Purpose:

The purpose of this lab is to configure areas of OSPF and EIGRP with an area of BGP in between those two areas. The main purpose was to figure out IPv6 because we already did IPv4.

Background:  
As I explained in the previous lab, BGP stands for Border Gateway Protocol. Because I already did a lab explaining the concepts of BGP, I will explain the history of IPv6 BGP. But long story short, it is classified as a path-vector routing protocol and it makes routing decisions based on rules set by an administrator. IPv6 BGP came out after packet tracer, which is where we do most of our labs, so we had to download GNS3 on a non-school computer so that we could actually implement IPv6 into a lab. Even though BGP is older than IPv6 itself, it took a while for BGP to become IPv6. One main difference between IPv4 and IPv6 is that anything IPv6 has to go under the address-family command. Also, BGP is defaulted to IPv4 so you have to make it not the default mode.

Lab Summary:

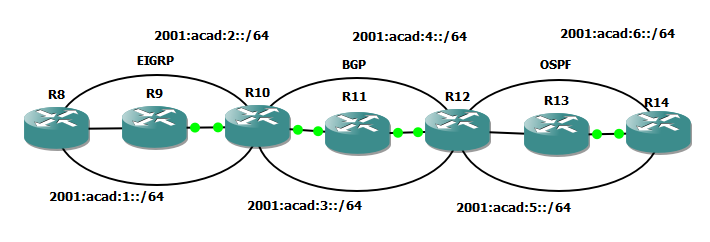
I set up a total of 7 routers with 3 total areas. Each area had 3 routers in it. The first area was EIGRP, then BGP, and finally OSPF

Lab Commands:

I tried to make commands specific to this lab and not commands from the lab before

|  |  |
| --- | --- |
| No bgp default ipv4-unicast | This made it so IPv4 was not the default |
| Address-family ipv6 unicast | This command makes it so you’re able to use IPv6 commands in BGP |
| Neighbor \_\_\_ activate | This activates the neighbor in IPv6 |
| Network \_\_\_ | This makes is so the network is present in IPv6 |
| Redistribute Connected | This redistributes the connected routes into the specified routing protocol |

Network Diagram:



ROUTER 1 SHOW RUN

hostname R1

no ip domain lookup

ipv6 unicast-routing

ipv6 cef

interface FastEthernet0/0

no ip address

speed auto

duplex auto

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

ipv6 eigrp 1

interface FastEthernet0/1

no ip address

shutdown

speed auto

duplex auto

ipv6 router eigrp 1

eigrp router-id 1.1.1.1

ROUTER 1 SHOW IPV6 ROUTE

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

via FastEthernet0/0, directly connected

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

via FastEthernet0/0, receive

D 2001:ACAD:2::/64 [90/30720]

via FE80::C809:42FF:FED8:8, FastEthernet0/0

EX 2001:ACAD:3::/64 [170/33280]

via FE80::C809:42FF:FED8:8, FastEthernet0/0

EX 2001:ACAD:4::/64 [170/25605376]

via FE80::C809:42FF:FED8:8, FastEthernet0/0

EX 2001:ACAD:5::/64 [170/25605376]

via FE80::C809:42FF:FED8:8, FastEthernet0/0

EX 2001:ACAD:6::/64 [170/25605376]

via FE80::C809:42FF:FED8:8, FastEthernet0/0

L FF00::/8 [0/0]

via Null0, receive

ROUTER 2 SHOW RUN

hostname R2

no ip domain lookup

ipv6 unicast-routing

ipv6 cef

interface FastEthernet0/0

no ip address

speed auto

duplex auto

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

ipv6 eigrp 1

interface FastEthernet0/1

no ip address

speed auto

duplex auto

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

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

ROUTER 2 SHOW IPV6 ROUTE

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

via FastEthernet0/0, directly connected

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

via FastEthernet0/0, receive

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

via FastEthernet0/1, directly connected

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

via FastEthernet0/1, receive

EX 2001:ACAD:3::/64 [170/30720]

via FE80::C80A:3DFF:FEAC:6, FastEthernet0/1

EX 2001:ACAD:4::/64 [170/25602816]

via FE80::C80A:3DFF:FEAC:6, FastEthernet0/1

EX 2001:ACAD:5::/64 [170/25602816]

via FE80::C80A:3DFF:FEAC:6, FastEthernet0/1

EX 2001:ACAD:6::/64 [170/25602816]

via FE80::C80A:3DFF:FEAC:6, FastEthernet0/1

L FF00::/8 [0/0]

via Null0, receive

ROUTER 3 SHOW RUN

hostname R3

ipv6 unicast-routing

ipv6 cef

interface FastEthernet0/0

no ip address

speed auto

duplex auto

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

interface FastEthernet0/1

no ip address

speed auto

duplex auto

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

ipv6 eigrp 1

router bgp 2

bgp router-id 3.3.3.3

bgp log-neighbor-changes

no bgp default ipv4-unicast

neighbor 2001:ACAD:3::2 remote-as 1

address-family ipv4

exit-address-family

address-family ipv6

redistribute connected

redistribute eigrp 1

network 2001:ACAD:3::/64

neighbor 2001:ACAD:3::2 activate

neighbor 2001:ACAD:3::2 send-community

exit-address-family

ipv6 router eigrp 1

eigrp router-id 3.3.3.3

redistribute bgp 2 metric 100 1 255 1 1500

redistribute connected

ROUTER 3 SHOW IPV6 ROUTE

D 2001:ACAD:1::/64 [90/30720]

via FE80::C809:42FF:FED8:6, FastEthernet0/1

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

via FastEthernet0/1, directly connected

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

via FastEthernet0/1, receive

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

via FastEthernet0/0, directly connected

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

via FastEthernet0/0, receive

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

via FE80::C80B:2CFF:FEAC:8, FastEthernet0/0

B 2001:ACAD:5::/64 [20/0]

via FE80::C80B:2CFF:FEAC:8, FastEthernet0/0

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

via FE80::C80B:2CFF:FEAC:8, FastEthernet0/0

L FF00::/8 [0/0]

via Null0, receive

ROUTER 4 SHOW RUN

hostname R4

no ip domain lookup

ipv6 unicast-routing

ipv6 cef

interface FastEthernet0/0

no ip address

speed auto

duplex auto

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

interface FastEthernet0/1

no ip address

speed auto

duplex auto

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

router bgp 1

bgp router-id 4.4.4.4

bgp log-neighbor-changes

no bgp default ipv4-unicast

neighbor 2001:ACAD:3::1 remote-as 2

neighbor 2001:ACAD:4::2 remote-as 3

address-family ipv4

exit-address-family

address-family ipv6

network 2001:ACAD:3::/64

network 2001:ACAD:4::/64

neighbor 2001:ACAD:3::1 activate

neighbor 2001:ACAD:3::1 send-community

neighbor 2001:ACAD:4::2 activate

neighbor 2001:ACAD:4::2 send-community

ROUTER 4 SHOW IPV6 ROUTE

B 2001:ACAD:1::/64 [20/30720]

via FE80::C80A:3DFF:FEAC:8, FastEthernet0/0

B 2001:ACAD:2::/64 [20/0]

via FE80::C80A:3DFF:FEAC:8, FastEthernet0/0

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

via FastEthernet0/0, directly connected

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

via FastEthernet0/0, receive

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

via FastEthernet0/1, directly connected

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

via FastEthernet0/1, receive

B 2001:ACAD:5::/64 [20/0]

via FE80::C80C:55FF:FED4:6, FastEthernet0/1

B 2001:ACAD:6::/64 [20/2]

via FE80::C80C:55FF:FED4:6, FastEthernet0/1

L FF00::/8 [0/0]

via Null0, receive

ROUTER 5 SHOW RUN

hostname R5

no ip domain lookup

ipv6 unicast-routing

ipv6 cef

interface FastEthernet0/0

no ip address

speed auto

duplex auto

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

ipv6 ospf 1 area 2

interface FastEthernet0/1

no ip address

speed auto

duplex auto

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

router bgp 3

bgp router-id 5.5.5.5

bgp log-neighbor-changes

no bgp default ipv4-unicast

neighbor 2001:ACAD:4::1 remote-as

address-family ipv4

exit-address-family

address-family ipv6

redistribute connected

redistribute ospf 1 match internal external 1 external 2

network 2001:ACAD:4::/64

neighbor 2001:ACAD:4::1 activate

neighbor 2001:ACAD:4::1 send-community

exit-address-family

ipv6 router ospf 1

router-id 5.5.5.5

redistribute connected

redistribute bgp 3

ROUTER 5 SHOW IPV6 ROUTE

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

via FE80::C80B:2CFF:FEAC:6, FastEthernet0/1

B 2001:ACAD:2::/64 [20/0]

via FE80::C80B:2CFF:FEAC:6, FastEthernet0/1

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

via FE80::C80B:2CFF:FEAC:6, FastEthernet0/1

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

via FastEthernet0/1, directly connected

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

via FastEthernet0/1, receive

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

via FastEthernet0/0, directly connected

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

via FastEthernet0/0, receive

O 2001:ACAD:6::/64 [110/2]

via FE80::C80D:2FF:FE18:8, FastEthernet0/0

L FF00::/8 [0/0]

via Null0, receive

ROUTER 6 SHOW RUN

hostname R6

no ip domain lookup

ipv6 unicast-routing

ipv6 cef

interface FastEthernet0/0

no ip address

speed auto

duplex auto

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

ipv6 ospf 1 area 2

interface FastEthernet0/1

no ip address

speed auto

duplex auto

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

ipv6 ospf 1 area 2

ipv6 router ospf 1

router-id 6.6.6.6

ROUTER 6 SHOW IPV6 ROUTE

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

via FE80::C80C:55FF:FED4:8, FastEthernet0/0

OE2 2001:ACAD:2::/64 [110/1]

via FE80::C80C:55FF:FED4:8, FastEthernet0/0

OE2 2001:ACAD:3::/64 [110/1]

via FE80::C80C:55FF:FED4:8, FastEthernet0/0

OE2 2001:ACAD:4::/64 [110/20]

via FE80::C80C:55FF:FED4:8, FastEthernet0/0

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

via FastEthernet0/0, directly connected

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

via FastEthernet0/0, receive

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

via FastEthernet0/1, directly connected

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

via FastEthernet0/1, receive

L FF00::/8 [0/0]

via Null0, receive

ROUTER 7 SHOW RUN

hostname R7

no ip domain lookup

ipv6 unicast-routing

interface FastEthernet0/0

no ip address

shutdown

speed auto

duplex auto

interface FastEthernet0/1

no ip address

speed auto

duplex auto

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

ipv6 ospf 1 area 2

ipv6 router ospf 1

router-id 7.7.7.7

ROUTER 7 SHOW IPV6 ROUTE

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

via FE80::C80D:2FF:FE18:6, FastEthernet0/1

OE2 2001:ACAD:2::/64 [110/1]

via FE80::C80D:2FF:FE18:6, FastEthernet0/1

OE2 2001:ACAD:3::/64 [110/1]

via FE80::C80D:2FF:FE18:6, FastEthernet0/1

OE2 2001:ACAD:4::/64 [110/20]

via FE80::C80D:2FF:FE18:6, FastEthernet0/1

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

via FE80::C80D:2FF:FE18:6, FastEthernet0/1

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

via FastEthernet0/1, directly connected

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

via FastEthernet0/1, receive

L FF00::/8 [0/0]

via Null0, receive

ROUTER 1 PING TO ROUTER 7

R1#ping 2001:acad:6::2

Type escape sequence to abort.

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

!!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 184/221/264 ms

ROUTER 1 PING TO ROUTER 4

R1#ping 2001:acad:4::1

Type escape sequence to abort.

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

!!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 120/128/140 ms

ROUTER 4 PING TO ROUTER 7

R4#ping 2001:acad:6::2

Type escape sequence to abort.

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

!!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 88/105/132 ms

ROUTER 7 PING TO ROUTER 3

R7#ping 2001:acad:3::1

Type escape sequence to abort.

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

!!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 148/169/192 ms

Problems:

At first, I had a problem with getting IPv6 BGP to work. I was looking at the wrong guides and I figured out that it was much simpler than I thought. I kept doing too many steps that I didn’t need to do because I hadn’t set up the things earlier. Specific steps were the internal peer-group. After a while, I looked it up on a different website and I found an easier solution. I also didn’t need the prefix list or the route-map. After I got BGP working, I had trouble redistributing the routes between the BGP network. Once again I was trying too hard to figure it out and there was a simple solution. I was able to ping from router 1 to router 7, but not from router 1 to router 4. I figured out that I had to do the redistribute connected command on router 3 and that is why I had trouble pinging one thing and not another. My last and probably the biggest problem was that when I tried to save, the project wouldn’t load up after I came back so I had to restart every time. It wasn’t until recently when I remembered I could copy and paste the code into notepad and then paste that when try it again.

Conclusion:

This was the hardest lab of the year for me because I kept getting lost. But in the end, I was able to pull through and complete the lab and be able to ping everything.