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| BGP in GNS3 Lab |  |
|  |  |
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Purpose

Set A system of network with 7 routers that has an OSPF, RIP, and BGP protocol running in ipv6. BGP protocol should be in eBGP. There should be three routers running each protocol, and two routers will have two protocol at the same time. Routers should have routes to all other networks, and devices should be able to ping any other device. There should be three routers running in BGP (Extra Credit).

Background Information on Lab Concepts

Open Shortest Path First (OSPF) is a routing protocol for Internet Protocol (IP) networks. OSPF was developed as an alternative for Routing Information Protocol (RIP), for it offers faster convergence and scales to much larger network implementations. OSPF is a link-state routing protocol that uses the concept of areas (a link-state is the status of router interfaces or connecting networks).  A network administrator can divide the routing domain into distinct areas to help control routing update traffic. OSPF version 2 (OSPFv2) is OSPF for IPv4, and OSPF version 3 (OSPFv3) is OSPF for IPv6. OSPFv3 is unable to generate its own router-id, so it needs manual configuration.

Enhanced Interior Gateway Routing Protocol (EIGRP) is an advanced distance-vector routing protocol that is used on a computer network for automating routing decisions and configuration. EIGRP builds its topology table from its neighbor’s advertisements. One advantage of EIGRP is that it uses very low network resources during normal operation, such that only hello packets are transmitted. EIGRP IPv4 and EIGRP IPv6 works in similar models.

Border Gateway Protocol (BGP) is a standardized exterior gateway protocol designed to exchange routing and reachability information between autonomous systems (AS). BGP is used as the routing protocol in the internet, and AS typically belongs to ISPs or government. EBGP is used between autonomous systems. It is used and implemented at the edge or border router that provides inter-connectivity for two or more autonomous system. It functions as the protocol responsible for interconnection of networks from different organizations or the Internet. IBGP is used inside the autonomous systems. It is used to provide information to internal routers having the same AS. It requires all the devices in same autonomous systems to form full mesh topology or either of Route reflectors.

Lab Summary

In GNs3, I placed 7 CISCO 4321 routers and added NIM-2T module on each one. I connected routers’ serial ports to their neighbors. I set up the OSPfv2 and OSPFv3 protocol on router 5, 6, and 7 by enabling it on the routers and addressing their directly connected networks. Then I set up EIGRP protocol on router 1, 2, and 3 by enabling it on the routers and addressing their directly connected networks. Then I set up BGP protocol on router 3, 4, and 5 by enabling it on the routers and addressing their directly connected networks and neighbors. At last I redistributed protocols on border routers so they can exchange routing information.

Lab Commands

Router (Config) # interface ? ----- enter an interface

Router (Config) # ipv6 unicast-routing ----- enable IPv6 on router

Router (Config-if) # ip address ? subnet-mask ? ----- set ipv4 address on an interface

Router (Config-if) # ipv6 address ? ----- set ipv6 address on an interface

Router (Config-if) # ipv6 address ? link-local ----- set link local address on an interface

Router (Config-if) # ipv6 eigrp ? ----- enable ipv6 EIGRP on an interface

Router (Config-if) # ipv6 ospf ? area ? ----- enable OSPFv3 on an interface

Router (Config) # router ospf ? ----- enable OSPFv2 on router

Router (Config-router) # network ? area ? ----- network statement

Router (Config-router) # redistribute bgp ? metric ? subnets ----- redistribute BGP protocol

Router (Config) # ipv6 router ospf ? ----- enable OSPFv3 on router

Router (Config-router) # router-id ? ----- set router id

Router (Config-router) # redistribute bgp ? metric ? ----- redistribute BGP protocol

Router (Config-router) # redistribute connected metric ? ----- connect redistribute

Router (Config) # router eigrp ? ----- enable EIGRP on router

Router (Config-router) # network ? ----- network statement

Router (Config-router) # redistribute bgp ? metric ? ----- redistribute BGP protocol

Router (Config) # ipv6 router eigrp ? ----- enable ipv6 EIGRP on router

Router (Config-router) # eigrp router-id ? set router id

Router (Config-router) # redistribute bgp ? metric ? ----- redistribute BGP protocol

Router (Config-router) # redistribute connected metric ? ----- connect redistribute

Router (Config) # router bgp ? ----- enable BGP on router

Router (Config-router) # network ? mask ? ----- network statement

Router (Config-router) # neighbor ? remote-as ? ----- set neighbors

Router (Config-router) # redistribute eigrp ? ----- redistribute EIGRP protocol

Router (Config-router) # redistribute ospf ? ----- redistribute OSPF protocol

Router (Config-router) # no bgp default ipv4-unicast ----- set BGP in ipv6

Router (Config-router) # address-family ipv6 ----- enable ipv6 BGP

Router (Config-router-af) # network ? ----- network statement

Router (Config-router) # neighbor ? activate ----- set neighbors

Network Diagram

Diagram

Description automatically generated

Configuration

R1:

*Current configuration : 950 bytes*

*version 15.2  
service timestamps debug datetime msec  
service timestamps log datetime msec  
  
hostname R1  
  
boot-start-marker  
boot-end-marker  
  
no aaa new-model  
no ip icmp rate-limit unreachable  
ip cef  
  
no ip domain lookup  
ipv6 unicast-routing  
ipv6 cef  
  
multilink bundle-name authenticated  
  
ip tcp synwait-time 5  
  
interface FastEthernet0/0  
 no ip address  
 shutdown  
 speed auto  
 duplex auto  
  
interface FastEthernet0/1  
 no ip address  
 speed auto  
 duplex auto  
 ipv6 address FE80::1 link-local  
 ipv6 address 2008:DB8:ACAD:1::1/64  
 ipv6 enable  
 ipv6 eigrp 1  
  
ip forward-protocol nd  
  
no ip http server  
no ip http secure-server  
  
ipv6 router eigrp 1  
 eigrp router-id 1.1.1.1  
  
control-plane  
  
line con 0  
 exec-timeout 0 0  
 privilege level 15  
 logging synchronous  
 stopbits 1  
line aux 0  
 exec-timeout 0 0  
 privilege level 15  
 logging synchronous  
 stopbits 1  
line vty 0 4  
 login  
  
end*

*IPv6 Routing Table - default - 8 entries*

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

*B - BGP, R - RIP, H - NHRP, 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, l - LISP*

*C 2008:DB8:ACAD:1::/64 [0/0]*

*via FastEthernet0/1, directly connected*

*L 2008:DB8:ACAD:1::1/128 [0/0]*

*via FastEthernet0/1, receive*

*D 2008:DB8:ACAD:2::/64 [90/30720]*

*via FE80::2, FastEthernet0/1*

*EX 2008:DB8:ACAD:3::/64 [170/286720]*

*via FE80::2, FastEthernet0/1*

*EX 2008:DB8:ACAD:4::/64 [170/286720]*

*via FE80::2, FastEthernet0/1*

*EX 2008:DB8:ACAD:5::/64 [170/286720]*

*via FE80::2, FastEthernet0/1*

*EX 2008:DB8:ACAD:6::/64 [170/286720]*

*via FE80::2, FastEthernet0/1*

*L FF00::/8 [0/0]*

*via Null0, receive*

R2:

*Current configuration : 1036 bytes  
  
version 15.2  
service timestamps debug datetime msec  
service timestamps log datetime msec  
  
hostname R2  
  
boot-start-marker  
boot-end-marker  
  
no aaa new-model  
no ip icmp rate-limit unreachable  
ip cef  
  
no ip domain lookup  
ipv6 unicast-routing  
ipv6 cef  
  
multilink bundle-name authenticated  
  
ip tcp synwait-time 5  
  
interface FastEthernet0/0  
 no ip address  
 speed auto  
 duplex auto  
 ipv6 address FE80::2 link-local  
 ipv6 address 2008:DB8:ACAD:1::2/64  
 ipv6 enable  
 ipv6 eigrp 1  
  
interface FastEthernet0/1  
 no ip address  
 speed auto  
 duplex auto  
 ipv6 address FE80::2 link-local  
 ipv6 address 2008:DB8:ACAD:2::1/64  
 ipv6 enable  
 ipv6 eigrp 1  
  
ip forward-protocol nd  
  
no ip http server  
no ip http secure-server  
  
ipv6 router eigrp 1  
 eigrp router-id 2.2.2.2  
  
control-plane  
  
line con 0  
 exec-timeout 0 0  
 privilege level 15  
 logging synchronous  
 stopbits 1  
line aux 0  
 exec-timeout 0 0  
 privilege level 15  
 logging synchronous  
 stopbits 1  
line vty 0 4  
 login  
  
end*

*IPv6 Routing Table - default - 9 entries*

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

*B - BGP, R - RIP, H - NHRP, 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, l - LISP*

*C 2008:DB8:ACAD:1::/64 [0/0]*

*via FastEthernet0/0, directly connected*

*L 2008:DB8:ACAD:1::2/128 [0/0]*

*via FastEthernet0/0, receive*

*C 2008:DB8:ACAD:2::/64 [0/0]*

*via FastEthernet0/1, directly connected*

*L 2008:DB8:ACAD:2::1/128 [0/0]*

*via FastEthernet0/1, receive*

*EX 2008:DB8:ACAD:3::/64 [170/284160]*

*via FE80::3, FastEthernet0/1*

*EX 2008:DB8:ACAD:4::/64 [170/284160]*

*via FE80::3, FastEthernet0/1*

*EX 2008:DB8:ACAD:5::/64 [170/284160]*

*via FE80::3, FastEthernet0/1*

*EX 2008:DB8:ACAD:6::/64 [170/284160]*

*via FE80::3, FastEthernet0/1*

*L FF00::/8 [0/0]*

*via Null0, receive*

R3:

*Current configuration : 1428 bytes  
  
version 15.2  
service timestamps debug datetime msec  
service timestamps log datetime msec  
  
hostname R3  
  
boot-start-marker  
boot-end-marker  
  
no aaa new-model  
no ip icmp rate-limit unreachable  
ip cef  
  
no ip domain lookup  
ipv6 unicast-routing  
ipv6 cef  
  
multilink bundle-name authenticated  
  
ip tcp synwait-time 5  
  
interface FastEthernet0/0  
 no ip address  
 speed auto  
 duplex auto  
 ipv6 address FE80::3 link-local  
 ipv6 address 2008:DB8:ACAD:2::2/64  
 ipv6 enable  
 ipv6 eigrp 1  
  
interface FastEthernet0/1  
 no ip address  
 speed auto  
 duplex auto  
 ipv6 address FE80::3 link-local  
 ipv6 address 2008:DB8:ACAD:3::1/64  
 ipv6 enable  
  
router bgp 3  
 bgp router-id 3.3.3.3  
 bgp log-neighbor-changes  
 no bgp default ipv4-unicast  
 neighbor 2008:DB8:ACAD:3::2 remote-as 4  
   
 address-family ipv4  
 exit-address-family  
   
 address-family ipv6  
  redistribute connected  
  redistribute eigrp 1 metric 1000000  
  network 2008:DB8:ACAD:3::/64  
  neighbor 2008:DB8:ACAD:3::2 activate  
 exit-address-family  
  
ip forward-protocol nd  
  
no ip http server  
no ip http secure-server  
  
ipv6 router eigrp 1  
 eigrp router-id 3.3.3.3  
 redistribute bgp 3 metric 1000000 1000 255 20 4  
 redistribute connected metric 1000000 1000 255 20 4*

*control-plane  
  
line con 0  
 exec-timeout 0 0  
 privilege level 15  
 logging synchronous  
 stopbits 1  
line aux 0  
 exec-timeout 0 0  
 privilege level 15  
 logging synchronous  
 stopbits 1  
line vty 0 4  
 login  
  
end*

*IPv6 Routing Table - default - 9 entries*

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

*B - BGP, R - RIP, H - NHRP, 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, l - LISP*

*D 2008:DB8:ACAD:1::/64 [90/30720]*

*via FE80::2, FastEthernet0/0*

*C 2008:DB8:ACAD:2::/64 [0/0]*

*via FastEthernet0/0, directly connected*

*L 2008:DB8:ACAD:2::2/128 [0/0]*

*via FastEthernet0/0, receive*

*C 2008:DB8:ACAD:3::/64 [0/0]*

*via FastEthernet0/1, directly connected*

*L 2008:DB8:ACAD:3::1/128 [0/0]*

*via FastEthernet0/1, receive*

*B 2008:DB8:ACAD:4::/64 [20/0]*

*via FE80::4, FastEthernet0/1*

*B 2008:DB8:ACAD:5::/64 [20/0]*

*via FE80::4, FastEthernet0/1*

*B 2008:DB8:ACAD:6::/64 [20/0]*

*via FE80::4, FastEthernet0/1*

*L FF00::/8 [0/0]*

*via Null0, receive*

R4:

*Current configuration : 1366 bytes  
  
version 15.2  
service timestamps debug datetime msec  
service timestamps log datetime msec  
  
hostname R4  
  
boot-start-marker  
boot-end-marker  
  
no aaa new-model  
no ip icmp rate-limit unreachable  
ip cef  
  
no ip domain lookup  
ipv6 unicast-routing  
ipv6 cef  
  
multilink bundle-name authenticated  
  
ip tcp synwait-time 5  
  
interface FastEthernet0/0  
 no ip address  
 speed auto  
 duplex auto  
 ipv6 address FE80::4 link-local  
 ipv6 address 2008:DB8:ACAD:3::2/64  
 ipv6 enable  
  
interface FastEthernet0/1  
 no ip address  
 speed auto  
 duplex auto  
 ipv6 address FE80::4 link-local  
 ipv6 address 2008:DB8:ACAD:4::1/64  
 ipv6 enable  
  
router bgp 4  
 bgp router-id 4.4.4.4  
 bgp log-neighbor-changes  
 no bgp default ipv4-unicast  
 neighbor 2008:DB8:ACAD:3::1 remote-as 3  
 neighbor 2008:DB8:ACAD:4::2 remote-as 5  
   
 address-family ipv4  
 exit-address-family  
   
 address-family ipv6  
  network 2008:DB8:ACAD:3::/64  
  network 2008:DB8:ACAD:4::/64  
  neighbor 2008:DB8:ACAD:3::1 activate  
  neighbor 2008:DB8:ACAD:4::2 activate  
 exit-address-family  
  
ip forward-protocol nd  
  
no ip http server  
no ip http secure-server  
  
control-plane  
  
line con 0  
 exec-timeout 0 0  
 privilege level 15  
 logging synchronous  
 stopbits 1  
line aux 0  
 exec-timeout 0 0  
 privilege level 15  
 logging synchronous  
 stopbits 1  
line vty 0 4  
 login  
  
end*

*IPv6 Routing Table - default - 9 entries*

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

*B - BGP, R - RIP, H - NHRP, 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, l - LISP*

*B 2008:DB8:ACAD:1::/64 [20/1000000]*

*via FE80::3, FastEthernet0/0*

*B 2008:DB8:ACAD:2::/64 [20/0]*

*via FE80::3, FastEthernet0/0*

*C 2008:DB8:ACAD:3::/64 [0/0]*

*via FastEthernet0/0, directly connected*

*L 2008:DB8:ACAD:3::2/128 [0/0]*

*via FastEthernet0/0, receive*

*C 2008:DB8:ACAD:4::/64 [0/0]*

*via FastEthernet0/1, directly connected*

*L 2008:DB8:ACAD:4::1/128 [0/0]*

*via FastEthernet0/1, receive*

*B 2008:DB8:ACAD:5::/64 [20/0]*

*via FE80::5, FastEthernet0/1*

*B 2008:DB8:ACAD:6::/64 [20/2]*

*via FE80::5, FastEthernet0/1*

*L FF00::/8 [0/0]*

*via Null0, receive*

R5:

*Current configuration : 1366 bytes  
  
version 15.2  
service timestamps debug datetime msec  
service timestamps log datetime msec  
  
hostname R5  
  
boot-start-marker  
boot-end-marker  
  
no aaa new-model  
no ip icmp rate-limit unreachable  
ip cef  
  
no ip domain lookup  
ipv6 unicast-routing  
ipv6 cef  
  
multilink bundle-name authenticated  
  
ip tcp synwait-time 5  
  
interface FastEthernet0/0  
 no ip address  
 speed auto  
 duplex auto  
 ipv6 address FE80::5 link-local  
 ipv6 address 2008:DB8:ACAD:4::2/64  
 ipv6 enable  
  
interface FastEthernet0/1  
 no ip address  
 speed auto  
 duplex auto  
 ipv6 address FE80::5 link-local  
 ipv6 address 2008:DB8:ACAD:5::1/64  
 ipv6 enable  
 ipv6 ospf 1 area 0  
  
router bgp 5  
 bgp router-id 5.5.5.5  
 bgp log-neighbor-changes  
 no bgp default ipv4-unicast  
 neighbor 2008:DB8:ACAD:4::1 remote-as 4  
   
 address-family ipv4  
 exit-address-family  
   
 address-family ipv6  
  redistribute connected*

*redistribute ospf 1  
  network 2008:DB8:ACAD:4::/64  
  neighbor 2008:DB8:ACAD:4::1 activate  
 exit-address-family  
  
ip forward-protocol nd  
  
no ip http server  
no ip http secure-server  
  
ipv6 router ospf 1  
 router-id 5.5.5.5*

*Redistribute connected metric 4  
 redistribute bgp 5 metric 4  
  
control-plane  
  
line con 0  
 exec-timeout 0 0  
 privilege level 15  
 logging synchronous  
 stopbits 1  
line aux 0  
 exec-timeout 0 0  
 privilege level 15  
 logging synchronous  
 stopbits 1  
line vty 0 4  
 login  
  
end*

*IPv6 Routing Table - default - 9 entries*

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

*B - BGP, R - RIP, H - NHRP, 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, l - LISP*

*B 2008:DB8:ACAD:1::/64 [20/0]*

*via FE80::4, FastEthernet0/0*

*B 2008:DB8:ACAD:2::/64 [20/0]*

*via FE80::4, FastEthernet0/0*

*B 2008:DB8:ACAD:3::/64 [20/0]*

*via FE80::4, FastEthernet0/0*

*C 2008:DB8:ACAD:4::/64 [0/0]*

*via FastEthernet0/0, directly connected*

*L 2008:DB8:ACAD:4::2/128 [0/0]*

*via FastEthernet0/0, receive*

*C 2008:DB8:ACAD:5::/64 [0/0]*

*via FastEthernet0/1, directly connected*

*L 2008:DB8:ACAD:5::1/128 [0/0]*

*via FastEthernet0/1, receive*

*O 2008:DB8:ACAD:6::/64 [110/2]*

*via FE80::6, FastEthernet0/1*

*L FF00::/8 [0/0]*

*via Null0, receive*

R6:

*Current configuration : 1041 bytes  
  
version 15.2  
service timestamps debug datetime msec  
service timestamps log datetime msec  
  
hostname R6  
  
boot-start-marker  
boot-end-marker  
  
no aaa new-model  
no ip icmp rate-limit unreachable  
ip cef  
  
no ip domain lookup  
ipv6 unicast-routing  
ipv6 cef  
  
multilink bundle-name authenticated  
  
ip tcp synwait-time 5  
  
interface FastEthernet0/0  
 no ip address  
 speed auto  
 duplex auto  
 ipv6 address FE80::6 link-local  
 ipv6 address 2008:DB8:ACAD:5::2/64  
 ipv6 enable  
 ipv6 ospf 1 area 0  
  
interface FastEthernet0/1  
 no ip address  
 speed auto  
 duplex auto  
 ipv6 address FE80::6 link-local  
 ipv6 address 2008:DB8:ACAD:6::1/64  
 ipv6 enable  
 ipv6 ospf 1 area 0  
  
ip forward-protocol nd  
  
no ip http server  
no ip http secure-server  
  
ipv6 router ospf 1  
 router-id 6.6.6.6*

*control-plane  
  
line con 0  
 exec-timeout 0 0  
 privilege level 15  
 logging synchronous  
 stopbits 1  
line aux 0  
 exec-timeout 0 0  
 privilege level 15  
 logging synchronous  
 stopbits 1  
line vty 0 4  
 login  
  
end*

*IPv6 Routing Table - default - 9 entries*

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

*B - BGP, R - RIP, H - NHRP, 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, l - LISP*

*OE2 2008:DB8:ACAD:1::/64 [110/4]*

*via FE80::5, FastEthernet0/0*

*OE2 2008:DB8:ACAD:2::/64 [110/4]*

*via FE80::5, FastEthernet0/0*

*OE2 2008:DB8:ACAD:3::/64 [110/4]*

*via FE80::5, FastEthernet0/0*

*OE2 2008:DB8:ACAD:4::/64 [110/4]*

*via FE80::5, FastEthernet0/0*

*C 2008:DB8:ACAD:5::/64 [0/0]*

*via FastEthernet0/0, directly connected*

*L 2008:DB8:ACAD:5::2/128 [0/0]*

*via FastEthernet0/0, receive*

*C 2008:DB8:ACAD:6::/64 [0/0]*

*via FastEthernet0/1, directly connected*

*L 2008:DB8:ACAD:6::1/128 [0/0]*

*via FastEthernet0/1, receive*

*L FF00::/8 [0/0]*

*via Null0, receive*

R7:

*Current configuration : 949 bytes  
  
version 15.2  
service timestamps debug datetime msec  
service timestamps log datetime msec  
  
hostname R7  
  
boot-start-marker  
boot-end-marker  
  
no aaa new-model  
no ip icmp rate-limit unreachable  
ip cef  
  
no ip domain lookup  
ipv6 unicast-routing  
ipv6 cef  
  
multilink bundle-name authenticated  
  
ip tcp synwait-time 5  
  
interface FastEthernet0/0  
 no ip address  
 speed auto  
 duplex auto  
 ipv6 address FE80::7 link-local  
 ipv6 address 2008:DB8:ACAD:6::2/64  
 ipv6 enable  
 ipv6 ospf 1 area 0  
  
interface FastEthernet0/1  
 no ip address  
 shutdown  
 speed auto  
 duplex auto  
  
ip forward-protocol nd  
  
no ip http server  
no ip http secure-server  
  
ipv6 router ospf 1  
 router-id 7.7.7.7  
  
control-plane  
  
line con 0  
 exec-timeout 0 0  
 privilege level 15  
 logging synchronous  
 stopbits 1  
line aux 0  
 exec-timeout 0 0  
 privilege level 15  
 logging synchronous  
 stopbits 1  
line vty 0 4  
 login  
  
end*

*IPv6 Routing Table - default - 8 entries*

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

*B - BGP, R - RIP, H - NHRP, 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, l - LISP*

*OE2 2008:DB8:ACAD:1::/64 [110/4]*

*via FE80::6, FastEthernet0/0*

*OE2 2008:DB8:ACAD:2::/64 [110/4]*

*via FE80::6, FastEthernet0/0*

*OE2 2008:DB8:ACAD:3::/64 [110/4]*

*via FE80::6, FastEthernet0/0*

*OE2 2008:DB8:ACAD:4::/64 [110/4]*

*via FE80::6, FastEthernet0/0*

*O 2008:DB8:ACAD:5::/64 [110/2]*

*via FE80::6, FastEthernet0/0*

*C 2008:DB8:ACAD:6::/64 [0/0]*

*via FastEthernet0/0, directly connected*

*L 2008:DB8:ACAD:6::2/128 [0/0]*

*via FastEthernet0/0, receive*

*L FF00::/8 [0/0]*

*via Null0, receive*

Problems

I realized that setting up IPv6 BGP is very different from setting up other ipv6 dynamic routing protocols. Both IPv6 BGP and IPv4 BGP are under the same router configuration mode, and I had to specify address family in it. After configuring the topology, I found problems that some routers aren’t able to connect some networks. I solved this problem by typing redistribute connected command in router configuration mode, so that they won’t automatically identify BGP routes as default routes.

Conclusion

R3:

*BGP table version is 7, 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*

*\*> 2008:DB8:ACAD:1::/64*

*FE80::2 1000000 32768 ?*

*\*> 2008:DB8:ACAD:2::/64*

*:: 0 32768 ?*

*\* 2008:DB8:ACAD:3::/64*

*2008:DB8:ACAD:3::2*

*0 0 4 i*

*\*> :: 0 32768 i*

*\*> 2008:DB8:ACAD:4::/64*

*2008:DB8:ACAD:3::2*

*0 0 4 i*

*\*> 2008:DB8:ACAD:5::/64*

*2008:DB8:ACAD:3::2*

*0 4 5 ?*

*\*> 2008:DB8:ACAD:6::/64*

*Network Next Hop Metric LocPrf Weight Path*

*2008:DB8:ACAD:3::2*

*0 4 5 ?*

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

R4:

*BGP table version is 7, local router ID is 4.4.4.4*

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

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

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

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

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

*Network Next Hop Metric LocPrf Weight Path*

*\*> 2008:DB8:ACAD:1::/64*

*2008:DB8:ACAD:3::1*

*1000000 0 3 ?*

*\*> 2008:DB8:ACAD:2::/64*

*2008:DB8:ACAD:3::1*

*0 0 3 ?*

*\* 2008:DB8:ACAD:3::/64*

*2008:DB8:ACAD:3::1*

*0 0 3 i*

*\*> :: 0 32768 i*

*\* 2008:DB8:ACAD:4::/64*

*2008:DB8:ACAD:4::2*

*0 0 5 i*

*\*> :: 0 32768 i*

*\*> 2008:DB8:ACAD:5::/64*

*Network Next Hop Metric LocPrf Weight Path*

*2008:DB8:ACAD:4::2*

*0 0 5 ?*

*\*> 2008:DB8:ACAD:6::/64*

*2008:DB8:ACAD:4::2*

*2 0 5 ?*

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

R5:

*BGP table version is 7, 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*

*\*> 2008:DB8:ACAD:1::/64*

*2008:DB8:ACAD:4::1*

*0 4 3 ?*

*\*> 2008:DB8:ACAD:2::/64*

*2008:DB8:ACAD:4::1*

*0 4 3 ?*

*\*> 2008:DB8:ACAD:3::/64*

*2008:DB8:ACAD:4::1*

*0 0 4 i*

*\* 2008:DB8:ACAD:4::/64*

*2008:DB8:ACAD:4::1*

*0 0 4 i*

*\*> :: 0 32768 i*

*\*> 2008:DB8:ACAD:5::/64*

*:: 0 32768 ?*

*Network Next Hop Metric LocPrf Weight Path*

*\*> 2008:DB8:ACAD:6::/64*

*FE80::6 2 32768 ?*

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

Ping:

*R1#ping 2008:DB8:ACAD:1::2*

*Type escape sequence to abort.*

*Sending 5, 100-byte ICMP Echos to 2008:DB8:ACAD:1::2, timeout is 2 seconds:*

*!!!!!*

*Success rate is 100 percent (5/5), round-trip min/avg/max = 12/48/128 ms*

*R1#ping 2008:DB8:ACAD:2::2*

*Type escape sequence to abort.*

*Sending 5, 100-byte ICMP Echos to 2008:DB8:ACAD:2::2, timeout is 2 seconds:*

*!!!!!*

*Success rate is 100 percent (5/5), round-trip min/avg/max = 44/53/60 ms*

*R1#ping 2008:DB8:ACAD:3::2*

*Type escape sequence to abort.*

*Sending 5, 100-byte ICMP Echos to 2008:DB8:ACAD:3::2, timeout is 2 seconds:*

*!!!!!*

*Success rate is 100 percent (5/5), round-trip min/avg/max = 52/55/56 ms*

*R1#ping 2008:DB8:ACAD:4::2*

*Type escape sequence to abort.*

*Sending 5, 100-byte ICMP Echos to 2008:DB8:ACAD:4::2, timeout is 2 seconds:*

*!!!!!*

*Success rate is 100 percent (5/5), round-trip min/avg/max = 72/72/76 ms*

*R1#ping 2008:DB8:ACAD:5::2*

*Type escape sequence to abort.*

*Sending 5, 100-byte ICMP Echos to 2008:DB8:ACAD:5::2, timeout is 2 seconds:*

*!!!!!*

*Success rate is 100 percent (5/5), round-trip min/avg/max = 76/92/124 ms*

*R1#ping 2008:DB8:ACAD:6::2*

*Type escape sequence to abort.*

*Sending 5, 100-byte ICMP Echos to 2008:DB8:ACAD:6::2, timeout is 2 seconds:*

*!!!!!*

*Success rate is 100 percent (5/5), round-trip min/avg/max = 88/112/144 ms*

All networks are connected to each other. In this lab, I used the concept of OSPF, EIGRP, and BGP routing protocols and redistribution of different routing protocol. The lab took about three hours to complete.