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

GigabitEthernet0/0/1

Loopback0 (passive)

Redistribution:

Redistributing protocol bgp 200 with metric 1000000 1 255 1 1500

R3# show ip bgp neighbor

BGP neighbor is 10.0.0.5, remote AS 100, external link

BGP version 4, remote router ID 2.2.2.2

BGP state = Established, up for 00:30:02

Last read 00:00:19, last write 00:00:04, 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: 17 3

Keepalives: 25 34

Route Refresh: 0 0

Total: 43 38

Do log neighbor state changes (via global configuration)

Default minimum time between advertisement runs is 30 seconds

For address family: IPv4 Unicast

Session: 10.0.0.5

BGP table version 22, neighbor version 22/0

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: 10 4 (Consumes 480 bytes)

Prefixes Total: 14 4

Implicit Withdraw: 0 0

Explicit Withdraw: 4 0

Used as bestpath: n/a 3

Used as multipath: n/a 0

Outbound Inbound

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

Bestpath from this peer: 3 n/a

Total: 3 0

Number of NLRIs in the update sent: max 2, 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 10.0.0.5

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: 10.0.0.6, Local port: 179

Foreign host: 10.0.0.5, Foreign port: 16694

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 0xB397E9):

Timer Starts Wakeups Next

Retrans 42 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: 2108471956 snduna: 2108473321 sndnxt: 2108473321

irs: 3641403094 rcvnxt: 3641403941

sndwnd: 15020 scale: 0 maxrcvwnd: 16384

rcvwnd: 15538 scale: 0 delrcvwnd: 846

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

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

uptime: 1802164 ms, Sent idletime: 4921 ms, Receive idletime: 4719 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: 78 (out of order: 0), with data: 36, total data bytes: 846

Sent: 79 (retransmit: 0, fastretransmit: 0, partialack: 0, Second Congestion: 0), with data: 42, total data bytes: 1364

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

fast lock acquisition failures: 0, slow path: 0

TCP Semaphore 0x7FE90517F600 FREE

BGP neighbor is 10.0.0.14, remote AS 200, **internal** link

BGP version 4, remote router ID 0.0.0.0

BGP state = Idle

Neighbor sessions:

0 active, is not multisession capable (disabled)

Stateful switchover support enabled: NO

Do log neighbor state changes (via global configuration)

Default minimum time between advertisement runs is 0 seconds

For address family: IPv4 Unicast

BGP table version 22, neighbor version 1/22

Output queue size : 0

Index 0, Advertise bit 0

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 10.0.0.14

Connections established 0; dropped 0

Last reset never

Interface associated: (none) (peering address NOT in same link)

Transport(tcp) path-mtu-discovery is enabled

Graceful-Restart is disabled

SSO is disabled

No active TCP connection

BGP neighbor is 2001:DB8:ACAD:4::2, remote AS 200, internal link

BGP version 4, remote router ID 0.0.0.0

BGP state = Idle

Neighbor sessions:

0 active, is not multisession capable (disabled)

Stateful switchover support enabled: NO

Do log neighbor state changes (via global configuration)

Default minimum time between advertisement runs is 0 seconds

For address family: IPv4 Unicast

BGP table version 22, neighbor version 1/22

Output queue size : 0

Index 0, Advertise bit 0

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:ACAD:4::2

Connections established 0; dropped 0

Last reset never

Interface associated: (none) (peering address NOT in same link)

Transport(tcp) path-mtu-discovery is enabled

Graceful-Restart is disabled

SSO is disabled

No active TCP connection

R4 Config:

R4#show run

Building configuration...

Current configuration : 1998 bytes

!

! Last configuration change at 18:16:45 UTC Wed Jan 5 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

multilink bundle-name authenticated

!

!

!

!

license udi pid ISR4321/K9 sn FDO210907U3

!

spanning-tree extend system-id

!

!

redundancy

mode none

!

!

vlan internal allocation policy ascending

!

!

!

!

!

!

interface Loopback0

ip address 192.168.3.1 255.255.255.252

ipv6 address FE80::4 link-local

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

ipv6 eigrp 10

!

interface GigabitEthernet0/0/0

ip address 10.0.0.10 255.255.255.252

negotiation auto

ipv6 address FE80::4 link-local

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

ipv6 eigrp 10

!

interface GigabitEthernet0/0/1

ip address 10.0.0.13 255.255.255.252

negotiation auto

ipv6 address FE80::4 link-local

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

ipv6 eigrp 10

!

interface Serial0/1/0

no ip address

shutdown

!

interface Serial0/1/1

no ip address

shutdown

!

interface GigabitEthernet0/2/0

no ip address

shutdown

negotiation auto

!

interface GigabitEthernet0/2/1

no ip address

shutdown

negotiation auto

!

interface GigabitEthernet0

vrf forwarding Mgmt-intf

no ip address

shutdown

negotiation auto

!

interface Vlan1

no ip address

shutdown

!

!

router eigrp 1

network 10.0.0.8 0.0.0.3

network 10.0.0.12 0.0.0.3

network 192.168.3.0

passive-interface Loopback0

eigrp router-id 4.4.4.4

!

ip forward-protocol nd

no ip http server

no ip http secure-server

ip tftp source-interface GigabitEthernet0

!

!

ipv6 router eigrp 10

passive-interface Loopback0

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

10.0.0.0/8 is variably subnetted, 8 subnets, 2 masks

D EX 10.0.0.0/30 [170/26112] via 10.0.0.9, 00:30:06, GigabitEthernet0/0/0

D 10.0.0.4/30 [90/3072] via 10.0.0.9, 00:30:06, GigabitEthernet0/0/0

C 10.0.0.8/30 is directly connected, GigabitEthernet0/0/0

L 10.0.0.10/32 is directly connected, GigabitEthernet0/0/0

C 10.0.0.12/30 is directly connected, GigabitEthernet0/0/1

L 10.0.0.13/32 is directly connected, GigabitEthernet0/0/1

D 10.0.0.16/30 [90/3072] via 10.0.0.14, 00:20:11, GigabitEthernet0/0/1

D EX 10.0.0.20/30

[170/26112] via 10.0.0.14, 00:18:13, GigabitEthernet0/0/1

192.168.0.0/32 is subnetted, 1 subnets

D EX 192.168.0.1 [170/26112] via 10.0.0.9, 00:30:06, GigabitEthernet0/0/0

192.168.1.0/30 is subnetted, 1 subnets

D EX 192.168.1.0 [170/26112] via 10.0.0.9, 00:30:06, GigabitEthernet0/0/0

192.168.2.0/30 is subnetted, 1 subnets

D 192.168.2.0 [90/130816] via 10.0.0.9, 00:30:06, GigabitEthernet0/0/0

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

C 192.168.3.0/30 is directly connected, Loopback0

L 192.168.3.1/32 is directly connected, Loopback0

192.168.4.0/30 is subnetted, 1 subnets

D 192.168.4.0 [90/130816] via 10.0.0.14, 00:21:27, GigabitEthernet0/0/1

192.168.5.0/30 is subnetted, 1 subnets

D EX 192.168.5.0 [170/26112] via 10.0.0.14, 00:18:59, GigabitEthernet0/0/1

192.168.6.0/32 is subnetted, 1 subnets

D EX 192.168.6.1 [170/26112] via 10.0.0.14, 00:17:28, GigabitEthernet0/0/1

R4#show ipv6 route

IPv6 Routing Table - default - 17 entries

Codes: C - Connected, L - Local, S - Static, U - Per-user Static route

B - BGP, R - RIP, I1 - ISIS L1, I2 - ISIS L2

IA - ISIS interarea, IS - ISIS summary, D - EIGRP, EX - EIGRP external

ND - ND Default, NDp - ND Prefix, DCE - Destination, NDr - Redirect

O - OSPF Intra, OI - OSPF Inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2

ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2, a - Application

EX 2001:DB8:ACAD:1::/64 [170/3072]

via FE80::3, GigabitEthernet0/0/0

D 2001:DB8:ACAD:2::/64 [90/3072]

via FE80::3, GigabitEthernet0/0/0

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

via GigabitEthernet0/0/0, directly connected

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

via GigabitEthernet0/0/0, receive

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

via GigabitEthernet0/0/1, directly connected

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

via GigabitEthernet0/0/1, receive

D 2001:DB8:ACAD:5::/64 [90/3072]

via FE80::5, GigabitEthernet0/0/1

EX 2001:DB8:ACAD:6::/64 [170/26112]

via FE80::5, GigabitEthernet0/0/1

EX 2001:DB8:ACAD:A::1/128 [170/3072]

via FE80::3, GigabitEthernet0/0/0

EX 2001:DB8:ACAD:B::/64 [170/3072]

via FE80::3, GigabitEthernet0/0/0

D 2001:DB8:ACAD:C::/64 [90/130816]

via FE80::3, GigabitEthernet0/0/0

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

via Loopback0, directly connected

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

via Loopback0, receive

D 2001:DB8:ACAD:E::/64 [90/130816]

via FE80::5, GigabitEthernet0/0/1

EX 2001:DB8:ACAD:F::/64 [170/26112]

via FE80::5, GigabitEthernet0/0/1

EX 2001:DB8:ACAD:AA::1/128 [170/26112]

via FE80::5, GigabitEthernet0/0/1

L FF00::/8 [0/0]

via Null0, receive

R4#show ip eigrp

% Incomplete command.

R4#show ip eigrp neighbors

EIGRP-IPv4 Neighbors for AS(1)

H Address Interface Hold Uptime SRTT RTO Q Seq

(sec) (ms) Cnt Num

1 10.0.0.14 Gi0/0/1 10 00:21:53 1 100 0 7

0 10.0.0.9 Gi0/0/0 14 00:30:28 1 100 0 16

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

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

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

R4# show ipv6 interface

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

IPv6 is enabled, link-local address is FE80::4

No Virtual link-local address(es):

Global unicast address(es):

2001:DB8:ACAD:3::2, subnet is 2001:DB8:ACAD:3::/64

Joined group address(es):

FF02::1

FF02::2

FF02::A

FF02::1:FF00:2

FF02::1:FF00:4

MTU is 1500 bytes

ICMP error messages limited to one every 100 milliseconds

ICMP redirects are enabled

ICMP unreachables are sent

ND DAD is enabled, number of DAD attempts: 1

ND reachable time is 30000 milliseconds (using 30000)

ND advertised reachable time is 0 (unspecified)

ND advertised retransmit interval is 0 (unspecified)

ND router advertisements are sent every 200 seconds

ND router advertisements live for 1800 seconds

ND advertised default router preference is Medium

Hosts use stateless autoconfig for addresses.

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

IPv6 is enabled, link-local address is FE80::4

No Virtual link-local address(es):

Global unicast address(es):

2001:DB8:ACAD:4::1, subnet is 2001:DB8:ACAD:4::/64

Joined group address(es):

FF02::1

FF02::2

FF02::A

FF02::1:FF00:1

FF02::1:FF00:4

MTU is 1500 bytes

ICMP error messages limited to one every 100 milliseconds

ICMP redirects are enabled

ICMP unreachables are sent

ND DAD is enabled, number of DAD attempts: 1

ND reachable time is 30000 milliseconds (using 30000)

ND advertised reachable time is 0 (unspecified)

ND advertised retransmit interval is 0 (unspecified)

ND router advertisements are sent every 200 seconds

ND router advertisements live for 1800 seconds

ND advertised default router preference is Medium

Hosts use stateless autoconfig for addresses.

Loopback0 is up, line protocol is up

IPv6 is enabled, link-local address is FE80::4

No Virtual link-local address(es):

Global unicast address(es):

2001:DB8:ACAD:D::1, subnet is 2001:DB8:ACAD:D::/64

Joined group address(es):

FF02::1

FF02::2

FF02::A

FF02::1:FF00:1

FF02::1:FF00:4

MTU is 1514 bytes

ICMP error messages limited to one every 100 milliseconds

ICMP redirects are enabled

ICMP unreachables are sent

ND DAD is not supported

ND reachable time is 30000 milliseconds (using 30000)

ND advertised reachable time is 0 (unspecified)

ND advertised retransmit interval is 0 (unspecified)

ND router advertisements live for 1800 seconds

ND advertised default router preference is Medium

ND RAs are suppressed (periodic)

Hosts use stateless autoconfig for addresses.

R4#show ipv6 eigrp neighbor

EIGRP-IPv6 Neighbors for AS(10)

H Address Interface Hold Uptime SRTT RTO Q Seq

(sec) (ms) Cnt Num

1 Link-local address: Gi0/0/1 12 00:22:16 1 100 0 5

FE80::5

0 Link-local address: Gi0/0/0 13 00:30:48 5 100 0 15

FE80::3

R4#show ipv6 eigrp border-routers

^

% Invalid input detected at '^' marker.

R4#show ip prot

\*\*\* 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: 4.4.4.4

Topology : 0 (base)

Active Timer: 3 min

Distance: internal 90 external 170

Maximum path: 4

Maximum hopcount 100

Maximum metric variance 1

Automatic Summarization: disabled

Maximum path: 4

Routing for Networks:

10.0.0.8/30

10.0.0.12/30

192.168.3.0

Passive Interface(s):

Loopback0

Routing Information Sources:

Gateway Distance Last Update

10.0.0.9 90 00:18:20

10.0.0.14 90 00:18:20

Distance: internal 90 external 170

R4# show ipv6 prot

IPv6 Routing Protocol is "connected"

IPv6 Routing Protocol is "application"

IPv6 Routing Protocol is "ND"

IPv6 Routing Protocol is "eigrp 10"

EIGRP-IPv6 Protocol for AS(10)

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:

GigabitEthernet0/0/0

GigabitEthernet0/0/1

Loopback0 (passive)

Redistribution:

None

R5 Config:

R5#show run

Building configuration...

Current configuration : 2884 bytes

!

! Last configuration change at 18:41:41 UTC Wed Jan 5 2022

!

version 15.5

service timestamps debug datetime msec

service timestamps log datetime msec

platform punt-keepalive disable-kernel-core

!

hostname R5

!

boot-start-marker

boot-end-marker

!

!

vrf definition Mgmt-intf

!

address-family ipv4

exit-address-family

!

address-family ipv6

exit-address-family

!

!

no aaa new-model

!

!

!

!

!

!

!

!

!

!

!

!

!

!

login on-success log

ipv6 unicast-routing

!

!

!

!

!

!

!

subscriber templating

multilink bundle-name authenticated

!

!

!

crypto pki trustpoint TP-self-signed-3458782570

enrollment selfsigned

subject-name cn=IOS-Self-Signed-Certificate-3458782570

revocation-check none

rsakeypair TP-self-signed-3458782570

!

!

crypto pki certificate chain TP-self-signed-3458782570

license udi pid ISR4321/K9 sn FDO214421CH

!

spanning-tree extend system-id

!

!

redundancy

mode none

!

!

vlan internal allocation policy ascending

!

!

!

!

!

!

interface Loopback0

ip address 192.168.4.1 255.255.255.252

ipv6 address FE80::5 link-local

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

ipv6 eigrp 10

!

interface GigabitEthernet0/0/0

ip address 10.0.0.14 255.255.255.252

negotiation auto

ipv6 address FE80::5 link-local

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

ipv6 eigrp 10

!

interface GigabitEthernet0/0/1

ip address 10.0.0.17 255.255.255.252

negotiation auto

ipv6 address FE80::5 link-local

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

ipv6 eigrp 10

!

interface Serial0/1/0

!

interface Serial0/1/1

!

interface Service-Engine0/2/0

no ip address

!

interface GigabitEthernet0

vrf forwarding Mgmt-intf

no ip address

shutdown

negotiation auto

!

interface Vlan1

no ip address

shutdown

!

!

router eigrp 1

network 10.0.0.12 0.0.0.3

network 10.0.0.16 0.0.0.3

network 192.168.4.0

redistribute bgp 200 metric 100000 1 255 1 1500

passive-interface Loopback0

eigrp router-id 5.5.5.5

!

router bgp 200

bgp router-id 5.5.5.5

bgp log-neighbor-changes

neighbor 10.0.0.9 remote-as 200

neighbor 10.0.0.9 update-source Loopback0

neighbor 10.0.0.18 remote-as 100

neighbor 2001:DB8:ACAD:3::1 remote-as 200

neighbor 2001:DB8:ACAD:3::1 update-source Loopback0

neighbor 2001:DB8:ACAD:5::2 remote-as 100

!

address-family ipv4

redistribute eigrp 1

neighbor 10.0.0.9 activate

neighbor 10.0.0.18 activate

neighbor 2001:DB8:ACAD:3::1 activate

no neighbor 2001:DB8:ACAD:5::2 activate

exit-address-family

!

address-family ipv6

redistribute connected

redistribute eigrp 10

neighbor 2001:DB8:ACAD:5::2 activate

exit-address-family

!

ip forward-protocol nd

ip http server

ip http authentication local

ip http secure-server

ip tftp source-interface GigabitEthernet0

!

!

ipv6 router eigrp 10

passive-interface Loopback0

eigrp router-id 5.5.5.5

redistribute bgp 200 metric 100000 1 255 1 1500

!

!

!

!

control-plane

!

!

line con 0

stopbits 1

line aux 0

stopbits 1

line vty 0 4

login

!

!

end

R5# show ip route

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

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

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

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

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

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

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

a - application route

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

Gateway of last resort is not set

10.0.0.0/8 is variably subnetted, 8 subnets, 2 masks

D EX 10.0.0.0/30 [170/26368] via 10.0.0.13, 00:56:14, GigabitEthernet0/0/0

D 10.0.0.4/30 [90/3328] via 10.0.0.13, 00:56:14, GigabitEthernet0/0/0

D 10.0.0.8/30 [90/3072] via 10.0.0.13, 00:56:14, GigabitEthernet0/0/0

C 10.0.0.12/30 is directly connected, GigabitEthernet0/0/0

L 10.0.0.14/32 is directly connected, GigabitEthernet0/0/0

C 10.0.0.16/30 is directly connected, GigabitEthernet0/0/1

L 10.0.0.17/32 is directly connected, GigabitEthernet0/0/1

B 10.0.0.20/30 [20/0] via 10.0.0.18, 00:52:57

192.168.0.0/32 is subnetted, 1 subnets

D EX 192.168.0.1 [170/26368] via 10.0.0.13, 00:56:14, GigabitEthernet0/0/0

192.168.1.0/30 is subnetted, 1 subnets

D EX 192.168.1.0 [170/26368] via 10.0.0.13, 00:56:14, GigabitEthernet0/0/0

192.168.2.0/30 is subnetted, 1 subnets

D 192.168.2.0 [90/131072] via 10.0.0.13, 00:56:14, GigabitEthernet0/0/0

192.168.3.0/30 is subnetted, 1 subnets

D 192.168.3.0 [90/130816] via 10.0.0.13, 00:56:14, GigabitEthernet0/0/0

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

C 192.168.4.0/30 is directly connected, Loopback0

L 192.168.4.1/32 is directly connected, Loopback0

192.168.5.0/30 is subnetted, 1 subnets

B 192.168.5.0 [20/0] via 10.0.0.18, 00:53:42

192.168.6.0/32 is subnetted, 1 subnets

B 192.168.6.1 [20/2] via 10.0.0.18, 00:52:12

R5# show ipv6 route

IPv6 Routing Table - default - 17 entries

Codes: C - Connected, L - Local, S - Static, U - Per-user Static route

B - BGP, R - RIP, I1 - ISIS L1, I2 - ISIS L2

IA - ISIS interarea, IS - ISIS summary, D - EIGRP, EX - EIGRP external

ND - ND Default, NDp - ND Prefix, DCE - Destination, NDr - Redirect

O - OSPF Intra, OI - OSPF Inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2

ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2, a - Application

EX 2001:DB8:ACAD:1::/64 [170/3328]

via FE80::4, GigabitEthernet0/0/0

D 2001:DB8:ACAD:2::/64 [90/3328]

via FE80::4, GigabitEthernet0/0/0

D 2001:DB8:ACAD:3::/64 [90/3072]

via FE80::4, GigabitEthernet0/0/0

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

via GigabitEthernet0/0/0, directly connected

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

via GigabitEthernet0/0/0, receive

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

via GigabitEthernet0/0/1, directly connected

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

via GigabitEthernet0/0/1, receive

B 2001:DB8:ACAD:6::/64 [20/0]

via FE80::6, GigabitEthernet0/0/1

EX 2001:DB8:ACAD:A::1/128 [170/3328]

via FE80::4, GigabitEthernet0/0/0

EX 2001:DB8:ACAD:B::/64 [170/3328]

via FE80::4, GigabitEthernet0/0/0

D 2001:DB8:ACAD:C::/64 [90/131072]

via FE80::4, GigabitEthernet0/0/0

D 2001:DB8:ACAD:D::/64 [90/130816]

via FE80::4, GigabitEthernet0/0/0

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

via Loopback0, directly connected

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

via Loopback0, receive

B 2001:DB8:ACAD:F::/64 [20/0]

via FE80::6, GigabitEthernet0/0/1

B 2001:DB8:ACAD:AA::1/128 [20/1]

via FE80::6, GigabitEthernet0/0/1

L FF00::/8 [0/0]

via Null0, receive

R5#show ip bgp

BGP table version is 14, local router ID is 5.5.5.5

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

\*>i 10.0.0.0/30 10.0.0.13 26368 32768 ?

\*>i 10.0.0.4/30 10.0.0.13 3328 32768 ?

\*>i 10.0.0.8/30 10.0.0.13 3072 32768 ?

\*> 10.0.0.12/30 0.0.0.0 0 32768 ?

\* 10.0.0.16/30 10.0.0.18 0 0 100 ?

\*> 0.0.0.0 0 32768 ?

\*> 10.0.0.20/30 10.0.0.18 0 0 100 ?

\*>i 192.168.0.1/32 10.0.0.13 26368 32768 ?

\*>i 192.168.1.0/30 10.0.0.13 26368 32768 ?

\*>i 192.168.2.0/30 10.0.0.13 131072 32768 ?

\*>i 192.168.3.0/30 10.0.0.13 130816 32768 ?

\*> 192.168.4.0/30 0.0.0.0 0 32768 ?

\*> 192.168.5.0/30 10.0.0.18 0 0 100 ?

\*> 192.168.6.1/32 10.0.0.18 2 0 100 ?

R5# show bgp ipv6

BGP table version is 39, local router ID is 5.5.5.5

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

\*>**i** 2001:DB8:ACAD:1::/64

FE80::4 3328 32768 ?

\*>i 2001:DB8:ACAD:2::/64

FE80::4 3328 32768 ?

\*>i 2001:DB8:ACAD:3::/64

FE80::4 3072 32768 ?

\*> 2001:DB8:ACAD:4::/64

:: 0 32768 ?

\* 2001:DB8:ACAD:5::/64

2001:DB8:ACAD:5::2

0 0 100 ?

\*> :: 0 32768 ?

\*> 2001:DB8:ACAD:6::/64

2001:DB8:ACAD:5::2

0 0 100 ?

Network Next Hop Metric LocPrf Weight Path

\*>i 2001:DB8:ACAD:A::1/128

FE80::4 3328 32768 ?

\*>i 2001:DB8:ACAD:B::/64

FE80::4 3328 32768 ?

\*>i 2001:DB8:ACAD:C::/64

FE80::4 131072 32768 ?

\*>i 2001:DB8:ACAD:D::/64

FE80::4 130816 32768 ?

\*> 2001:DB8:ACAD:E::/64

:: 0 32768 ?

\*> 2001:DB8:ACAD:F::/64

2001:DB8:ACAD:5::2

0 0 100 ?

\*> 2001:DB8:ACAD:AA::1/128

2001:DB8:ACAD:5::2

1 0 100 ?

% NOTE: This command is deprecated. Please use 'show bgp ipv6 unicast'

R5#show ip bgp neighbors

BGP neighbor is 10.0.0.9, remote AS 200, **internal** link

BGP version 4, remote router ID 0.0.0.0

BGP state = Idle

Neighbor sessions:

0 active, is not multisession capable (disabled)

Stateful switchover support enabled: NO

Do log neighbor state changes (via global configuration)

Default minimum time between advertisement runs is 0 seconds

For address family: IPv4 Unicast

BGP table version 14, neighbor version 1/14

Output queue size : 0

Index 0, Advertise bit 0

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 10.0.0.9

Connections established 0; dropped 0

Last reset never

Interface associated: (none) (peering address NOT in same link)

Transport(tcp) path-mtu-discovery is enabled

Graceful-Restart is disabled

SSO is disabled

No active TCP connection

BGP neighbor is 10.0.0.18, remote AS 100, external link

BGP version 4, remote router ID 6.6.6.6

BGP state = Established, up for 00:55:18

Last read 00:00:35, last write 00:00:39, 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: 7 4

Keepalives: 61 60

Route Refresh: 0 0

Total: 69 65

Do log neighbor state changes (via global configuration)

Default minimum time between advertisement runs is 30 seconds

For address family: IPv4 Unicast

Session: 10.0.0.18

BGP table version 14, neighbor version 14/0

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: 10 4 (Consumes 480 bytes)

Prefixes Total: 10 4

Implicit Withdraw: 0 0

Explicit Withdraw: 0 0

Used as bestpath: n/a 3

Used as multipath: n/a 0

Outbound Inbound

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

Bestpath from this peer: 3 n/a

Total: 3 0

Number of NLRIs in the update sent: max 3, 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 10.0.0.18

Connections established 1; dropped 0

Last reset never

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

Interface associated: GigabitEthernet0/0/1 (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: 10.0.0.17, Local port: 179

Foreign host: 10.0.0.18, Foreign port: 31695

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 0x369C11):

Timer Starts Wakeups Next

Retrans 63 0 0x0

TimeWait 0 0 0x0

AckHold 64 63 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: 198311293 snduna: 198312883 sndnxt: 198312883

irs: 355780732 rcvnxt: 355782123

sndwnd: 16270 scale: 0 maxrcvwnd: 16384

rcvwnd: 14994 scale: 0 delrcvwnd: 1390

SRTT: 1000 ms, RTTO: 1003 ms, RTV: 3 ms, KRTT: 0 ms

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

uptime: 3318018 ms, Sent idletime: 35564 ms, Receive idletime: 35764 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: 128 (out of order: 0), with data: 64, total data bytes: 1390

Sent: 128 (retransmit: 0, fastretransmit: 0, partialack: 0, Second Congestion: 0), with data: 63, total data bytes: 1589

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

fast lock acquisition failures: 0, slow path: 0

TCP Semaphore 0x7FE18AE09620 FREE

BGP neighbor is 2001:DB8:ACAD:3::1, remote AS 200, **internal** link

BGP version 4, remote router ID 0.0.0.0

BGP state = Idle

Neighbor sessions:

0 active, is not multisession capable (disabled)

Stateful switchover support enabled: NO

Do log neighbor state changes (via global configuration)

Default minimum time between advertisement runs is 0 seconds

For address family: IPv4 Unicast

BGP table version 14, neighbor version 1/14

Output queue size : 0

Index 0, Advertise bit 0

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:ACAD:3::1

Connections established 0; dropped 0

Last reset never

Interface associated: (none) (peering address NOT in same link)

Transport(tcp) path-mtu-discovery is enabled

Graceful-Restart is disabled

SSO is disabled

No active TCP connection

R5#$ show bgp ipv6 unicast neighbors

BGP neighbor is 2001:DB8:ACAD:5::2, remote AS 100, external link

BGP version 4, remote router ID 6.6.6.6

BGP state = Established, up for 00:55:33

Last read 00:00:03, last write 00:00:10, 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: 17 5

Keepalives: 62 61

Route Refresh: 0 0

Total: 80 67

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:ACAD:5::2

BGP table version 39, neighbor version 39/0

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: 10 4 (Consumes 576 bytes)

Prefixes Total: 31 8

Implicit Withdraw: 21 4

Explicit Withdraw: 0 0

Used as bestpath: n/a 3

Used as multipath: n/a 0

Outbound Inbound

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

Bestpath from this peer: 7 n/a

Total: 7 0

Number of NLRIs in the update sent: max 4, 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:ACAD:5::2

Connections established 1; dropped 0

Last reset never

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

Interface associated: GigabitEthernet0/0/1 (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:ACAD:5::1, Local port: 24000

Foreign host: 2001:DB8:ACAD:5::2, 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 0x36DCF2):

Timer Starts Wakeups Next

Retrans 67 0 0x0

TimeWait 0 0 0x0

AckHold 65 60 0x0

SendWnd 0 0 0x0

KeepAlive 0 0 0x0

GiveUp 0 0 0x0

PmtuAger 2460 2459 0x36DD51

DeadWait 0 0 0x0

Linger 0 0 0x0

ProcessQ 0 0 0x0

iss: 3944683959 snduna: 3944686855 sndnxt: 3944686855

irs: 2945266886 rcvnxt: 2945268552

sndwnd: 16384 scale: 0 maxrcvwnd: 16384

rcvwnd: 16251 scale: 0 delrcvwnd: 133

SRTT: 1000 ms, RTTO: 1003 ms, RTV: 3 ms, KRTT: 0 ms

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

uptime: 3333094 ms, Sent idletime: 3020 ms, Receive idletime: 3220 ms

Status Flags: active open

Option Flags: nagle, path mtu capable

IP Precedence value : 6

Datagrams (max data segment is 1440 bytes):

Rcvd: 133 (out of order: 0), with data: 66, total data bytes: 1665

Sent: 132 (retransmit: 0, fastretransmit: 0, partialack: 0, Second Congestion: 0), with data: 132, total data bytes: 8183

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

fast lock acquisition failures: 0, slow path: 0

TCP Semaphore 0x7FE18AE096E0 FREE

R5# show ip eigrp neighbor

EIGRP-IPv4 Neighbors for AS(1)

H Address Interface Hold Uptime SRTT RTO Q Seq

(sec) (ms) Cnt Num

0 10.0.0.13 Gi0/0/0 12 00:57:10 1 100 0 25

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

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

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

R5#show ipv6 eigrp neighbor

EIGRP-IPv6 Neighbors for AS(10)

H Address Interface Hold Uptime SRTT RTO Q Seq

(sec) (ms) Cnt Num

0 Link-local address: Gi0/0/0 10 00:57:13 156 936 0 25

FE80::4

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

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

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

R5#show ip prot

\*\*\* 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

Redistributing: bgp 200

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

R5#show ipv6 prot

IPv6 Routing Protocol is "connected"

IPv6 Routing Protocol is "application"

IPv6 Routing Protocol is "ND"

IPv6 Routing Protocol is "bgp 200"

IGP synchronization is disabled

Redistribution:

Redistributing protocol connected

Redistributing protocol eigrp 10

Neighbor(s):

Address FiltIn FiltOut Weight RoutemapIn RoutemapOut

2001:DB8:ACAD:5::2

IPv6 Routing Protocol is "eigrp 10"

EIGRP-IPv6 Protocol for AS(10)

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:

GigabitEthernet0/0/0

GigabitEthernet0/0/1

Loopback0 (passive)

Redistribution:

Redistributing protocol bgp 200 with metric 100000 1 255 1 1500

R6 Config:

R6#show run

Building configuration...

Current configuration : 2729 bytes

!

! Last configuration change at 19:22:03 UTC Wed Jan 5 2022

!

version 15.5

service timestamps debug datetime msec

service timestamps log datetime msec

no platform punt-keepalive disable-kernel-core

!

hostname R6

!

boot-start-marker

boot system flash bootflash:isr4300-universalk9.16.09.08.SPA.bin

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

!

!

!

login on-success log

ipv6 unicast-routing

!

!

!

!

!

!

!

subscriber templating

multilink bundle-name authenticated

!

!

!

crypto pki trustpoint TP-self-signed-3632327409

enrollment selfsigned

subject-name cn=IOS-Self-Signed-Certificate-3632327409

revocation-check none

rsakeypair TP-self-signed-3632327409

!

!

crypto pki certificate chain TP-self-signed-3632327409

license udi pid ISR4321/K9 sn FDO214414VU

!

spanning-tree extend system-id

!

!

redundancy

mode none

!

!

vlan internal allocation policy ascending

!

!

!

!

!

!

interface Loopback0

ip address 192.168.5.1 255.255.255.252

ipv6 address FE80::6 link-local

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

ipv6 ospf 10 area 1

!

interface GigabitEthernet0/0/0

ip address 10.0.0.18 255.255.255.252

negotiation auto

ipv6 address FE80::6 link-local

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

ipv6 ospf 10 area 1

!

interface GigabitEthernet0/0/1

ip address 10.0.0.21 255.255.255.252

negotiation auto

ipv6 address FE80::6 link-local

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

ipv6 ospf 10 area 1

!

interface Serial0/1/0

!

interface Serial0/1/1

!

interface GigabitEthernet0

vrf forwarding Mgmt-intf

no ip address

shutdown

negotiation auto

!

interface Vlan1

no ip address

shutdown

!

router ospf 1

router-id 6.6.6.6

redistribute bgp 100 metric 100000 subnets

passive-interface Loopback0

network 10.0.0.16 0.0.0.3 area 1

network 10.0.0.20 0.0.0.3 area 1

network 192.168.5.0 0.0.0.255 area 1

!

router bgp 100

bgp router-id 6.6.6.6

bgp log-neighbor-changes

neighbor 10.0.0.17 remote-as 200

neighbor 2001:DB8:ACAD:5::1 remote-as 200

!

address-family ipv4

redistribute connected

redistribute ospf 1

neighbor 10.0.0.17 activate

no neighbor 2001:DB8:ACAD:5::1 activate

exit-address-family

!

address-family ipv6

redistribute connected

redistribute ospf 10

neighbor 2001:DB8:ACAD:5::1 activate

exit-address-family

!

ip forward-protocol nd

ip http server

ip http authentication local

ip http secure-server

ip tftp source-interface GigabitEthernet0

!

!

ipv6 router ospf 10

router-id 6.6.6.6

passive-interface Loopback0

redistribute bgp 100 metric 1000000

!

!

!

!

control-plane

!

!

line con 0

stopbits 1

line aux 0

stopbits 1

line vty 0 4

login

!

!

end

R6# show ip route

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

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

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

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

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

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

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

a - application route

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

Gateway of last resort is not set

10.0.0.0/8 is variably subnetted, 8 subnets, 2 masks

B 10.0.0.0/30 [20/26368] via 10.0.0.17, 00:55:50

B 10.0.0.4/30 [20/3328] via 10.0.0.17, 00:55:50

B 10.0.0.8/30 [20/3072] via 10.0.0.17, 00:55:50

B 10.0.0.12/30 [20/0] via 10.0.0.17, 00:55:50

C 10.0.0.16/30 is directly connected, GigabitEthernet0/0/0

L 10.0.0.18/32 is directly connected, GigabitEthernet0/0/0

C 10.0.0.20/30 is directly connected, GigabitEthernet0/0/1

L 10.0.0.21/32 is directly connected, GigabitEthernet0/0/1

192.168.0.0/32 is subnetted, 1 subnets

B 192.168.0.1 [20/26368] via 10.0.0.17, 00:55:50

192.168.1.0/30 is subnetted, 1 subnets

B 192.168.1.0 [20/26368] via 10.0.0.17, 00:55:50

192.168.2.0/30 is subnetted, 1 subnets

B 192.168.2.0 [20/131072] via 10.0.0.17, 00:55:50

192.168.3.0/30 is subnetted, 1 subnets

B 192.168.3.0 [20/130816] via 10.0.0.17, 00:55:50

192.168.4.0/30 is subnetted, 1 subnets

B 192.168.4.0 [20/0] via 10.0.0.17, 00:55:50

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

C 192.168.5.0/30 is directly connected, Loopback0

L 192.168.5.1/32 is directly connected, Loopback0

192.168.6.0/32 is subnetted, 1 subnets

O 192.168.6.1 [110/2] via 10.0.0.22, 00:54:20, GigabitEthernet0/0/1

R6# show ipv6 route

IPv6 Routing Table - default - 17 entries

Codes: C - Connected, L - Local, S - Static, U - Per-user Static route

B - BGP, R - RIP, I1 - ISIS L1, I2 - ISIS L2

IA - ISIS interarea, IS - ISIS summary, D - EIGRP, EX - EIGRP external

ND - ND Default, NDp - ND Prefix, DCE - Destination, NDr - Redirect

O - OSPF Intra, OI - OSPF Inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2

ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2, a - Application

B 2001:DB8:ACAD:1::/64 [20/3328]

via FE80::5, GigabitEthernet0/0/0

B 2001:DB8:ACAD:2::/64 [20/3328]

via FE80::5, GigabitEthernet0/0/0

B 2001:DB8:ACAD:3::/64 [20/3072]

via FE80::5, GigabitEthernet0/0/0

B 2001:DB8:ACAD:4::/64 [20/0]

via FE80::5, GigabitEthernet0/0/0

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

via GigabitEthernet0/0/0, directly connected

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

via GigabitEthernet0/0/0, receive

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

via GigabitEthernet0/0/1, directly connected

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

via GigabitEthernet0/0/1, receive

B 2001:DB8:ACAD:A::1/128 [20/3328]

via FE80::5, GigabitEthernet0/0/0

B 2001:DB8:ACAD:B::/64 [20/3328]

via FE80::5, GigabitEthernet0/0/0

B 2001:DB8:ACAD:C::/64 [20/131072]

via FE80::5, GigabitEthernet0/0/0

B 2001:DB8:ACAD:D::/64 [20/130816]

via FE80::5, GigabitEthernet0/0/0

B 2001:DB8:ACAD:E::/64 [20/0]

via FE80::5, GigabitEthernet0/0/0

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

via Loopback0, directly connected

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

via Loopback0, receive

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

via FE80::7, GigabitEthernet0/0/1

L FF00::/8 [0/0]

via Null0, receive

R6# show ip bgp

BGP table version is 14, local router ID is 6.6.6.6

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

\*> 10.0.0.0/30 10.0.0.17 26368 0 200 ?

\*> 10.0.0.4/30 10.0.0.17 3328 0 200 ?

\*> 10.0.0.8/30 10.0.0.17 3072 0 200 ?

\*> 10.0.0.12/30 10.0.0.17 0 0 200 ?

\* 10.0.0.16/30 10.0.0.17 0 0 200 ?

\*> 0.0.0.0 0 32768 ?

\*> 10.0.0.20/30 0.0.0.0 0 32768 ?

\*> 192.168.0.1/32 10.0.0.17 26368 0 200 ?

\*> 192.168.1.0/30 10.0.0.17 26368 0 200 ?

\*> 192.168.2.0/30 10.0.0.17 131072 0 200 ?

\*> 192.168.3.0/30 10.0.0.17 130816 0 200 ?

\*> 192.168.4.0/30 10.0.0.17 0 0 200 ?

\*> 192.168.5.0/30 0.0.0.0 0 32768 ?

\*> 192.168.6.1/32 10.0.0.22 2 32768 ?

R6#show bgp ipv7

^

% Invalid input detected at '^' marker.

R6#show bgp ipv6

BGP table version is 38, local router ID is 6.6.6.6

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

\*> 2001:DB8:ACAD:1::/64

2001:DB8:ACAD:5::1

3328 0 200 ?

\*> 2001:DB8:ACAD:2::/64

2001:DB8:ACAD:5::1

3328 0 200 ?

\*> 2001:DB8:ACAD:3::/64

2001:DB8:ACAD:5::1

3072 0 200 ?

\*> 2001:DB8:ACAD:4::/64

2001:DB8:ACAD:5::1

0 0 200 ?

\*> 2001:DB8:ACAD:5::/64

:: 0 32768 ?

\* 2001:DB8:ACAD:5::1

Network Next Hop Metric LocPrf Weight Path

0 0 200 ?

\*> 2001:DB8:ACAD:6::/64

:: 0 32768 ?

\*> 2001:DB8:ACAD:A::1/128

2001:DB8:ACAD:5::1

3328 0 200 ?

\*> 2001:DB8:ACAD:B::/64

2001:DB8:ACAD:5::1

3328 0 200 ?

\*> 2001:DB8:ACAD:C::/64

2001:DB8:ACAD:5::1

131072 0 200 ?

\*> 2001:DB8:ACAD:D::/64

2001:DB8:ACAD:5::1

130816 0 200 ?

\*> 2001:DB8:ACAD:E::/64

2001:DB8:ACAD:5::1

0 0 200 ?

\*> 2001:DB8:ACAD:F::/64

:: 0 32768 ?

\*> 2001:DB8:ACAD:AA::1/128

FE80::7 1 32768 ?

Network Next Hop Metric LocPrf Weight Path

% NOTE: This command is deprecated. Please use 'show bgp ipv6 unicast'

R6# show ip bgp neighbors

BGP neighbor is 10.0.0.17, remote AS 200, external link

BGP version 4, remote router ID 5.5.5.5

BGP state = Established, up for 00:57:22

Last read 00:00:57, last write 00:00:42, 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: 4 7

Keepalives: 62 63

Route Refresh: 0 0

Total: 67 71

Do log neighbor state changes (via global configuration)

Default minimum time between advertisement runs is 30 seconds

For address family: IPv4 Unicast

Session: 10.0.0.17

BGP table version 14, neighbor version 14/0

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: 4 10 (Consumes 1200 bytes)

Prefixes Total: 4 10

Implicit Withdraw: 0 0

Explicit Withdraw: 0 0

Used as bestpath: n/a 9

Used as multipath: n/a 0

Outbound Inbound

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

Bestpath from this peer: 9 n/a

Total: 9 0

Number of NLRIs in the update sent: max 2, 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 10.0.0.17

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: 10.0.0.18, Local port: 31695

Foreign host: 10.0.0.17, 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 0x38A904):

Timer Starts Wakeups Next

Retrans 68 1 0x0

TimeWait 0 0 0x0

AckHold 65 62 0x0

SendWnd 0 0 0x0

KeepAlive 0 0 0x0

GiveUp 0 0 0x0

PmtuAger 2557 2556 0x38A9A6

DeadWait 0 0 0x0

Linger 0 0 0x0

ProcessQ 0 0 0x0

iss: 355780732 snduna: 355782161 sndnxt: 355782161

irs: 198311293 rcvnxt: 198312921

sndwnd: 14956 scale: 0 maxrcvwnd: 16384

rcvwnd: 16232 scale: 0 delrcvwnd: 152

SRTT: 1000 ms, RTTO: 1003 ms, RTV: 3 ms, KRTT: 0 ms

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

uptime: 3444929 ms, Sent idletime: 42879 ms, Receive idletime: 42678 ms

Status Flags: active open

Option Flags: nagle, path mtu capable

IP Precedence value : 6

Datagrams (max data segment is 1460 bytes):

Rcvd: 132 (out of order: 0), with data: 65, total data bytes: 1627

Sent: 132 (retransmit: 1, fastretransmit: 0, partialack: 0, Second Congestion: 0), with data: 66, total data bytes: 1428

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

fast lock acquisition failures: 0, slow path: 0

TCP Semaphore 0x7FF2BE8EBE48 FREE

R6#$ show bgp ipv6 unicast neighbors

BGP neighbor is 2001:DB8:ACAD:5::1, remote AS 200, external link

BGP version 4, remote router ID 5.5.5.5

BGP state = Established, up for 00:57:31

Last read 00:00:11, last write 00:00:20, 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: 5 17

Keepalives: 63 64

Route Refresh: 0 0

Total: 69 82

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:ACAD:5::1

BGP table version 38, neighbor version 38/0

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: 4 10 (Consumes 1440 bytes)

Prefixes Total: 8 31

Implicit Withdraw: 4 21

Explicit Withdraw: 0 0

Used as bestpath: n/a 9

Used as multipath: n/a 0

Outbound Inbound

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

Bestpath from this peer: 29 n/a

Total: 29 0

Number of NLRIs in the update sent: max 3, 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:ACAD:5::1

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:ACAD:5::2, Local port: 179

Foreign host: 2001:DB8:ACAD:5::1, Foreign port: 24000

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 0x38CF34):

Timer Starts Wakeups Next

Retrans 67 0 0x0

TimeWait 0 0 0x0

AckHold 68 64 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: 2945266886 snduna: 2945268590 sndnxt: 2945268590

irs: 3944683959 rcvnxt: 3944686893

sndwnd: 16213 scale: 0 maxrcvwnd: 16384

rcvwnd: 16346 scale: 0 delrcvwnd: 38

SRTT: 1000 ms, RTTO: 1003 ms, RTV: 3 ms, KRTT: 0 ms

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

uptime: 3451163 ms, Sent idletime: 11020 ms, Receive idletime: 11220 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: 136 (out of order: 0), with data: 69, total data bytes: 2933

Sent: 137 (retransmit: 0, fastretransmit: 0, partialack: 0, Second Congestion: 0), with data: 137, total data bytes: 7191

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

fast lock acquisition failures: 0, slow path: 0

TCP Semaphore 0x7FF2BE8EBD88 FREE

R6#$ show ip bgp summary

BGP router identifier 6.6.6.6, local AS number 100

BGP table version is 14, main routing table version 14

13 network entries using 3224 bytes of memory

14 path entries using 1680 bytes of memory

8/8 BGP path/bestpath attribute entries using 1984 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 6912 total bytes of memory

BGP activity 26/0 prefixes, 28/0 paths, scan interval 60 secs

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

10.0.0.17 4 200 72 68 14 0 0 00:57:41 10

R6# show bgp ipv6 unicast summary

BGP router identifier 6.6.6.6, local AS number 100

BGP table version is 38, main routing table version 38

13 network entries using 3536 bytes of memory

14 path entries using 2016 bytes of memory

7/7 BGP path/bestpath attribute entries using 1736 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 7312 total bytes of memory

BGP activity 26/0 prefixes, 28/0 paths, scan interval 60 secs

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

2001:DB8:ACAD:5::1

4 200 82 69 38 0 0 00:57:47 10

R6#show ip ospf neighbor

Neighbor ID Pri State Dead Time Address Interface

7.7.7.7 1 FULL/DR 00:00:31 10.0.0.22 GigabitEthernet0/0/1

R6#show ip ospf

Routing Process "ospf 1" with ID 6.6.6.6

Start time: 00:03:44.756, Time elapsed: 00:58:41.520

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

It is an autonomous system boundary router

Redistributing External Routes from,

bgp 100 with metric mapped to 100000, includes subnets in redistribution

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 9. Checksum Sum 0x02D7EF

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 1

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

Area has no authentication

SPF algorithm last executed 00:55:15.480 ago

SPF algorithm executed 4 times

Area ranges are

Number of LSA 3. Checksum Sum 0x021203

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

R6# show ip ospf interface

Loopback0 is up, line protocol is up

Internet Address 192.168.5.1/30, Area 1, Attached via Network Statement

Process ID 1, Router ID 6.6.6.6, 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 10.0.0.21/30, Area 1, Attached via Network Statement

Process ID 1, Router ID 6.6.6.6, 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) 7.7.7.7, Interface address 10.0.0.22

Backup Designated router (ID) 6.6.6.6, Interface address 10.0.0.21

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

oob-resync timeout 40

Hello due in 00:00:08

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 10, maximum is 10

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

Neighbor Count is 1, Adjacent neighbor count is 1

Adjacent with neighbor 7.7.7.7 (Designated Router)

Suppress hello for 0 neighbor(s)

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

Internet Address 10.0.0.18/30, Area 1, Attached via Network Statement

Process ID 1, Router ID 6.6.6.6, 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) 6.6.6.6, Interface address 10.0.0.18

No backup designated router on this network

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

oob-resync timeout 40

Hello due in 00:00:08

Supports Link-local Signaling (LLS)

Cisco NSF helper support enabled

IETF NSF helper support enabled

Index 1/1/1, flood queue length 0

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

Last flood scan length is 0, maximum is 0

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

Neighbor Count is 0, Adjacent neighbor count is 0

Suppress hello for 0 neighbor(s)

R6#$ show ip ospf border-routers

OSPF Router with ID (6.6.6.6) (Process ID 1)

Base Topology (MTID 0)

Internal Router Routing Table

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

R6#show ipv6 ospf neighbor

OSPFv3 Router with ID (6.6.6.6) (Process ID 10)

Neighbor ID Pri State Dead Time Interface ID Interface

7.7.7.7 1 FULL/DR 00:00:39 6 GigabitEthernet0/0/1

R6# show ipv6 ospf

Routing Process "ospfv3 10" with ID 6.6.6.6

Supports NSSA (compatible with RFC 3101)

Supports Database Exchange Summary List Optimization (RFC 5243)

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

It is an autonomous system boundary router

Redistributing External Routes from,

bgp 100 with metric 1000000

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 9. Checksum Sum 0x0397BD

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 1

Number of interfaces in this area is 3

SPF algorithm executed 2 times

Number of LSA 9. Checksum Sum 0x03523B

Number of DCbitless LSA 0

Number of indication LSA 0

Number of DoNotAge LSA 0

Flood list length 0

R6# show ipv6 ospf interface

Loopback0 is up, line protocol is up

Link Local Address FE80::6, Interface ID 12

Area 1, Process ID 10, Instance ID 0, Router ID 6.6.6.6

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::6, Interface ID 7

Area 1, Process ID 10, Instance ID 0, Router ID 6.6.6.6

Network Type BROADCAST, Cost: 1

Transmit Delay is 1 sec, State BDR, Priority 1

Designated Router (ID) 7.7.7.7, local address FE80::7

Backup Designated router (ID) 6.6.6.6, local address FE80::6

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

Hello due in 00:00:09

Graceful restart helper support enabled

Index 1/3/3, flood queue length 0

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

Last flood scan length is 2, maximum is 10

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

Neighbor Count is 1, Adjacent neighbor count is 1

Adjacent with neighbor 7.7.7.7 (Designated Router)

Suppress hello for 0 neighbor(s)

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

Link Local Address FE80::6, Interface ID 6

Area 1, Process ID 10, Instance ID 0, Router ID 6.6.6.6

Network Type BROADCAST, Cost: 1

Transmit Delay is 1 sec, State DR, Priority 1

Designated Router (ID) 6.6.6.6, local address FE80::6

No backup designated router on this network

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

Hello due in 00:00:08

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 0, maximum is 0

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

Neighbor Count is 0, Adjacent neighbor count is 0

Suppress hello for 0 neighbor(s)

R6# show ipv6 ospf border-routers

OSPFv3 Router with ID (6.6.6.6) (Process ID 10)

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

R6# show ip prot

\*\*\* 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 6.6.6.6

It is an autonomous system boundary router

Redistributing External Routes from,

bgp 100 with metric mapped to 100000, includes subnets in redistribution

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

Maximum path: 4

Routing for Networks:

10.0.0.16 0.0.0.3 area 1

10.0.0.20 0.0.0.3 area 1

192.168.5.0 0.0.0.255 area 1

Passive Interface(s):

Loopback0

Routing Information Sources:

Gateway Distance Last Update

7.7.7.7 110 00:55:53

Distance: (default is 110)

Routing Protocol is "bgp 100"

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

Redistributing: connected, ospf 1 (internal)

Neighbor(s):

Address FiltIn FiltOut DistIn DistOut Weight RouteMap

10.0.0.17

Maximum path: 1

Routing Information Sources:

Gateway Distance Last Update

Gateway Distance Last Update

10.0.0.17 20 00:57:24

Distance: external 20 internal 200 local 200

R6# show ipv6 prot

IPv6 Routing Protocol is "connected"

IPv6 Routing Protocol is "application"

IPv6 Routing Protocol is "ND"

IPv6 Routing Protocol is "ospf 10"

Router ID 6.6.6.6

Autonomous system boundary router

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

Interfaces (Area 1):

Loopback0

GigabitEthernet0/0/1

GigabitEthernet0/0/0

Redistribution:

Redistributing protocol bgp 100 with metric 1000000

IPv6 Routing Protocol is "bgp 100"

IGP synchronization is disabled

Redistribution:

Redistributing protocol connected

Redistributing protocol ospf 10 (internal)

Neighbor(s):

Address FiltIn FiltOut Weight RoutemapIn RoutemapOut

2001:DB8:ACAD:5::1

R6#

R7 Config:

R6#show run

Building configuration...

Current configuration : 1813 bytes

!

! Last configuration change at 18:34:57 UTC Wed Jan 5 2022

!

version 15.5

service timestamps debug datetime msec

service timestamps log datetime msec

no platform punt-keepalive disable-kernel-core

!

hostname R7

!

boot-start-marker

boot-end-marker

!

!

vrf definition Mgmt-intf

!

address-family ipv4

exit-address-family

!

address-family ipv6

exit-address-family

!

!

no aaa new-model

!

!

!

!

ipv6 unicast-routing

subscriber templating

multilink bundle-name authenticated

!

license udi pid ISR4321/K9 sn FDO21442167

!

spanning-tree extend system-id

!

!

redundancy

mode none

!

!

vlan internal allocation policy ascending

!

!

!

!

!

!

interface Loopback0

ip address 192.168.6.1 255.255.255.252

ipv6 address FE80::7 link-local

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

ipv6 ospf 10 area 1

!

interface GigabitEthernet0/0/0

ip address 10.0.0.22 255.255.255.252

negotiation auto

ipv6 address FE80::7 link-local

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

ipv6 ospf 10 area 1

!

interface GigabitEthernet0/0/1

no ip address

shutdown

negotiation auto

ipv6 address FE80::7 link-local

ipv6 address 2001:DB8:ACAD:7::1/64

!

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

router-id 7.7.7.7

passive-interface Loopback0

network 10.0.0.20 0.0.0.3 area 1

network 192.168.6.0 0.0.0.255 area 1

!

ip forward-protocol nd

no ip http server

no ip http secure-server

ip tftp source-interface GigabitEthernet0

!

!

ipv6 router ospf 10

router-id 7.7.7.7

passive-interface Loopback0

!

!

!

!

control-plane

!

!

line con 0

stopbits 1

line aux 0

stopbits 1

line vty 0 4

login

!

!

end

R7#$ show ip route

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

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

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

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

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

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

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

a - application route

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

Gateway of last resort is not set

10.0.0.0/8 is variably subnetted, 7 subnets, 2 masks

O E2 10.0.0.0/30

[110/100000] via 10.0.0.21, 00:56:39, GigabitEthernet0/0/0

O E2 10.0.0.4/30

[110/100000] via 10.0.0.21, 00:56:39, GigabitEthernet0/0/0

O E2 10.0.0.8/30

[110/100000] via 10.0.0.21, 00:56:39, GigabitEthernet0/0/0

O E2 10.0.0.12/30

[110/100000] via 10.0.0.21, 00:56:39, GigabitEthernet0/0/0

O 10.0.0.16/30 [110/2] via 10.0.0.21, 00:56:39, GigabitEthernet0/0/0

C 10.0.0.20/30 is directly connected, GigabitEthernet0/0/0

L 10.0.0.22/32 is directly connected, GigabitEthernet0/0/0

192.168.0.0/32 is subnetted, 1 subnets

O E2 192.168.0.1

[110/100000] via 10.0.0.21, 00:56:39, GigabitEthernet0/0/0

192.168.1.0/30 is subnetted, 1 subnets

O E2 192.168.1.0

[110/100000] via 10.0.0.21, 00:56:39, GigabitEthernet0/0/0

192.168.2.0/30 is subnetted, 1 subnets

O E2 192.168.2.0

[110/100000] via 10.0.0.21, 00:56:39, GigabitEthernet0/0/0

192.168.3.0/30 is subnetted, 1 subnets

O E2 192.168.3.0

[110/100000] via 10.0.0.21, 00:56:39, GigabitEthernet0/0/0

192.168.4.0/30 is subnetted, 1 subnets

O E2 192.168.4.0

[110/100000] via 10.0.0.21, 00:56:39, GigabitEthernet0/0/0

192.168.5.0/32 is subnetted, 1 subnets

O 192.168.5.1 [110/2] via 10.0.0.21, 00:56:39, GigabitEthernet0/0/0

192.168.6.0/24 is variably subnetted, 2 subnets, 2 masks

C 192.168.6.0/30 is directly connected, Loopback0

L 192.168.6.1/32 is directly connected, Loopback0

R7# show ipv6 route

IPv6 Routing Table - default - 16 entries

Codes: C - Connected, L - Local, S - Static, U - Per-user Static route

B - BGP, R - RIP, I1 - ISIS L1, I2 - ISIS L2

IA - ISIS interarea, IS - ISIS summary, D - EIGRP, EX - EIGRP external

ND - ND Default, NDp - ND Prefix, DCE - Destination, NDr - Redirect

O - OSPF Intra, OI - OSPF Inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2

ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2, a - Application

OE2 2001:DB8:ACAD:1::/64 [110/1000000]

via FE80::6, GigabitEthernet0/0/0

OE2 2001:DB8:ACAD:2::/64 [110/1000000]

via FE80::6, GigabitEthernet0/0/0

OE2 2001:DB8:ACAD:3::/64 [110/1000000]

via FE80::6, GigabitEthernet0/0/0

OE2 2001:DB8:ACAD:4::/64 [110/1000000]

via FE80::6, GigabitEthernet0/0/0

O 2001:DB8:ACAD:5::/64 [110/2]

via FE80::6, GigabitEthernet0/0/0

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

via GigabitEthernet0/0/0, directly connected

L 2001:DB8:ACAD:6::2/128 [0/0]

via GigabitEthernet0/0/0, receive

OE2 2001:DB8:ACAD:A::1/128 [110/1000000]

via FE80::6, GigabitEthernet0/0/0

OE2 2001:DB8:ACAD:B::/64 [110/1000000]

via FE80::6, GigabitEthernet0/0/0

OE2 2001:DB8:ACAD:C::/64 [110/1000000]

via FE80::6, GigabitEthernet0/0/0

OE2 2001:DB8:ACAD:D::/64 [110/1000000]

via FE80::6, GigabitEthernet0/0/0

OE2 2001:DB8:ACAD:E::/64 [110/1000000]

via FE80::6, GigabitEthernet0/0/0

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

via FE80::6, GigabitEthernet0/0/0

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

via Loopback0, directly connected

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

via Loopback0, receive

L FF00::/8 [0/0]

via Null0, receive

R7# show ip ospf

Routing Process "ospf 1" with ID 7.7.7.7

Start time: 00:07:32.548, Time elapsed: 00:57:50.290

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 9. Checksum Sum 0x02D7EF

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 1

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

Area has no authentication

SPF algorithm last executed 00:56:47.856 ago

SPF algorithm executed 3 times

Area ranges are

Number of LSA 3. Checksum Sum 0x021203

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

R7# show ip ospf neighbor

Neighbor ID Pri State Dead Time Address Interface

6.6.6.6 1 FULL/BDR 00:00:33 10.0.0.21 GigabitEthernet0/0/0

R7# show ip ospf interface

Loopback0 is up, line protocol is up

Internet Address 192.168.6.1/30, Area 1, Attached via Network Statement

Process ID 1, Router ID 7.7.7.7, 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 10.0.0.22/30, Area 1, Attached via Network Statement

Process ID 1, Router ID 7.7.7.7, 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) 7.7.7.7, Interface address 10.0.0.22

Backup Designated router (ID) 6.6.6.6, Interface address 10.0.0.21

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

oob-resync timeout 40

Hello due in 00:00:02

Supports Link-local Signaling (LLS)

Cisco NSF helper support enabled

IETF NSF 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 3

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

Neighbor Count is 1, Adjacent neighbor count is 1

Adjacent with neighbor 6.6.6.6 (Backup Designated Router)

Suppress hello for 0 neighbor(s)

R7# show ip ospf border-rout

OSPF Router with ID (7.7.7.7) (Process ID 1)

Base Topology (MTID 0)

Internal Router Routing Table

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

i 6.6.6.6 [1] via 10.0.0.21, GigabitEthernet0/0/0, ASBR, Area 1, SPF 3

R7# show ipv6 ospf neighbor

OSPFv3 Router with ID (7.7.7.7) (Process ID 10)

Neighbor ID Pri State Dead Time Interface ID Interface

6.6.6.6 1 FULL/BDR 00:00:36 7 GigabitEthernet0/0/0

R7#show ipv6 ospf interface

Loopback0 is up, line protocol is up

Link Local Address FE80::7, Interface ID 12

Area 1, Process ID 10, Instance ID 0, Router ID 7.7.7.7

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::7, Interface ID 6

Area 1, Process ID 10, Instance ID 0, Router ID 7.7.7.7

Network Type BROADCAST, Cost: 1

Transmit Delay is 1 sec, State DR, Priority 1

Designated Router (ID) 7.7.7.7, local address FE80::7

Backup Designated router (ID) 6.6.6.6, local address FE80::6

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

Hello due in 00:00:02

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 0, maximum is 5

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

Neighbor Count is 1, Adjacent neighbor count is 1

Adjacent with neighbor 6.6.6.6 (Backup Designated Router)

Suppress hello for 0 neighbor(s)

R7# show ipv6 ospf border-routers

OSPFv3 Router with ID (7.7.7.7) (Process ID 10)

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

i 6.6.6.6 [1] via FE80::6, GigabitEthernet0/0/0, ASBR, Area 1, SPF 3

R7#show ip prot

\*\*\* 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 7.7.7.7

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

Maximum path: 4

Routing for Networks:

10.0.0.20 0.0.0.3 area 1

192.168.6.0 0.0.0.255 area 1

Passive Interface(s):

Loopback0

Routing Information Sources:

Gateway Distance Last Update

6.6.6.6 110 00:57:23

Distance: (default is 110)

R7#show ipv6 prot

IPv6 Routing Protocol is "connected"

IPv6 Routing Protocol is "application"

IPv6 Routing Protocol is "ND"

IPv6 Routing Protocol is "ospf 10"

Router ID 7.7.7.7

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

Interfaces (Area 1):

Loopback0

GigabitEthernet0/0/0

Redistribution:

None