A circuit board

Description automatically generated

OSPF Areas Lab

AREA configurations

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***Purpose***

For this lab, we were asked to apply the theory of OSPF areas we’ve done in our last lab to our own networks from scratch. It took a lot of troubleshooting, reading, and at one point I reset my entire network to scratch to redo all the configurations and connections. As mentioned, our last lab had us work on the theory of different OSPF area types, all that needed to be done was research into the commands used to configure the areas.

***Background***

OSPF, or Open Shortest Path First, is a protocol used to route packets to their destinations. The way this is done is by using LSAs, or Link-State-Advertisements. There are, however, cases where certain LSA types need to be blocked from certain areas. These area types are the Backbone, Stubby, Totally Stubby, and Not-So-Stubby, or NSSA areas. Each of these area types filters a different combination of packet types. This is where each of these types come in. Backbones do not filter anything, as they’re the hub for the network. Stubby areas filter out type 5 LSAs, or external routes. Totally stubby areas filter out all routes outside its area, or LSA types 3, 4, and 5. Finally, NSSA areas change type 5 LSAs into type 7 LSAs, which I have gone over more in my previous OSPF theory lab. In the end, this lab is very similar to our OSPF configuration lab, with the only real difference being the area configuration itself.

***Lab Summary***

To begin, in our CCNP meetings, Mr. Mason drew a sample topology for this lab, so I began by saving the diagram to my computer and creating the skeleton of routers and serial connections based off said diagram. After sketching out an IP scheme on paper, I added IP addresses to each interface and verified that everything could ping without any OSPF configuration applied. After the basic OSPF area configuration all that was left to do was editing each area with the different types of OSPF area. After some research and a lot of help from my classmate, Yuna, who I thank for having the patience to help me start again from scratch when I couldn’t figure out the issues I had, I finished configuring everything. All the areas were able to filter out the unneeded packets in their databases, and all the routers were able to ping. The only complex configuration I had to do was redistribution from the EIGRP area into the NSSA, and vice versa with OSPF. This basically means that all the OSPF routes from within the network become distributed within the EIGRP area, and the EIGRP area shares its routes with the rest of the network. With a few internet guides and meetings, that was all fixed and finished as well. After a bit of tidying and labeling, the lab was complete.

***Lab Commands***

Besides the basic OSPF commands, a few new area configuration commands were needed to complete this lab. First was **area [*area-id*] nssa**, which configures an NSSA area on a router. Along the same vein, the stubby area and totally stubby area commands follow this pattern. For a router in a stubby area, the command is **area [*area-id*] stub**, and for a router in a totally stubby area, the command is **area [*area-id*] stub no-summary.** These three commands would all be performed in **router ospf [*process-id*]**, as they are OSPF commands.

For EIGRP areas, things get trickier, as this area houses the external routes. To configure a router as part of an EIGRP area, the command is **router eigrp [*process-id*]**, and to assign a router id to an eigrp router, it’s as simple as **eigrp router-id [*router-id*].** Further configuration is required, as explained here.

Since OSPF and EIGRP can’t communicate that well by default, we need to redistribute the routes between the two areas. The commands to redistribute routes are a bit complex in text form, but rather simple in purpose. On the EIGRP side, in **router eigrp [*process-id*]**, the command to redistribute OSPF into EIGRP is a lengthy one, **redistribute ospf [*process-id*] metric 1000 33 255 1 1500**. In the immortal words of Mr. Mason, “The numbers don’t really matter,” but I digress…

For the OSPF redistribution, it mirrors the EIGRP side, as the commands are similar in some regards. While in OSPF configuration, and after making sure to add a router ID, the command to redistribute EIGRP routes into OSPF is **redistribute eigrp [*process-id*] subnets**, and all this can be tested with simple pings. The aim of this setup is so that EIGRP area’s packets can be properly detected and converted from type 5 into type 7. As previously explained in my last lab, the point of NSSA configuration is so the external type 5 packets can be “smuggled” through the filters of the area, and once the packets leave the area, they revert to normal external route packets.

Besides hostnames for ease of configuration, no other new commands were used in this lab, and the topology for the completed lab is shown here.

***Diagram

Description automatically generatedNetwork Topology***

***Configurations***

R0#show run

Building configuration...

Current configuration : 1048 bytes

version 15.4

no service timestamps log datetime msec

no service timestamps debug datetime msec

no service password-encryption

hostname R0

no ip cef

no ipv6 cef

spanning-tree mode pvst

interface GigabitEthernet0/0/0

no ip address

duplex auto

speed auto

shutdown

interface GigabitEthernet0/0/1

no ip address

duplex auto

speed auto

shutdown

interface Serial0/1/0

ip address 192.168.1.1 255.255.255.0

clock rate 56000

interface Serial0/1/1

ip address 192.168.2.1 255.255.255.0

clock rate 56000

interface Serial0/2/0

ip address 192.168.3.1 255.255.255.0

clock rate 56000

interface Serial0/2/1

no ip address

clock rate 2000000

shutdown

interface Vlan1

no ip address

shutdown

router ospf 10

router-id 10.10.10.10

log-adjacency-changes

network 192.168.1.0 0.0.0.255 area 0

network 192.168.2.0 0.0.0.255 area 0

network 192.168.3.0 0.0.0.255 area 0

ip classless

ip flow-export version 9

line con 0

line aux 0

line vty 0 4

login

end

R0#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, E - EGP

i - IS-IS, 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

Gateway of last resort is not set

5.0.0.0/24 is subnetted, 1 subnets

O E2 5.5.5.0/24 [110/20] via 192.168.3.2, 00:00:25, Serial0/2/0

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

C 192.168.1.0/24 is directly connected, Serial0/1/0

L 192.168.1.1/32 is directly connected, Serial0/1/0

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

C 192.168.2.0/24 is directly connected, Serial0/1/1

L 192.168.2.1/32 is directly connected, Serial0/1/1

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

C 192.168.3.0/24 is directly connected, Serial0/2/0

L 192.168.3.1/32 is directly connected, Serial0/2/0

O IA 192.168.11.0/24 [110/128] via 192.168.1.2, 00:00:25, Serial0/1/0

O IA 192.168.12.0/24 [110/128] via 192.168.2.2, 00:00:25, Serial0/1/1

O IA 192.168.13.0/24 [110/128] via 192.168.3.2, 00:00:05, Serial0/2/0

O IA 192.168.23.0/24 [110/192] via 192.168.3.2, 00:00:05, Serial0/2/0

R0#show ip ospf

Routing Process "ospf 10" with ID 10.10.10.10

Supports only single TOS(TOS0) routes

Supports opaque LSA

SPF schedule delay 5 secs, Hold time between two SPFs 10 secs

Minimum LSA interval 5 secs. Minimum LSA arrival 1 secs

Number of external LSA 1. Checksum Sum 0x007e1f

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

External flood list length 0

Area BACKBONE(0)

Number of interfaces in this area is 3

Area has no authentication

SPF algorithm executed 7 times

Area ranges are

Number of LSA 9. Checksum Sum 0x03bd01

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

R0#show ip ospf database

OSPF Router with ID (10.10.10.10) (Process ID 10)

Router Link States (Area 0)

Link ID ADV Router Age Seq# Checksum Link count

5.5.5.5 5.5.5.5 81 0x80000002 0x004d4c 2

1.1.1.1 1.1.1.1 81 0x80000002 0x003a83 2

3.3.3.3 3.3.3.3 81 0x80000002 0x00c3e7 2

10.10.10.10 10.10.10.10 81 0x80000007 0x000c7b 6

Summary Net Link States (Area 0)

Link ID ADV Router Age Seq# Checksum

192.168.11.0 1.1.1.1 86 0x80000001 0x00c2e3

192.168.12.0 3.3.3.3 86 0x80000001 0x007b22

192.168.13.0 5.5.5.5 61 0x80000002 0x003261

192.168.23.0 5.5.5.5 61 0x80000003 0x004404

Summary ASB Link States (Area 0)

Link ID ADV Router Age Seq# Checksum

5.5.5.5 5.5.5.5 1 0x80000010 0x00a86a

Type-5 AS External Link States

Link ID ADV Router Age Seq# Checksum Tag

5.5.5.0 5.5.5.5 81 0x80000001 0x007e1f 0

R1#show run

Building configuration...

Current configuration : 989 bytes

version 15.4

no service timestamps log datetime msec

no service timestamps debug datetime msec

no service password-encryption

hostname R1

ip cef

no ipv6 cef

spanning-tree mode pvst

interface GigabitEthernet0/0/0

no ip address

duplex auto

speed auto

shutdown

interface GigabitEthernet0/0/1

no ip address

duplex auto

speed auto

shutdown

interface Serial0/1/0

ip address 192.168.1.2 255.255.255.0

interface Serial0/1/1

ip address 192.168.11.1 255.255.255.0

clock rate 56000

interface Serial0/2/0

no ip address

clock rate 2000000

shutdown

interface Serial0/2/1

no ip address

clock rate 2000000

shutdown

interface Vlan1

no ip address

shutdown

router ospf 10

router-id 1.1.1.1

log-adjacency-changes

area 1 stub

network 192.168.11.0 0.0.0.255 area 1

network 192.168.1.0 0.0.0.255 area 0

ip classless

ip flow-export version 9

line con 0

line aux 0

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, E - EGP

i - IS-IS, 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

Gateway of last resort is not set

5.0.0.0/24 is subnetted, 1 subnets

O E2 5.5.5.0/24 [110/20] via 192.168.1.1, 00:01:51, Serial0/1/0

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

C 192.168.1.0/24 is directly connected, Serial0/1/0

L 192.168.1.2/32 is directly connected, Serial0/1/0

O 192.168.2.0/24 [110/128] via 192.168.1.1, 00:01:51, Serial0/1/0

O 192.168.3.0/24 [110/128] via 192.168.1.1, 00:01:51, Serial0/1/0

192.168.11.0/24 is variably subnetted, 2 subnets, 2 masks

C 192.168.11.0/24 is directly connected, Serial0/1/1

L 192.168.11.1/32 is directly connected, Serial0/1/1

O IA 192.168.12.0/24 [110/192] via 192.168.1.1, 00:01:51, Serial0/1/0

O IA 192.168.13.0/24 [110/192] via 192.168.1.1, 00:01:36, Serial0/1/0

O IA 192.168.23.0/24 [110/256] via 192.168.1.1, 00:01:36, Serial0/1/0

R1#show ip ospf

Routing Process "ospf 10" with ID 1.1.1.1

Supports only single TOS(TOS0) routes

Supports opaque LSA

It is an area border router

SPF schedule delay 5 secs, Hold time between two SPFs 10 secs

Minimum LSA interval 5 secs. Minimum LSA arrival 1 secs

Number of external LSA 1. Checksum Sum 0x007e1f

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 2. 1 normal 1 stub 0 nssa

External flood list length 0

Area 1

Number of interfaces in this area is 1

It is a stub area

generates stub default route with cost 1

Area has no authentication

SPF algorithm executed 4 times

Area ranges are

Number of LSA 9. Checksum Sum 0x046e13

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

Area BACKBONE(0)

Number of interfaces in this area is 1

Area has no authentication

SPF algorithm executed 13 times

Area ranges are

Number of LSA 9. Checksum Sum 0x03a10f

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 database

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

Router Link States (Area 0)

Link ID ADV Router Age Seq# Checksum Link count

1.1.1.1 1.1.1.1 215 0x80000002 0x003a83 2

3.3.3.3 3.3.3.3 215 0x80000002 0x00c3e7 2

5.5.5.5 5.5.5.5 215 0x80000002 0x004d4c 2

10.10.10.10 10.10.10.10 215 0x80000007 0x000c7b 6

Summary Net Link States (Area 0)

Link ID ADV Router Age Seq# Checksum

192.168.11.0 1.1.1.1 220 0x80000001 0x00c2e3

192.168.12.0 3.3.3.3 219 0x80000001 0x007b22

192.168.13.0 5.5.5.5 195 0x80000002 0x003261

192.168.23.0 5.5.5.5 195 0x80000003 0x004404

Summary ASB Link States (Area 0)

Link ID ADV Router Age Seq# Checksum

5.5.5.5 5.5.5.5 5 0x8000002a 0x007583

Router Link States (Area 1)

Link ID ADV Router Age Seq# Checksum Link count

1.1.1.1 1.1.1.1 215 0x80000004 0x006c5c 2

2.2.2.2 2.2.2.2 215 0x80000003 0x000bba 2

Summary Net Link States (Area 1)

Link ID ADV Router Age Seq# Checksum

0.0.0.0 1.1.1.1 220 0x80000001 0x0075e4

192.168.1.0 1.1.1.1 205 0x80000002 0x002f80

192.168.3.0 1.1.1.1 205 0x80000003 0x0099d2

192.168.2.0 1.1.1.1 205 0x80000004 0x00a2c9

192.168.12.0 1.1.1.1 205 0x80000005 0x00b46c

192.168.13.0 1.1.1.1 190 0x80000006 0x00a777

192.168.23.0 1.1.1.1 190 0x80000007 0x00b81b

Type-5 AS External Link States

Link ID ADV Router Age Seq# Checksum Tag

5.5.5.0 5.5.5.5 214 0x80000001 0x007e1f 0

R2#show run

Building configuration...

Current configuration : 940 bytes

version 15.4

no service timestamps log datetime msec

no service timestamps debug datetime msec

no service password-encryption

hostname R2

ip cef

no ipv6 cef

spanning-tree mode pvst

interface GigabitEthernet0/0/0

no ip address

duplex auto

speed auto

shutdown

interface GigabitEthernet0/0/1

no ip address

duplex auto

speed auto

shutdown

interface Serial0/1/0

no ip address

clock rate 2000000

shutdown

interface Serial0/1/1

ip address 192.168.11.2 255.255.255.0

interface Serial0/2/0

no ip address

clock rate 2000000

shutdown

interface Serial0/2/1

no ip address

clock rate 2000000

shutdown

interface Vlan1

no ip address

shutdown

router ospf 10

router-id 2.2.2.2

log-adjacency-changes

area 1 stub

network 192.168.11.0 0.0.0.255 area 1

ip classless

ip flow-export version 9

line con 0

line aux 0

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, E - EGP

i - IS-IS, 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

Gateway of last resort is 192.168.11.1 to network 0.0.0.0

O IA 192.168.1.0/24 [110/128] via 192.168.11.1, 00:07:41, Serial0/1/1

O IA 192.168.2.0/24 [110/192] via 192.168.11.1, 00:07:41, Serial0/1/1

O IA 192.168.3.0/24 [110/192] via 192.168.11.1, 00:07:41, Serial0/1/1

192.168.11.0/24 is variably subnetted, 2 subnets, 2 masks

C 192.168.11.0/24 is directly connected, Serial0/1/1

L 192.168.11.2/32 is directly connected, Serial0/1/1

O IA 192.168.12.0/24 [110/256] via 192.168.11.1, 00:07:41, Serial0/1/1

O IA 192.168.13.0/24 [110/256] via 192.168.11.1, 00:07:26, Serial0/1/1

O IA 192.168.23.0/24 [110/320] via 192.168.11.1, 00:07:26, Serial0/1/1

O\*IA 0.0.0.0/0 [110/65] via 192.168.11.1, 00:07:51, Serial0/1/1

R2#show ip ospf

Routing Process "ospf 10" with ID 2.2.2.2

Supports only single TOS(TOS0) routes

Supports opaque LSA

SPF schedule delay 5 secs, Hold time between two SPFs 10 secs

Minimum LSA interval 5 secs. Minimum LSA arrival 1 secs

Number of external LSA 0. Checksum Sum 0x000000

Number of opaque AS LSA 0. Checksum Sum 0x000000

Number of DCbitless external and opaque AS LSA 0

Number of DoNotAge external and opaque AS LSA 0

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

External flood list length 0

Area 1

Number of interfaces in this area is 1

It is a stub area

Area has no authentication

SPF algorithm executed 4 times

Area ranges are

Number of LSA 9. Checksum Sum 0x046e13

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 database

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

Router Link States (Area 1)

Link ID ADV Router Age Seq# Checksum Link count

2.2.2.2 2.2.2.2 501 0x80000003 0x000bba 2

1.1.1.1 1.1.1.1 501 0x80000004 0x006c5c 2

Summary Net Link States (Area 1)

Link ID ADV Router Age Seq# Checksum

0.0.0.0 1.1.1.1 506 0x80000001 0x0075e4

192.168.1.0 1.1.1.1 491 0x80000002 0x002f80

192.168.3.0 1.1.1.1 491 0x80000003 0x0099d2

192.168.2.0 1.1.1.1 491 0x80000004 0x00a2c9

192.168.12.0 1.1.1.1 491 0x80000005 0x00b46c

192.168.13.0 1.1.1.1 476 0x80000006 0x00a777

192.168.23.0 1.1.1.1 476 0x80000007 0x00b81b

R3#show run

Building configuration...

Current configuration : 1000 bytes

version 15.4

no service timestamps log datetime msec

no service timestamps debug datetime msec

no service password-encryption

hostname R3

ip cef

no ipv6 cef

spanning-tree mode pvst

interface GigabitEthernet0/0/0

no ip address

duplex auto

speed auto

shutdown

interface GigabitEthernet0/0/1

no ip address

duplex auto

speed auto

shutdown

interface Serial0/1/0

ip address 192.168.2.2 255.255.255.0

interface Serial0/1/1

ip address 192.168.12.1 255.255.255.0

clock rate 56000

interface Serial0/2/0

no ip address

clock rate 2000000

shutdown

interface Serial0/2/1

no ip address

clock rate 2000000

shutdown

interface Vlan1

no ip address

shutdown

router ospf 10

router-id 3.3.3.3

log-adjacency-changes

area 2 stub no-summary

network 192.168.12.0 0.0.0.255 area 2

network 192.168.2.0 0.0.0.255 area 0

ip classless

ip flow-export version 9

line con 0

line aux 0

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, E - EGP

i - IS-IS, 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

Gateway of last resort is not set

5.0.0.0/24 is subnetted, 1 subnets

O E2 5.5.5.0/24 [110/20] via 192.168.2.1, 00:08:34, Serial0/1/0

O 192.168.1.0/24 [110/128] via 192.168.2.1, 00:08:34, Serial0/1/0

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

C 192.168.2.0/24 is directly connected, Serial0/1/0

L 192.168.2.2/32 is directly connected, Serial0/1/0

O 192.168.3.0/24 [110/128] via 192.168.2.1, 00:08:34, Serial0/1/0

O IA 192.168.11.0/24 [110/192] via 192.168.2.1, 00:08:34, Serial0/1/0

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

C 192.168.12.0/24 is directly connected, Serial0/1/1

L 192.168.12.1/32 is directly connected, Serial0/1/1

O IA 192.168.13.0/24 [110/192] via 192.168.2.1, 00:08:24, Serial0/1/0

O IA 192.168.23.0/24 [110/256] via 192.168.2.1, 00:08:24, Serial0/1/0

R3#show ip ospf

Routing Process "ospf 10" with ID 3.3.3.3

Supports only single TOS(TOS0) routes

Supports opaque LSA

It is an area border router

SPF schedule delay 5 secs, Hold time between two SPFs 10 secs

Minimum LSA interval 5 secs. Minimum LSA arrival 1 secs

Number of external LSA 1. Checksum Sum 0x007e1f

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 2. 1 normal 1 stub 0 nssa

External flood list length 0

Area 2

Number of interfaces in this area is 1

It is a stub area

generates stub default route with cost 1

Area has no authentication

SPF algorithm executed 5 times

Area ranges are

Number of LSA 3. Checksum Sum 0x014c5f

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

Area BACKBONE(0)

Number of interfaces in this area is 1

Area has no authentication

SPF algorithm executed 56 times

Area ranges are

Number of LSA 9. Checksum Sum 0x03f465

Number of opaque link LSA 0. Checksum Sum 0x000000

Number of DCbitless LSA 0

Number of indication LSA 0

Number of DoNotAge LSA 0

Flood list length 0

R3#show ip ospf database

OSPF Router with ID (3.3.3.3) (Process ID 10)

Router Link States (Area 0)

Link ID ADV Router Age Seq# Checksum Link count

3.3.3.3 3.3.3.3 575 0x80000002 0x00c3e7 2

5.5.5.5 5.5.5.5 575 0x80000002 0x004d4c 2

1.1.1.1 1.1.1.1 575 0x80000002 0x003a83 2

10.10.10.10 10.10.10.10 575 0x80000007 0x000c7b 6

Summary Net Link States (Area 0)

Link ID ADV Router Age Seq# Checksum

192.168.12.0 3.3.3.3 580 0x80000001 0x007b22

192.168.11.0 1.1.1.1 580 0x80000001 0x00c2e3

192.168.13.0 5.5.5.5 555 0x80000002 0x003261

192.168.23.0 5.5.5.5 555 0x80000003 0x004404

Summary ASB Link States (Area 0)

Link ID ADV Router Age Seq# Checksum

5.5.5.5 5.5.5.5 6 0x80000072 0x00e3cc

Router Link States (Area 2)

Link ID ADV Router Age Seq# Checksum Link count

3.3.3.3 3.3.3.3 575 0x80000004 0x003a74 2

4.4.4.4 4.4.4.4 575 0x80000003 0x00d8d2 2

Summary Net Link States (Area 2)

Link ID ADV Router Age Seq# Checksum

0.0.0.0 3.3.3.3 580 0x80000001 0x003919

Type-5 AS External Link States

Link ID ADV Router Age Seq# Checksum Tag

5.5.5.0 5.5.5.5 575 0x80000001 0x007e1f 0

R4#show run

Building configuration...

Current configuration : 951 bytes

version 15.4

no service timestamps log datetime msec

no service timestamps debug datetime msec

no service password-encryption

hostname R4

ip cef

no ipv6 cef

spanning-tree mode pvst

interface GigabitEthernet0/0/0

no ip address

duplex auto

speed auto

shutdown

interface GigabitEthernet0/0/1

no ip address

duplex auto

speed auto

shutdown

interface Serial0/1/0

no ip address

clock rate 2000000

shutdown

interface Serial0/1/1

ip address 192.168.12.2 255.255.255.0

interface Serial0/2/0

no ip address

clock rate 2000000

shutdown

interface Serial0/2/1

no ip address

clock rate 2000000

shutdown

interface Vlan1

no ip address

shutdown

router ospf 10

router-id 4.4.4.4

log-adjacency-changes

area 2 stub no-summary

network 192.168.12.0 0.0.0.255 area 2

ip classless

ip flow-export version 9

line con 0

line aux 0

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, E - EGP

i - IS-IS, 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

Gateway of last resort is 192.168.12.1 to network 0.0.0.0

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

C 192.168.12.0/24 is directly connected, Serial0/1/1

L 192.168.12.2/32 is directly connected, Serial0/1/1

O\*IA 0.0.0.0/0 [110/65] via 192.168.12.1, 00:09:50, Serial0/1/1

R4#show ip ospf

Routing Process "ospf 10" with ID 4.4.4.4

Supports only single TOS(TOS0) routes

Supports opaque LSA

SPF schedule delay 5 secs, Hold time between two SPFs 10 secs

Minimum LSA interval 5 secs. Minimum LSA arrival 1 secs

Number of external LSA 0. Checksum Sum 0x000000

Number of opaque AS LSA 0. Checksum Sum 0x000000

Number of DCbitless external and opaque AS LSA 0

Number of DoNotAge external and opaque AS LSA 0

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

External flood list length 0

Area 2

Number of interfaces in this area is 1

It is a stub area

Area has no authentication

SPF algorithm executed 2 times

Area ranges are

Number of LSA 3. Checksum Sum 0x014c5f

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

R4#show ip ospf database

OSPF Router with ID (4.4.4.4) (Process ID 10)

Router Link States (Area 2)

Link ID ADV Router Age Seq# Checksum Link count

4.4.4.4 4.4.4.4 664 0x80000003 0x00d8d2 2

3.3.3.3 3.3.3.3 664 0x80000004 0x003a74 2

Summary Net Link States (Area 2)

Link ID ADV Router Age Seq# Checksum

0.0.0.0 3.3.3.3 669 0x80000001 0x003919

R5#show run

Building configuration...

Current configuration : 989 bytes

version 15.4

no service timestamps log datetime msec

no service timestamps debug datetime msec

no service password-encryption

hostname R5

ip cef

no ipv6 cef

spanning-tree mode pvst

interface GigabitEthernet0/0/0

no ip address

duplex auto

speed auto

shutdown

interface GigabitEthernet0/0/1

no ip address

duplex auto

speed auto

shutdown

interface Serial0/1/0

ip address 192.168.3.2 255.255.255.0

interface Serial0/1/1

ip address 192.168.13.1 255.255.255.0

clock rate 56000

interface Serial0/2/0

no ip address

clock rate 2000000

shutdown

interface Serial0/2/1

no ip address

clock rate 2000000

shutdown

interface Vlan1

no ip address

shutdown

router ospf 10

router-id 5.5.5.5

log-adjacency-changes

area 3 nssa

network 192.168.13.0 0.0.0.255 area 3

network 192.168.3.0 0.0.0.255 area 0

ip classless

ip flow-export version 9

line con 0

line aux 0

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, E - EGP

i - IS-IS, 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

Gateway of last resort is not set

5.0.0.0/24 is subnetted, 1 subnets

O N2 5.5.5.0/24 [110/20] via 192.168.13.2, 00:11:18, Serial0/1/1

O 192.168.1.0/24 [110/128] via 192.168.3.1, 00:11:23, Serial0/1/0

O 192.168.2.0/24 [110/128] via 192.168.3.1, 00:11:23, Serial0/1/0

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

C 192.168.3.0/24 is directly connected, Serial0/1/0

L 192.168.3.2/32 is directly connected, Serial0/1/0

O IA 192.168.11.0/24 [110/192] via 192.168.3.1, 00:11:23, Serial0/1/0

O IA 192.168.12.0/24 [110/192] via 192.168.3.1, 00:11:23, Serial0/1/0

192.168.13.0/24 is variably subnetted, 2 subnets, 2 masks

C 192.168.13.0/24 is directly connected, Serial0/1/1

L 192.168.13.1/32 is directly connected, Serial0/1/1

O 192.168.23.0/24 [110/128] via 192.168.13.2, 00:11:18, Serial0/1/1

R5#show ip ospf

Routing Process "ospf 10" with ID 5.5.5.5

Supports only single TOS(TOS0) routes

Supports opaque LSA

It is an area border router

SPF schedule delay 5 secs, Hold time between two SPFs 10 secs

Minimum LSA interval 5 secs. Minimum LSA arrival 1 secs

Number of external LSA 2. Checksum Sum 0x00fc3e

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 2. 1 normal 0 stub 1 nssa

External flood list length 0

Area 3

Number of interfaces in this area is 1

It is a NSSA area

Perform type-7/type-5 LSA translation

Area has no authentication

SPF algorithm executed 2 times

Area ranges are

Number of LSA 9. Checksum Sum 0x03be1c

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

Area BACKBONE(0)

Number of interfaces in this area is 1

Area has no authentication

SPF algorithm executed 71 times

Area ranges are

Number of LSA 9. Checksum Sum 0x03b883

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

R5#show ip ospf database

OSPF Router with ID (5.5.5.5) (Process ID 10)

Router Link States (Area 0)

Link ID ADV Router Age Seq# Checksum Link count

5.5.5.5 5.5.5.5 720 0x80000002 0x004d4c 2

3.3.3.3 3.3.3.3 720 0x80000002 0x00c3e7 2

1.1.1.1 1.1.1.1 720 0x80000002 0x003a83 2

10.10.10.10 10.10.10.10 720 0x80000007 0x000c7b 6

Summary Net Link States (Area 0)

Link ID ADV Router Age Seq# Checksum

192.168.11.0 1.1.1.1 725 0x80000001 0x00c2e3

192.168.12.0 3.3.3.3 725 0x80000001 0x007b22

192.168.13.0 5.5.5.5 700 0x80000002 0x003261

192.168.23.0 5.5.5.5 700 0x80000003 0x004404

Summary ASB Link States (Area 0)

Link ID ADV Router Age Seq# Checksum

5.5.5.5 5.5.5.5 2 0x80000090 0x00a7ea

Router Link States (Area 3)

Link ID ADV Router Age Seq# Checksum Link count

5.5.5.5 5.5.5.5 721 0x80000004 0x000e84 2

6.6.6.6 6.6.6.6 721 0x80000005 0x00b919 4

7.7.7.7 7.7.7.7 721 0x80000003 0x00d797 2

Summary Net Link States (Area 3)

Link ID ADV Router Age Seq# Checksum

192.168.3.0 5.5.5.5 711 0x80000001 0x00a2fb

192.168.1.0 5.5.5.5 711 0x80000002 0x003926

192.168.2.0 5.5.5.5 711 0x80000003 0x002c31

192.168.11.0 5.5.5.5 711 0x80000004 0x0049c9

192.168.12.0 5.5.5.5 711 0x80000005 0x003cd4

Type-7 AS External Link States (Area 3)

Link ID ADV Router Age Seq# Checksum Tag

5.5.5.0 7.7.7.7 730 0x80000001 0x008ff9 0

Type-5 AS External Link States

Link ID ADV Router Age Seq# Checksum Tag

5.5.5.0 5.5.5.5 721 0x80000001 0x007e1f 0

R6#show run

Building configuration...

Current configuration : 991 bytes

version 15.4

no service timestamps log datetime msec

no service timestamps debug datetime msec

no service password-encryption

hostname R6

ip cef

no ipv6 cef

spanning-tree mode pvst

interface GigabitEthernet0/0/0

no ip address

duplex auto

speed auto

shutdown

interface GigabitEthernet0/0/1

no ip address

duplex auto

speed auto

shutdown

interface Serial0/1/0

ip address 192.168.23.1 255.255.255.0

clock rate 56000

interface Serial0/1/1

ip address 192.168.13.2 255.255.255.0

interface Serial0/2/0

no ip address

clock rate 2000000

shutdown

interface Serial0/2/1

no ip address

clock rate 2000000

shutdown

interface Vlan1

no ip address

shutdown

router ospf 10

router-id 6.6.6.6

log-adjacency-changes

area 3 nssa

network 192.168.13.0 0.0.0.255 area 3

network 192.168.23.0 0.0.0.255 area 3

ip classless

ip flow-export version 9

line con 0

line aux 0

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, E - EGP

i - IS-IS, 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

Gateway of last resort is not set

5.0.0.0/24 is subnetted, 1 subnets

O N2 5.5.5.0/24 [110/20] via 192.168.23.2, 00:12:39, Serial0/1/0

O IA 192.168.1.0/24 [110/192] via 192.168.13.1, 00:12:29, Serial0/1/1

O IA 192.168.2.0/24 [110/192] via 192.168.13.1, 00:12:29, Serial0/1/1

O IA 192.168.3.0/24 [110/128] via 192.168.13.1, 00:12:29, Serial0/1/1

O IA 192.168.11.0/24 [110/256] via 192.168.13.1, 00:12:29, Serial0/1/1

O IA 192.168.12.0/24 [110/256] via 192.168.13.1, 00:12:29, Serial0/1/1

192.168.13.0/24 is variably subnetted, 2 subnets, 2 masks

C 192.168.13.0/24 is directly connected, Serial0/1/1

L 192.168.13.2/32 is directly connected, Serial0/1/1

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

C 192.168.23.0/24 is directly connected, Serial0/1/0

L 192.168.23.1/32 is directly connected, Serial0/1/0

R6#show ip ospf

Routing Process "ospf 10" with ID 6.6.6.6

Supports only single TOS(TOS0) routes

Supports opaque LSA

SPF schedule delay 5 secs, Hold time between two SPFs 10 secs

Minimum LSA interval 5 secs. Minimum LSA arrival 1 secs

Number of external LSA 0. Checksum Sum 0x000000

Number of opaque AS LSA 0. Checksum Sum 0x000000

Number of DCbitless external and opaque AS LSA 0

Number of DoNotAge external and opaque AS LSA 0

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

External flood list length 0

Area 3

Number of interfaces in this area is 2

It is a NSSA area

Perform type-7/type-5 LSA translation

Area has no authentication

SPF algorithm executed 3 times

Area ranges are

Number of LSA 9. Checksum Sum 0x03be1c

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 database

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

Router Link States (Area 3)

Link ID ADV Router Age Seq# Checksum Link count

7.7.7.7 7.7.7.7 840 0x80000003 0x00d797 2

5.5.5.5 5.5.5.5 840 0x80000004 0x000e84 2

6.6.6.6 6.6.6.6 840 0x80000005 0x00b919 4

Summary Net Link States (Area 3)

Link ID ADV Router Age Seq# Checksum

192.168.3.0 5.5.5.5 830 0x80000001 0x00a2fb

192.168.1.0 5.5.5.5 830 0x80000002 0x003926

192.168.2.0 5.5.5.5 830 0x80000003 0x002c31

192.168.11.0 5.5.5.5 830 0x80000004 0x0049c9

192.168.12.0 5.5.5.5 830 0x80000005 0x003cd4

Type-7 AS External Link States (Area 3)

Link ID ADV Router Age Seq# Checksum Tag

5.5.5.0 7.7.7.7 849 0x80000001 0x008ff9 0

R7#show run

Building configuration...

Current configuration : 1090 bytes

version 15.4

no service timestamps log datetime msec

no service timestamps debug datetime msec

no service password-encryption

hostname R7

ip cef

no ipv6 cef

spanning-tree mode pvst

interface GigabitEthernet0/0/0

no ip address

duplex auto

speed auto

shutdown

interface GigabitEthernet0/0/1

no ip address

duplex auto

speed auto

shutdown

interface Serial0/1/0

ip address 192.168.23.2 255.255.255.0

interface Serial0/1/1

ip address 5.5.5.1 255.255.255.0

clock rate 2000000

interface Serial0/2/0

no ip address

clock rate 2000000

shutdown

interface Serial0/2/1

no ip address

clock rate 2000000

shutdown

interface Vlan1

no ip address

shutdown

router eigrp 1

eigrp router-id 5.5.5.1

redistribute ospf 10 metric 1000 33 255 1 1500

network 5.0.0.0

router ospf 10

router-id 7.7.7.7

log-adjacency-changes

area 3 nssa

redistribute eigrp 1 subnets

network 192.168.23.0 0.0.0.255 area 3

ip classless

ip flow-export version 9

line con 0

line aux 0

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, E - EGP

i - IS-IS, 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

Gateway of last resort is not set

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

C 5.5.5.0/24 is directly connected, Serial0/1/1

L 5.5.5.1/32 is directly connected, Serial0/1/1

O IA 192.168.1.0/24 [110/256] via 192.168.23.1, 00:18:51, Serial0/1/0

O IA 192.168.2.0/24 [110/256] via 192.168.23.1, 00:18:51, Serial0/1/0

O IA 192.168.3.0/24 [110/192] via 192.168.23.1, 00:18:51, Serial0/1/0

O IA 192.168.11.0/24 [110/320] via 192.168.23.1, 00:18:51, Serial0/1/0

O IA 192.168.12.0/24 [110/320] via 192.168.23.1, 00:18:51, Serial0/1/0

O 192.168.13.0/24 [110/128] via 192.168.23.1, 00:19:01, Serial0/1/0

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

C 192.168.23.0/24 is directly connected, Serial0/1/0

L 192.168.23.2/32 is directly connected, Serial0/1/0

R7#show ip ospf

Routing Process "ospf 10" with ID 7.7.7.7

Supports only single TOS(TOS0) routes

Supports opaque LSA

It is an autonomous system boundary router

SPF schedule delay 5 secs, Hold time between two SPFs 10 secs

Minimum LSA interval 5 secs. Minimum LSA arrival 1 secs

Number of external LSA 0. Checksum Sum 0x000000

Number of opaque AS LSA 0. Checksum Sum 0x000000

Number of DCbitless external and opaque AS LSA 0

Number of DoNotAge external and opaque AS LSA 0

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

External flood list length 0

Area 3

Number of interfaces in this area is 1

It is a NSSA area

Perform type-7/type-5 LSA translation

Area has no authentication

SPF algorithm executed 4 times

Area ranges are

Number of LSA 9. Checksum Sum 0x03be1c

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 database

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

Router Link States (Area 3)

Link ID ADV Router Age Seq# Checksum Link count

7.7.7.7 7.7.7.7 1181 0x80000003 0x00d797 2

5.5.5.5 5.5.5.5 1181 0x80000004 0x000e84 2

6.6.6.6 6.6.6.6 1181 0x80000005 0x00b919 4

Summary Net Link States (Area 3)

Link ID ADV Router Age Seq# Checksum

192.168.3.0 5.5.5.5 1171 0x80000001 0x00a2fb

192.168.1.0 5.5.5.5 1171 0x80000002 0x003926

192.168.2.0 5.5.5.5 1171 0x80000003 0x002c31

192.168.11.0 5.5.5.5 1171 0x80000004 0x0049c9

192.168.12.0 5.5.5.5 1171 0x80000005 0x003cd4

Type-7 AS External Link States (Area 3)

Link ID ADV Router Age Seq# Checksum Tag

5.5.5.0 7.7.7.7 1190 0x80000001 0x008ff9 0

R8#show run

Building configuration...

Current configuration : 873 bytes

version 15.4

no service timestamps log datetime msec

no service timestamps debug datetime msec

no service password-encryption

hostname R8

ip cef

no ipv6 cef

spanning-tree mode pvst

interface GigabitEthernet0/0/0

no ip address

duplex auto

speed auto

shutdown

interface GigabitEthernet0/0/1

no ip address

duplex auto

speed auto

shutdown

interface Serial0/1/0

no ip address

clock rate 2000000

shutdown

interface Serial0/1/1

ip address 5.5.5.2 255.255.255.0

interface Serial0/2/0

no ip address

clock rate 2000000

shutdown

interface Serial0/2/1

no ip address

clock rate 2000000

shutdown

interface Vlan1

no ip address

shutdown

router eigrp 1

network 5.0.0.0

ip classless

ip flow-export version 9

no cdp run

line con 0

line aux 0

line vty 0 4

login

end

R8#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, E - EGP

i - IS-IS, 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

Gateway of last resort is not set

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

C 5.5.5.0/24 is directly connected, Serial0/1/1

L 5.5.5.2/32 is directly connected, Serial0/1/1

D EX 192.168.1.0/24 [170/3080448] via 5.5.5.1, 00:19:45, Serial0/1/1

D EX 192.168.2.0/24 [170/3080448] via 5.5.5.1, 00:19:45, Serial0/1/1

D EX 192.168.3.0/24 [170/3080448] via 5.5.5.1, 00:19:45, Serial0/1/1

D EX 192.168.11.0/24 [170/3080448] via 5.5.5.1, 00:19:45, Serial0/1/1

D EX 192.168.12.0/24 [170/3080448] via 5.5.5.1, 00:19:45, Serial0/1/1

D EX 192.168.13.0/24 [170/3080448] via 5.5.5.1, 00:19:55, Serial0/1/1

D EX 192.168.23.0/24 [170/3080448] via 5.5.5.1, 00:20:01, Serial0/1/1

R8#show ip ospf

(Nothing)

R8#show ip ospf database

(Nothing)

R2#ping 5.5.5.2

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 5.5.5.2, timeout is 2 seconds:

!!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 17/28/62 ms

R4#ping 5.5.5.2

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 5.5.5.2, timeout is 2 seconds:

!!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 24/54/69 ms

R8#ping 192.168.11.2

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 192.168.11.2, timeout is 2 seconds:

!!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 54/63/74 ms

R8#ping 192.168.12.2

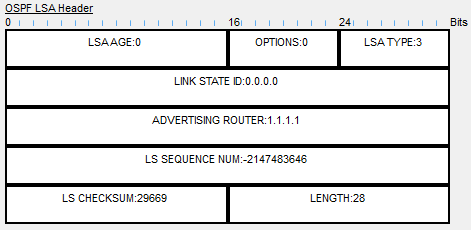
Type escape sequence to abort.

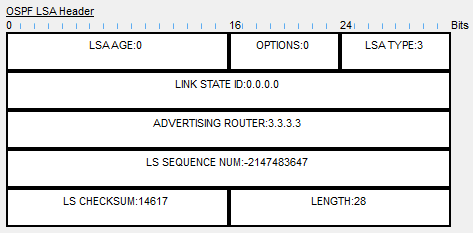
Sending 5, 100-byte ICMP Echos to 192.168.12.2, timeout is 2 seconds:

!!!!!

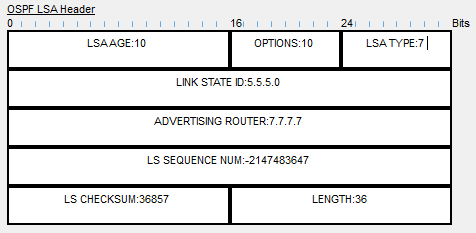
Success rate is 100 percent (5/5), round-trip min/avg/max = 10/55/87 ms

Type 3 Packet from R1 to R2:



Type 3 Packet from R3 to R4: 

Type 7 Packet from R7 to R6



The reason this packet is so important is that it shows a type 7 packet, that only occur in NSSA areas. Type 7 packets are the “smuggled” packets, as they carry external routes through the area.

***Problems***

This lab caused me much grief, but through the help of my classmates and thorough researching, in the end everything turned out ok. For starters, at the beginning, I accidentally configured my routers with either the wrong OSPF process ID, or multiple areas, which took a long time to figure out what the problem really was. This was solved with the nuclear option, which was clearing the lab entirely and starting from the beginning. Even then, I had to reload a few routers because it was faster than trying to remove the areas from the router itself.

My next issue occurred with not knowing how to configure the EIGRP area. After tinkering to no end, Mr. Mason helped me with in Microsoft Teams meetings. The problem turned out to be that the redistribution didn’t work the first time, so a repeat of the command used was all it took, and routers could ping router 8. Along with his help, a bit of googling provided some useful guides too.

Lastly came the issue of how I could prove that my network was doing what it was supposed to. I used packet tracer’s simulation mode, saved all the configurations onto the routers, and power cycled the whole network. Then, I stepped through the whole process, clicking on each OSPF packet that I thought contained the magical typing. It’s comparable to looking for several needles in a cybernetic haystack. The packets I looked for were the type 3 packets delivering a default route to the stubby and totally stubby areas, and the ever-elusive type 7 packet from router 7 to router 6. The reason the type 7 packet is so important in this case is because that’s a conversion that only NSSA areas can perform, meaning everything was smooth and operational.

***Conclusion***

Overall, this lab differs from the last OSPF setup lab purely from the area configurations, packet searching, and the lone EIGRP area. Nothing else really changes, as it’s a very typical OSPF network. Where this lab really became complex was in the area configuration I mentioned. In previous labs, Mr. Mason showed us what to do and had us replicate it, which was what I expected going into this lab as well. Unfortunately, all we were given was the network diagram that our networks were expected to look like and let loose. This was the first lab where all the commands and configurations had to be researched purely by us students. In conclusion, a very fun lab experience, even though it was challenging.