

NWEN302

Lab 2

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REPORT

Introduction

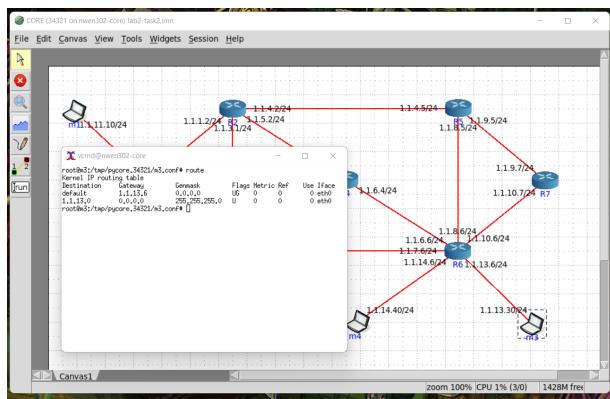
In this investigation we will be utilizing the CORE GUI to create networks which hold multiple hosts and connected routers in a test to garner knowledge on configuring IPv4 and associated IPv6 addresses. We can complete this investigation by making use of the Zebra, OSPFv3 and OSPFv4 services. By editing the Zebra service we can integrate our own routing paths to tell the network where to travel when communicating between hosts. When dealing with situations where we have links with maximum speeds we need to take them into account when routing paths as if every path were made equal the paths would be straight forward.

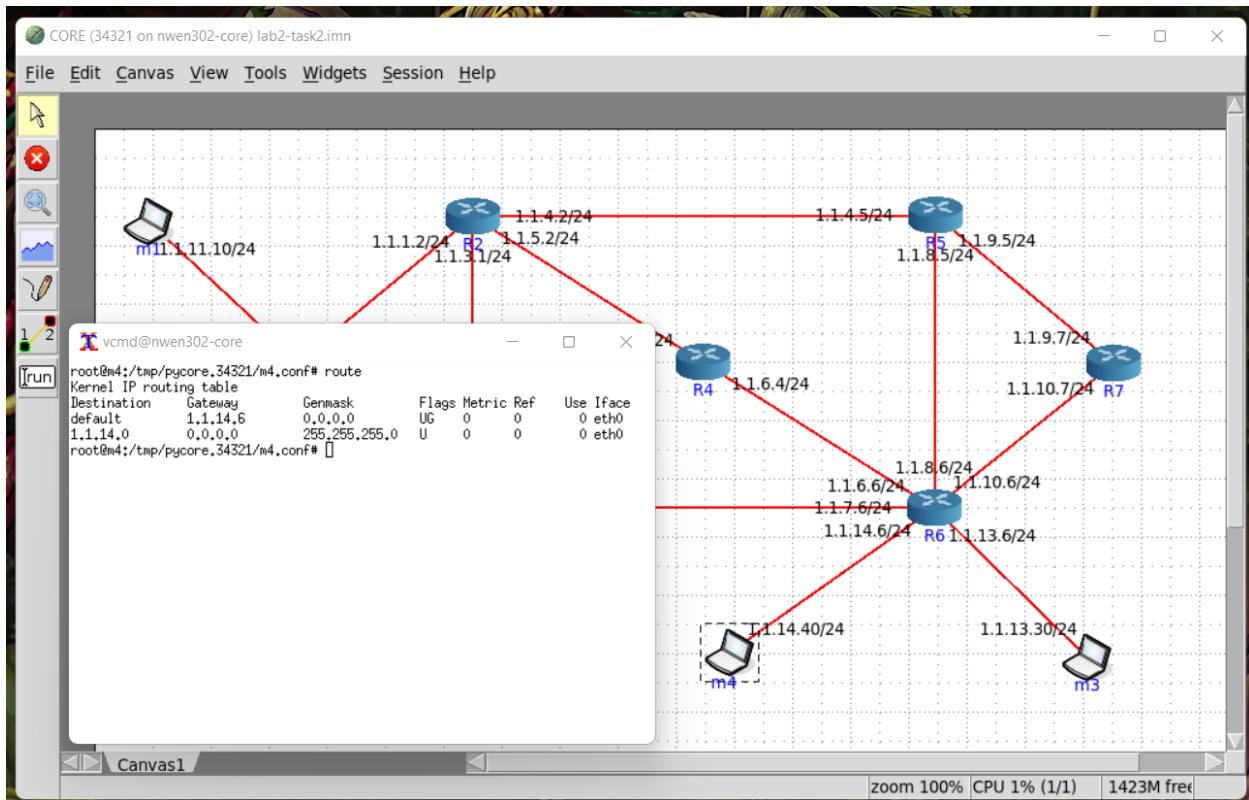
Procedures

With our created network setup we will be attempting to make the hosts m1 and m2 communicate with hosts m3 and m4. To ensure this process is able to take place we will be adding a few steps to create the routing between them by;

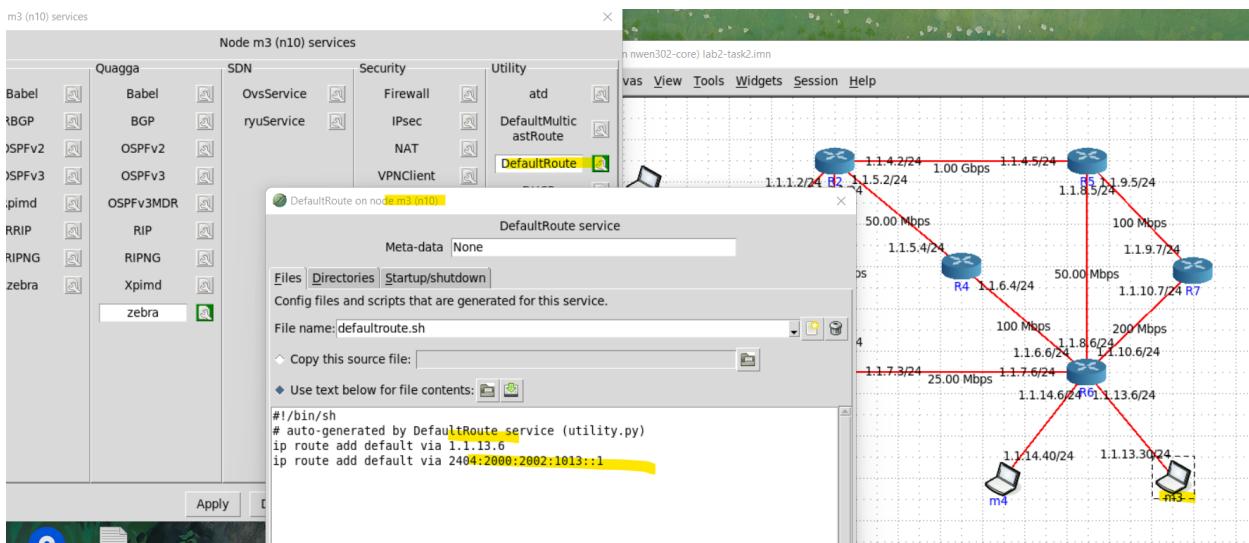
Configuring the Linux Hosts, with this we will add the “Default Gateways” in each hosts settings and add the correct ipv4 ping address to re-route the communication.

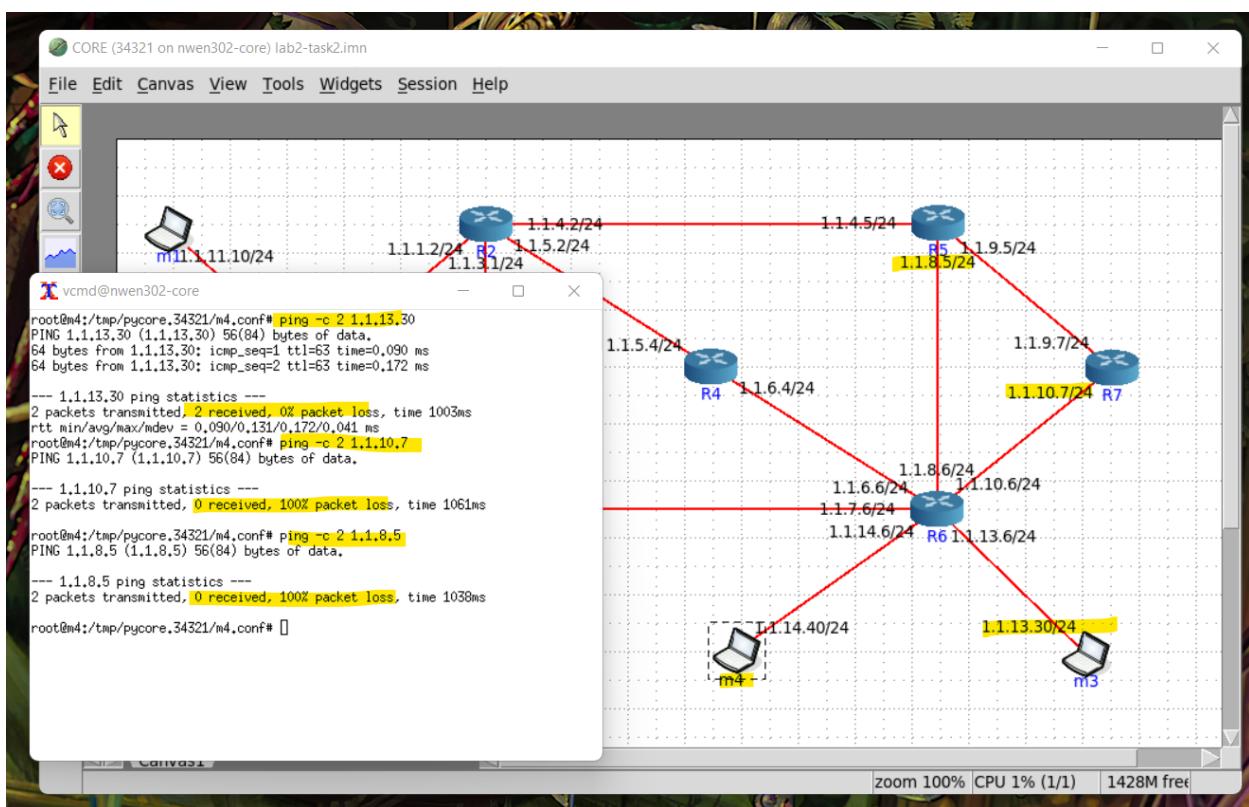
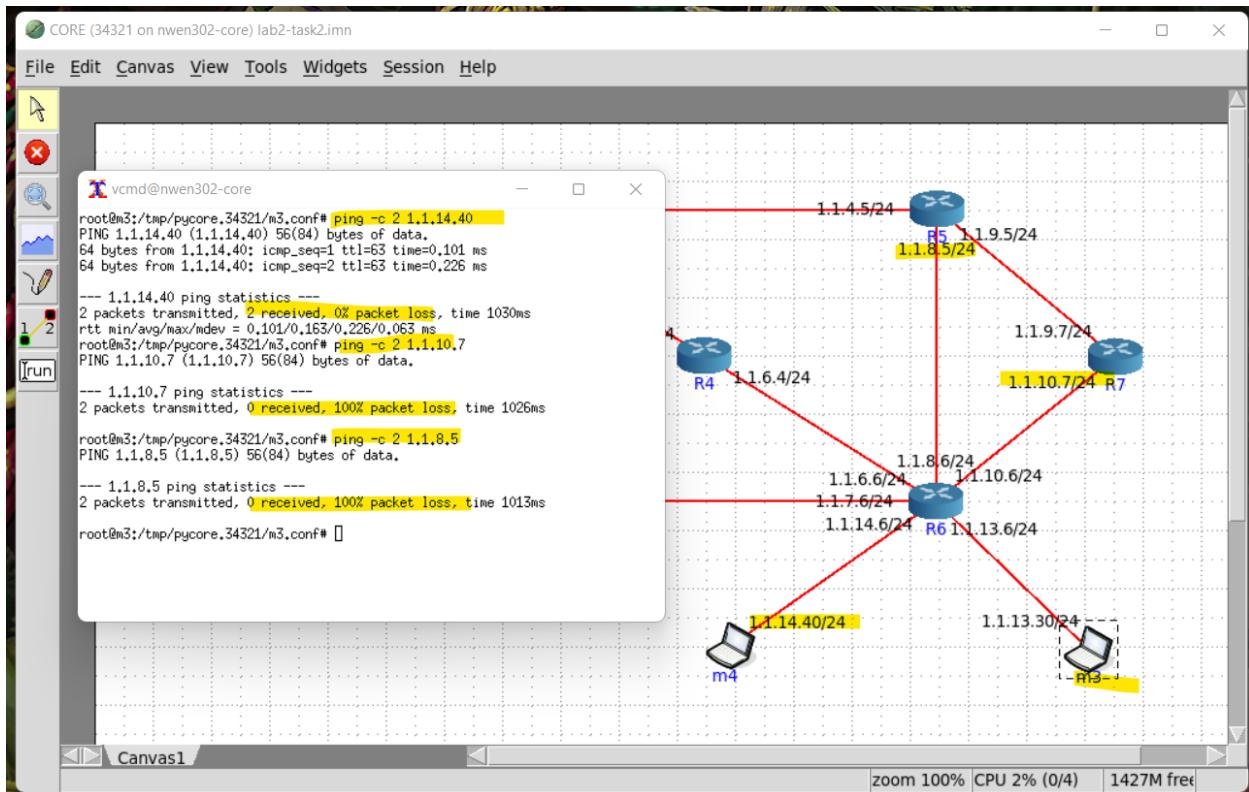
Below shows the steps I took before and after and showing the ping results: (no nearby host)





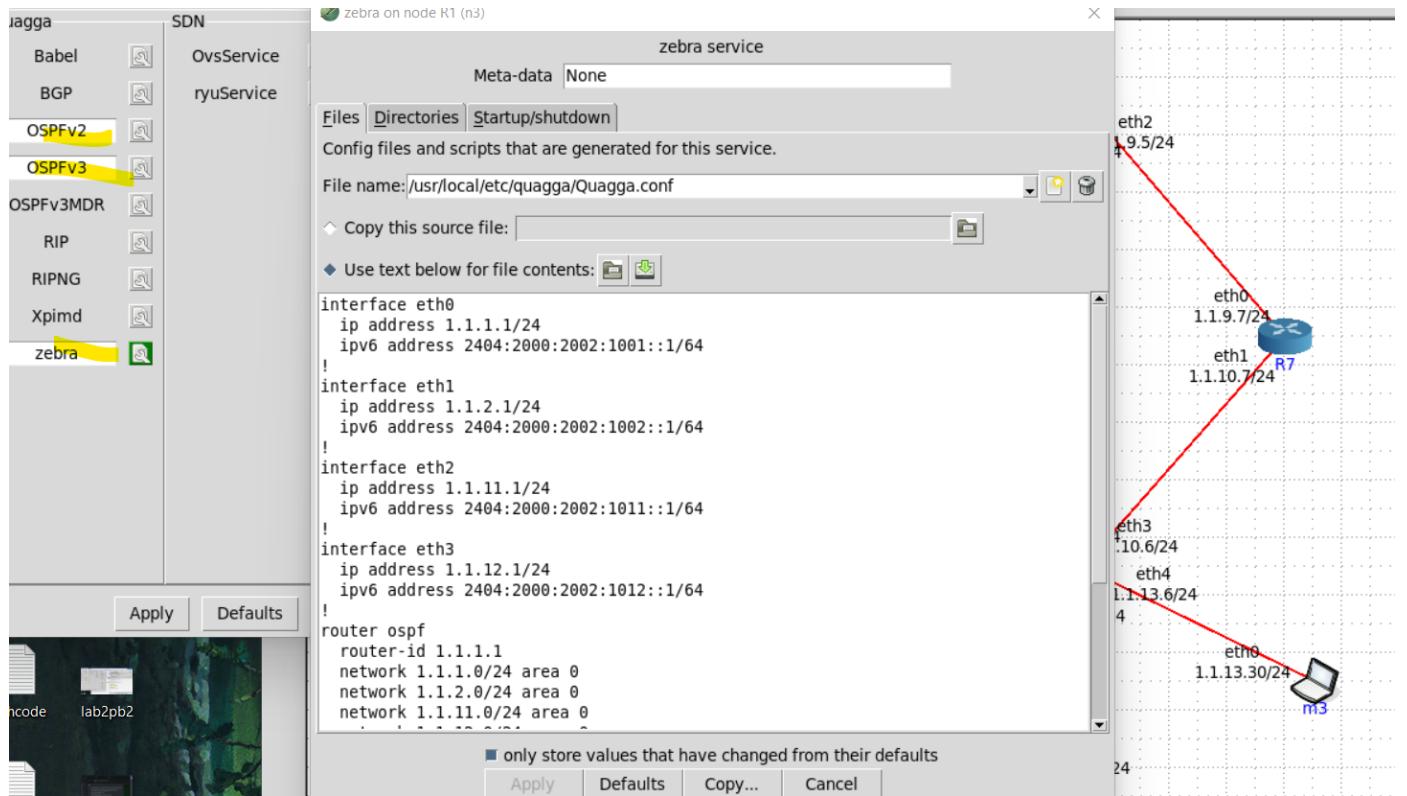
- After changing the Default Gateway settings on the host itself it appears we are now able to ping the other neighboring host as seen below:



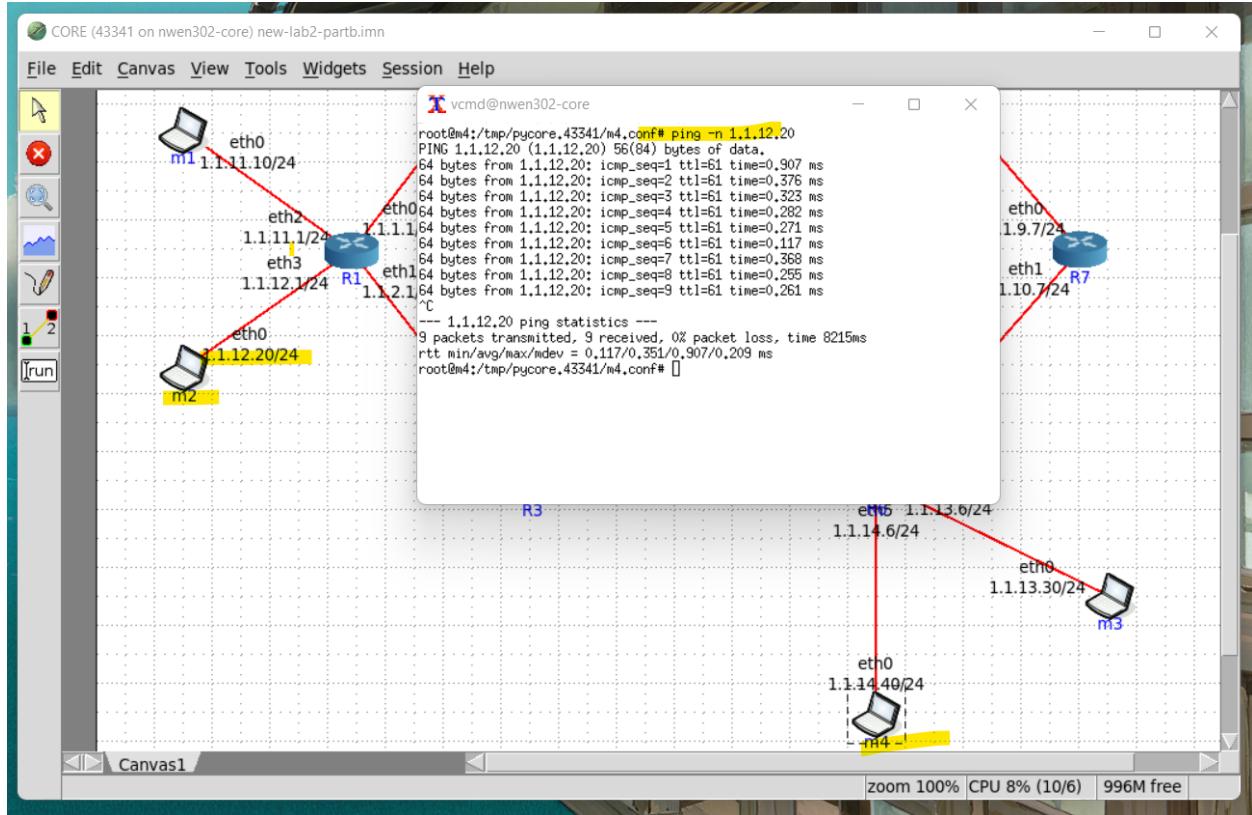


- The above screenshot shows that we are able to ping the neighboring host but not the other hosts on the network

The procedures I took to implement OSPFv2 and OSPFv3 were to remove the routing path information from the zebra service and turn on the OSPF functions in the services for each node. Once updating each node with the OSPF it updates the zebra settings with the necessary link routing information as seen below:



- When implementing the OSPF settings I can now ping hosts from the other side of the network without having to set my own routes in the zebra service.
- Below is a screenshot showing I can ping host m2 from host m4

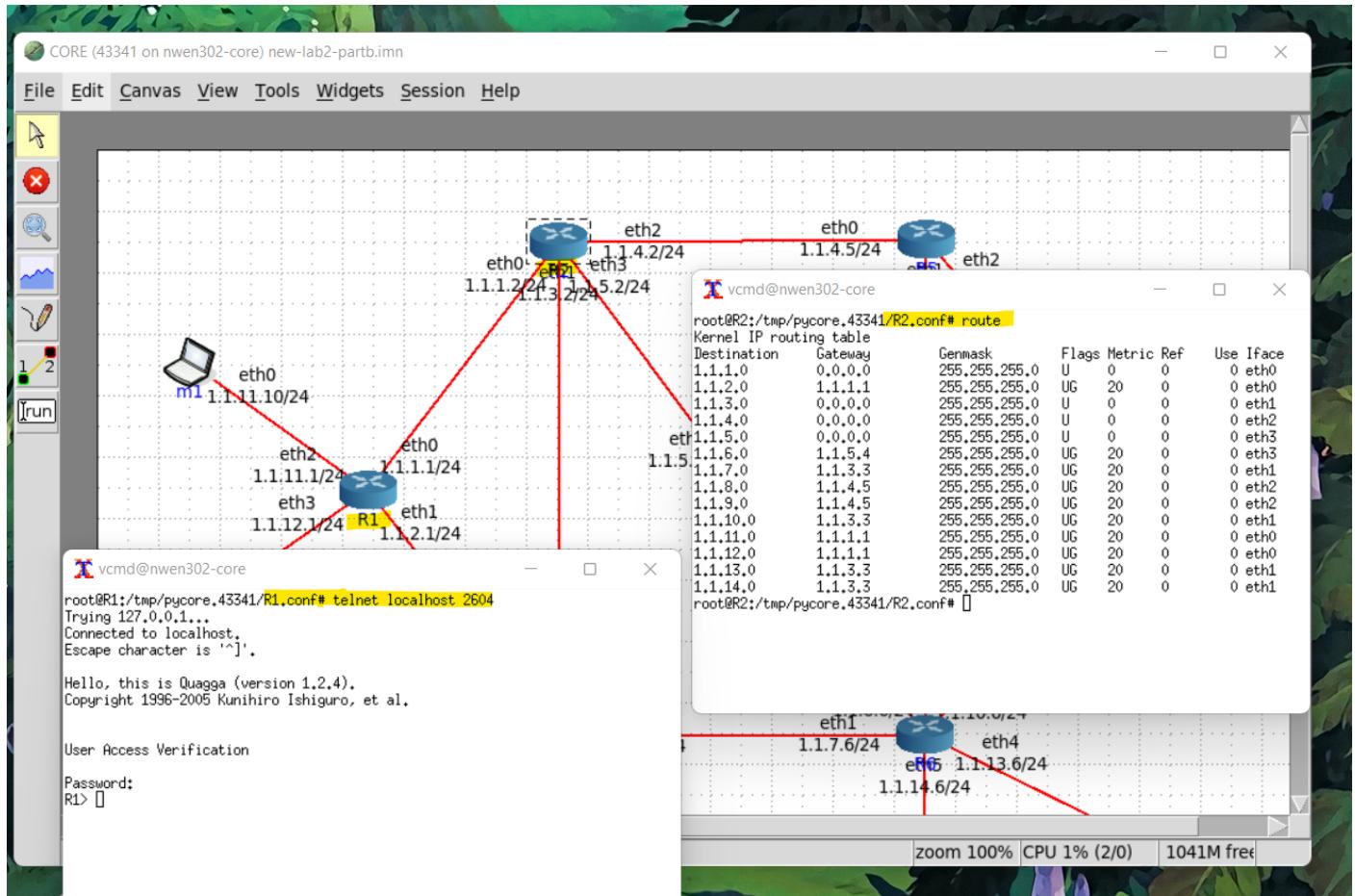


PART B - Tasks

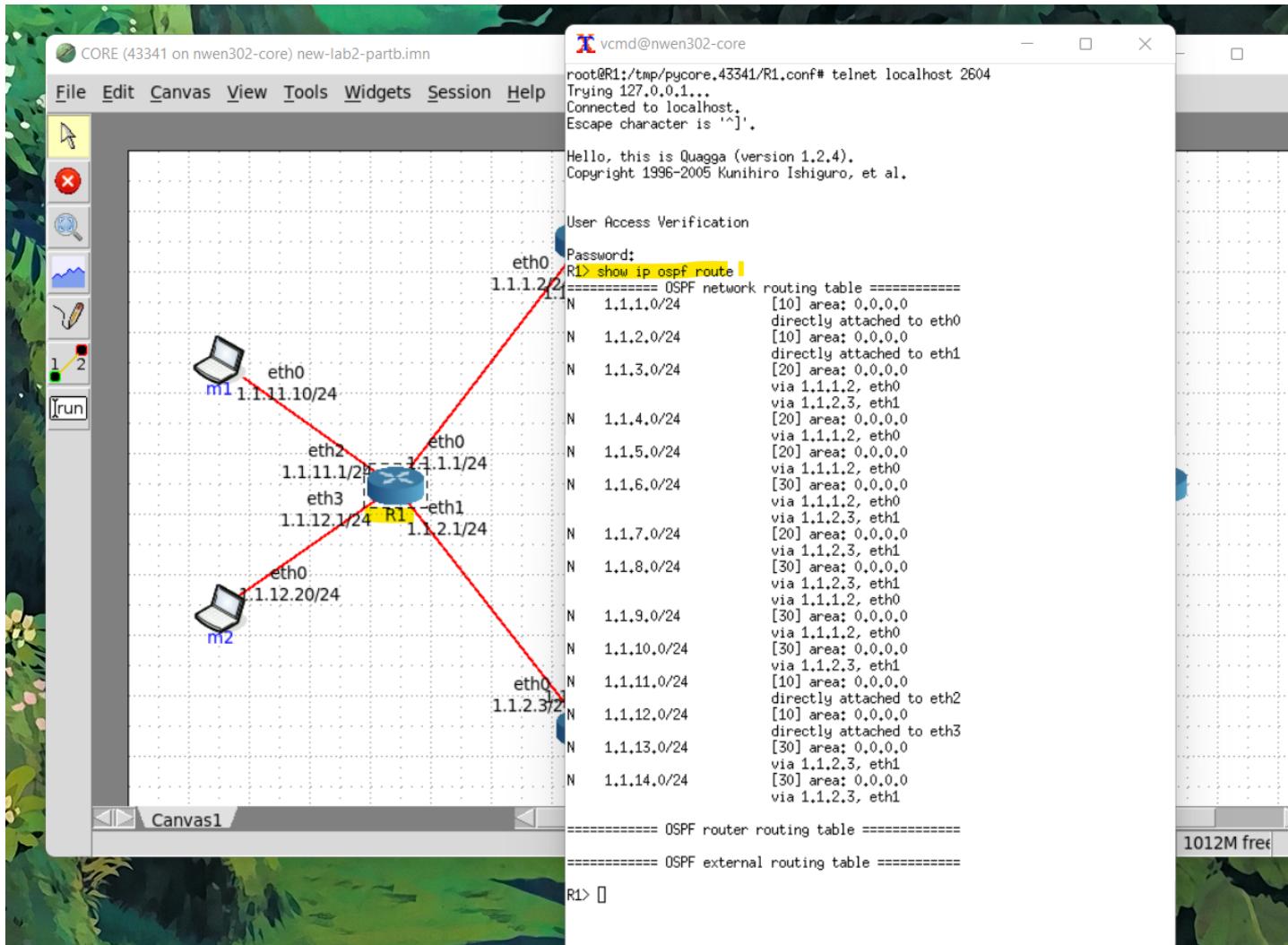
Task 1

Include at least one version of this routing table in your report.

- After connecting to the telnet localhost 2604 on router 1 the routing table on router 2 looks as so;



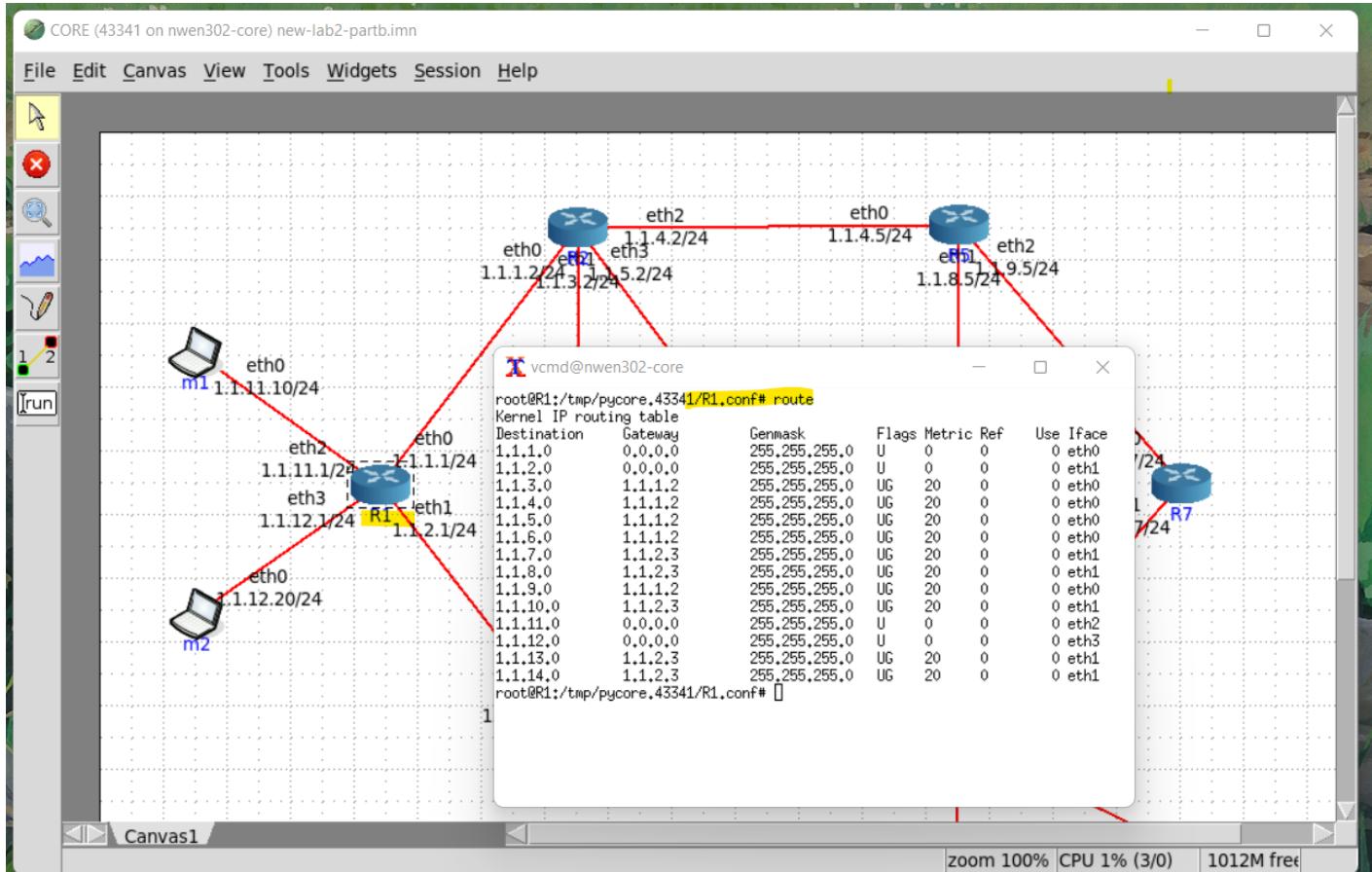
- The OSPF routing table on router 1;



Task 2

Disconnect from the OSPF process on one of the routers and run the route command at the unix prompt. Describe how the Unix routing table has changed.

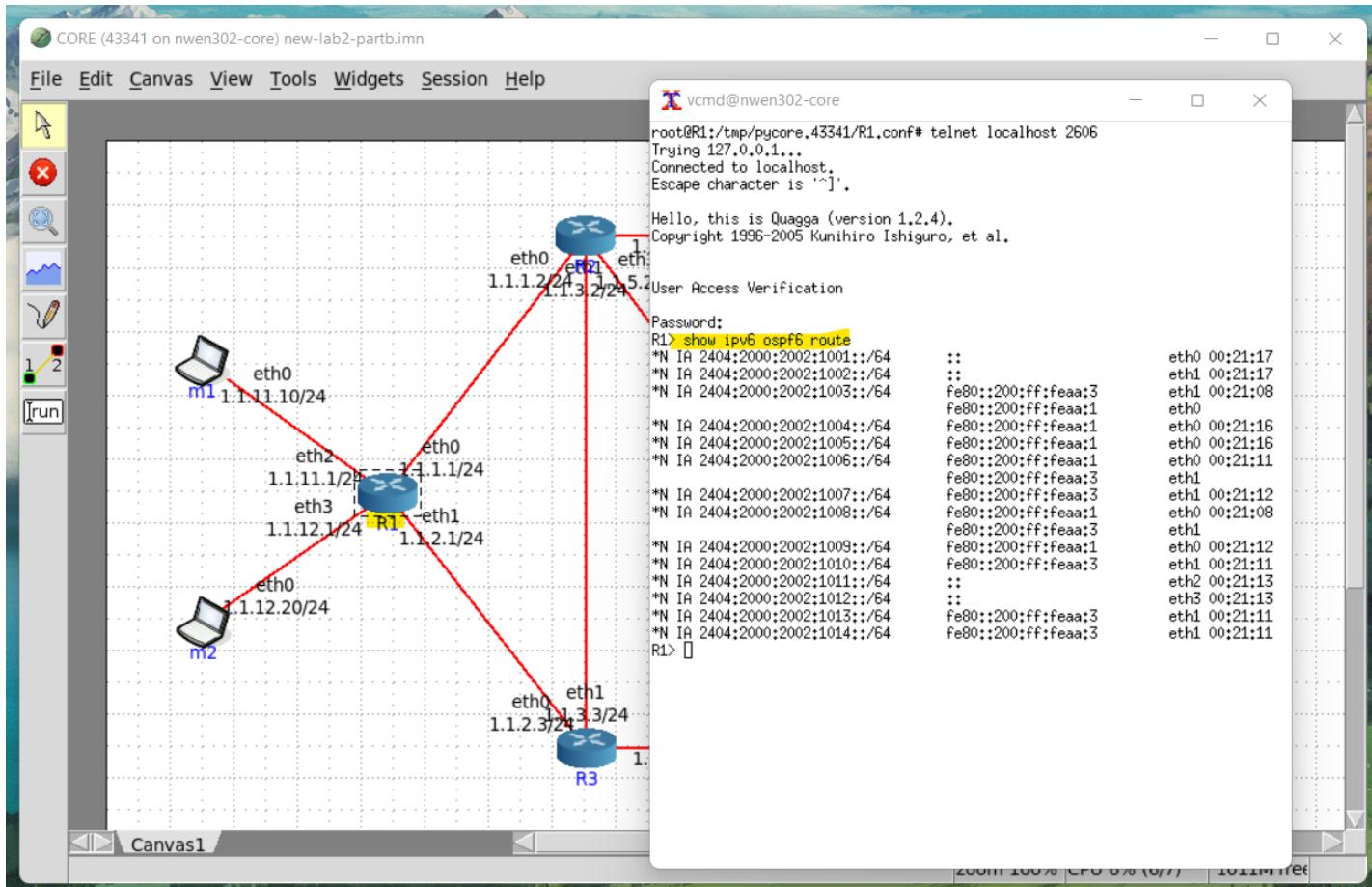
- Routing table has updated with new entries after executing the OSPF route command



Task 3

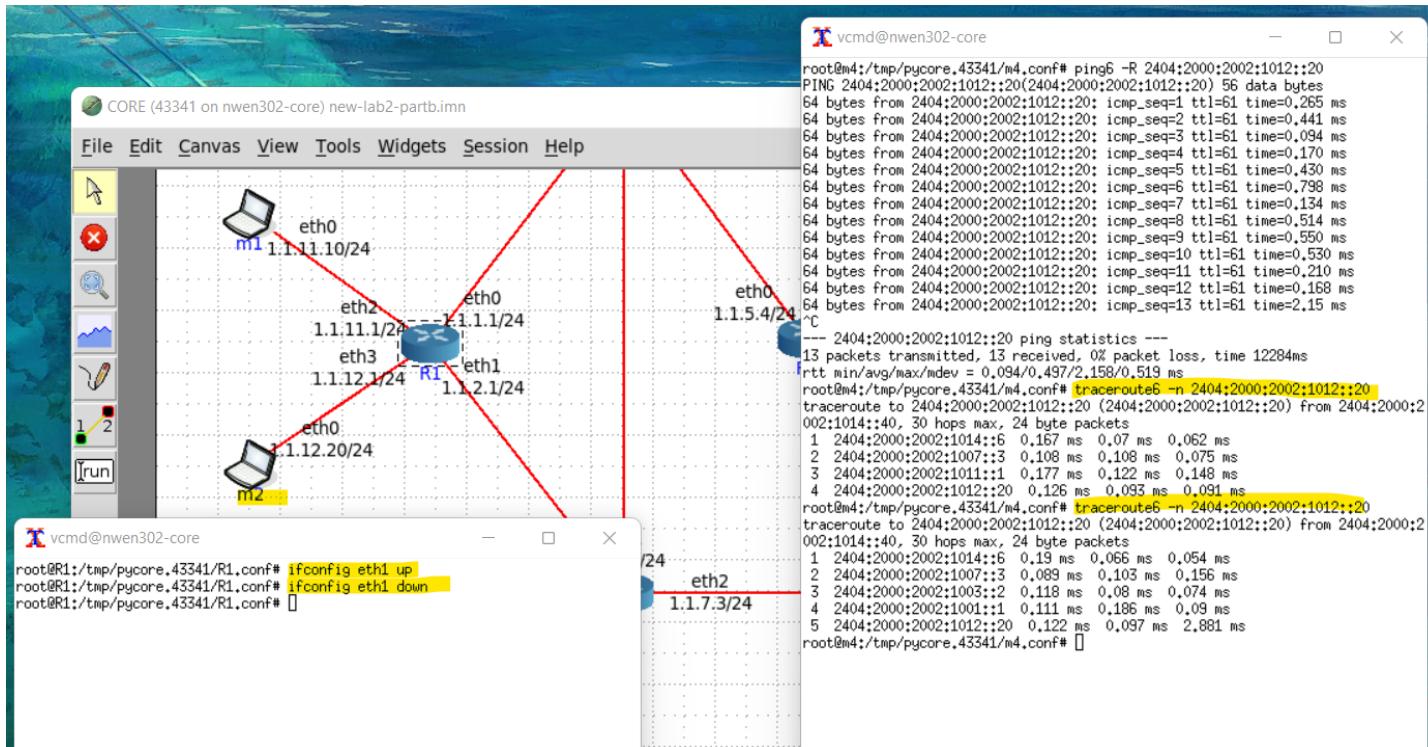
Record the OSPFv3 (IPv6) routing table in your report.-

- The OSPF IPv6 routing table;



Task 4

Test your IPv6 network using the aforementioned tools and record the results of your tests



Task 5

Record the debugging output from the experiment with disconnecting c2

- Debug output seen below: (a few pages- with parts in between where I disconnected and reconnected eth1)

```
vcmd@nwen302-core
```

```
N 1.1.14.0/24      [20] area: 0.0.0.0
via 1.1.7.6, eth2

===== OSPF router routing table =====

===== OSPF external routing table =====

R3> enable
Password:
R3# terminal monitor
R3# debug ospf lsa
R3# 2022/09/28 09:20:45 OSPF: LSA[Refresh]:ospf_lsa_refresh_walker(): start
2022/09/28 09:20:45 OSPF: LSA[Refresh]: ospf_lsa_refresh_walker(): next index 36
2022/09/28 09:20:45 OSPF: LSA[Refresh]: ospf_lsa_refresh_walker(): refresh index
35
2022/09/28 09:20:45 OSPF: LSA[Refresh]: ospf_lsa_refresh_walker(): end
2022/09/28 09:20:55 OSPF: LSA[Refresh]:ospf_lsa_refresh_walker(): start
2022/09/28 09:20:55 OSPF: LSA[Refresh]: ospf_lsa_refresh_walker(): next index 37
2022/09/28 09:20:55 OSPF: LSA[Refresh]: ospf_lsa_refresh_walker(): refresh index
36
2022/09/28 09:20:55 OSPF: LSA[Refresh]: ospf_lsa_refresh_walker(): end
2022/09/28 09:21:05 OSPF: LSA[Refresh]:ospf_lsa_refresh_walker(): start
2022/09/28 09:21:05 OSPF: LSA[Refresh]: ospf_lsa_refresh_walker(): next index 38
2022/09/28 09:21:05 OSPF: LSA[Refresh]: ospf_lsa_refresh_walker(): refresh index
37
2022/09/28 09:21:05 OSPF: LSA[Refresh]: ospf_lsa_refresh_walker(): end
2022/09/28 09:21:12 OSPF: RXmtL(0)++, NBR(1.1.1.1), LSA[Type1,id(1.1.1.1),ar(1.1
.1.1)]
2022/09/28 09:21:12 OSPF: Skip this neighbor: inbr == onbr
2022/09/28 09:21:12 OSPF: RXmtL(0)++, NBR(1.1.6.6), LSA[Type1,id(1.1.1.1),ar(1.1
.1.1)]
2022/09/28 09:21:12 OSPF: LSA: freed 0x55f2ab4b5800
2022/09/28 09:21:12 OSPF: LSA[Type1:id(1.1.1.1)]: data freed 0x55f2ab4b63b0
2022/09/28 09:21:12 OSPF: SPF: Scheduled in 0 msec
2022/09/28 09:21:12 OSPF: LSA[Type1,id(1.1.1.1),ar(1.1.1.1)]: Install router-LSA
to Area 0.0.0.0
2022/09/28 09:21:13 OSPF: RXmtL(1)--, NBR(1.1.6.6), LSA[Type1,id(1.1.1.1),ar(1.1
.1.1)]
2022/09/28 09:21:13 OSPF: LSA: freed 0x55f2ab4b7330
2022/09/28 09:21:13 OSPF: SPF Processing Time(usecs): External Routes: 3

2022/09/28 09:21:15 OSPF: LSA[Refresh]:ospf_lsa_refresh_walker(): start
2022/09/28 09:21:15 OSPF: LSA[Refresh]: ospf_lsa_refresh_walker(): next index 39
2022/09/28 09:21:15 OSPF: LSA[Refresh]: ospf_lsa_refresh_walker(): refresh index
38
2022/09/28 09:21:15 OSPF: LSA[Refresh]: ospf_lsa_refresh_walker(): end
2022/09/28 09:21:19 OSPF: RXmtL(0)++, NBR(1.1.1.1), LSA[Type1,id(1.1.1.1),ar(1.1
.1.1)]
2022/09/28 09:21:19 OSPF: Skip this neighbor: inbr == onbr
2022/09/28 09:21:19 OSPF: RXmtL(0)++, NBR(1.1.6.6), LSA[Type1,id(1.1.1.1),ar(1.1
.1.1)]
2022/09/28 09:21:19 OSPF: LSA: freed 0x55f2ab4b7ba0
2022/09/28 09:21:19 OSPF: LSA[Type1:id(1.1.1.1)]: data freed 0x55f2ab4b2e10
2022/09/28 09:21:19 OSPF: LSA[Type1,id(1.1.1.1),ar(1.1.1.1)]: Install router-LSA
to Area 0.0.0.0
2022/09/28 09:21:19 OSPF: RXmtL(1)--, NBR(1.1.6.6), LSA[Type1,id(1.1.1.1),ar(1.1
.1.1)]
```

X vcmd@nwen302-core

```
2022/09/28 09:21:19 OSPF: RXmtL(1)--, NBR(1.1.6.6), LSA[Type1,id(1.1.1.1),ar(1.1.1.1)]
2022/09/28 09:21:20 OSPF: LSA: freed 0x55f2ab4b7ba0
2022/09/28 09:21:20 OSPF: LSA[Type1:1.1.1.1]: data freed 0x55f2ab4b10d0
2022/09/28 09:21:21 OSPF: DR-Election[1st]: Backup 0.0.0.0
2022/09/28 09:21:21 OSPF: DR-Election[1st]: DR 1.1.2.3
2022/09/28 09:21:21 OSPF: nsm_change_state(1.1.1.1, Full -> Init): scheduling new router-LSA origination
2022/09/28 09:21:21 OSPF: LSA[Type1]: Create router-LSA instance
2022/09/28 09:21:21 OSPF: LSA[Type1]: Interface eth0 has no DR. Adding stub interface
2022/09/28 09:21:21 OSPF: LSA[Type1]: Interface eth1 has a DR. Adding transit interface
2022/09/28 09:21:21 OSPF: LSA[Type1]: Interface eth2 has a DR. Adding transit interface
2022/09/28 09:21:21 OSPF: LSA: freed 0x55f2ab4b1a30
2022/09/28 09:21:21 OSPF: LSA[Type1:1.1.2.3]: data freed 0x55f2ab4ae4a0
2022/09/28 09:21:21 OSPF: LSA[Refresh]: lsa 1.1.2.3 with age 0 added to index 215
2022/09/28 09:21:21 OSPF: LSA[Refresh:1.1.2.3]: ospf_refresher_register_lsa(): setting refresh_list on lsa 0x55f2ab4b7ba0 (slod 215)
2022/09/28 09:21:21 OSPF: SPF: Scheduled in 0 msec
2022/09/28 09:21:21 OSPF: LSA[Type1,id(1.1.2.3),ar(1.1.2.3)]: Install router-LSA to Area 0.0.0.0
2022/09/28 09:21:21 OSPF: RXmtL(0)++, NBR(1.1.1.2), LSA[Type1,id(1.1.2.3),ar(1.1.2.3)]
2022/09/28 09:21:21 OSPF: RXmtL(0)++, NBR(1.1.6.6), LSA[Type1,id(1.1.2.3),ar(1.1.2.3)]
2022/09/28 09:21:21 OSPF: LSA[Type1:1.1.2.3]: router-LSA refresh
2022/09/28 09:21:21 OSPF: LSA Header
2022/09/28 09:21:21 OSPF: LS age 0
2022/09/28 09:21:21 OSPF: Options 2 (*|-|-|-|-|-|E|-)
2022/09/28 09:21:21 OSPF: LS type 1 (router-LSA)
2022/09/28 09:21:21 OSPF: Link State ID 1.1.2.3
2022/09/28 09:21:21 OSPF: Advertising Router 1.1.2.3
2022/09/28 09:21:21 OSPF: LS sequence number 0x8000000d
2022/09/28 09:21:21 OSPF: LS checksum 0xc00d
2022/09/28 09:21:21 OSPF: length 60
2022/09/28 09:21:21 OSPF: RXmtL(1)++, NBR(1.1.1.2), LSA[Type2,id(1.1.2.3),ar(1.1.2.3)]
2022/09/28 09:21:21 OSPF: RXmtL(1)++, NBR(1.1.6.6), LSA[Type2,id(1.1.2.3),ar(1.1.2.3)]
2022/09/28 09:21:21 OSPF: LSA[Type2,id(1.1.2.3),ar(1.1.2.3)]: MaxAge LSA remover scheduled.
2022/09/28 09:21:21 OSPF: RXmtL(1)--, NBR(1.1.1.1), LSA[Type1,id(1.1.1.1),ar(1.1.1.1)]
2022/09/28 09:21:21 OSPF: Skip this neighbor: inbr == nbr
2022/09/28 09:21:21 OSPF: RXmtL(2)++, NBR(1.1.6.6), LSA[Type1,id(1.1.1.1),ar(1.1.1.1)]
2022/09/28 09:21:21 OSPF: LSA: freed 0x55f2ab4b7230
2022/09/28 09:21:21 OSPF: LSA[Type1:1.1.1.1]: data freed 0x55f2ab4b20d0
2022/09/28 09:21:21 OSPF: SPF: Scheduled in 35 msec
2022/09/28 09:21:21 OSPF: LSA[Type1,id(1.1.1.1),ar(1.1.1.1)]: Install router-LSA to Area 0.0.0.0
2022/09/28 09:21:21 OSPF: RXmtL(3)--, NBR(1.1.6.6), LSA[Type1,id(1.1.1.1),ar(1.1.1.1)]
```

X vcmd@nwen302-core

```
.2.3)]
2022/09/28 09:21:22 OSPF: LSA: freed 0x55f2ab4b75b0
2022/09/28 09:21:22 OSPF: RXmtL(2)--, NBR(1.1.6.6), LSA[Type1,id(1.1.2.3),ar(1.1
.2.3)]
2022/09/28 09:21:22 OSPF: LSA: freed 0x55f2ab4b75b0
2022/09/28 09:21:22 OSPF: RXmtL(1)--, NBR(1.1.6.6), LSA[Type2,id(1.1.2.3),ar(1.1
.2.3)]
2022/09/28 09:21:22 OSPF: LSA: freed 0x55f2ab4b75b0
2022/09/28 09:21:22 OSPF: LSA: freed 0x55f2ab4b4000
2022/09/28 09:21:22 OSPF: LSA[Type1:1.1.1.1]: data freed 0x55f2ab4b05b0
2022/09/28 09:21:22 OSPF: SPF Processing Time(usecs): External Routes: 9

2022/09/28 09:21:25 OSPF: LSA[Refresh]:ospf_lsa_refresh_walker(): start
2022/09/28 09:21:25 OSPF: LSA[Refresh]: ospf_lsa_refresh_walker(): next index 40
2022/09/28 09:21:25 OSPF: LSA[Refresh]: ospf_lsa_refresh_walker(): refresh index
39
2022/09/28 09:21:25 OSPF: LSA[Refresh]: ospf_lsa_refresh_walker(): end
2022/09/28 09:21:25 OSPF: DR-Election[1st]: Backup 1.1.2.1
2022/09/28 09:21:25 OSPF: DR-Election[1st]: DR 1.1.2.3
2022/09/28 09:21:25 OSPF: Packet[DD]: Neighbor 1.1.1.1: Initial DBD from Slave,
ignoring.
2022/09/28 09:21:25 OSPF: Skip this neighbor: inbr == onbr
2022/09/28 09:21:25 OSPF: RXmtL(0)++, NBR(1.1.6.6), LSA[Type1,id(1.1.1.1),ar(1.1
.1.1)]
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4b3a50
2022/09/28 09:21:25 OSPF: LSA[Type1:1.1.1.1]: data freed 0x55f2ab4b3fb0
2022/09/28 09:21:25 OSPF: LSA[Type1,id(1.1.1.1),ar(1.1.1.1)]: Install router-LSA
to Area 0.0.0.0
2022/09/28 09:21:25 OSPF: RXmtL(1)--, NBR(1.1.6.6), LSA[Type1,id(1.1.1.1),ar(1.1
.1.1)]
2022/09/28 09:21:25 OSPF: Packet[DD]: Neighbor 1.1.1.1 Negotiation done (Master)
+
2022/09/28 09:21:25 OSPF: RXmtL(0)++, NBR(1.1.1.1), LSA[Type2,id(1.1.2.3),ar(1.1
.2.3)]
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4b3a30
2022/09/28 09:21:25 OSPF: LSA[Type1:1.1.1.1]: data freed 0x55f2ab421ad0
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4b3a30
2022/09/28 09:21:25 OSPF: LSA[Type1:1.1.1.2]: data freed 0x55f2ab421ad0
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4b3a30
2022/09/28 09:21:25 OSPF: LSA[Type1:1.1.2.3]: data freed 0x55f2ab421ad0
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4b3a30
2022/09/28 09:21:25 OSPF: LSA[Type1:1.1.4.5]: data freed 0x55f2ab421ad0
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4b3a30
2022/09/28 09:21:25 OSPF: LSA[Type1:1.1.5.4]: data freed 0x55f2ab421ad0
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4b3a30
2022/09/28 09:21:25 OSPF: LSA[Type1:1.1.6.6]: data freed 0x55f2ab421ad0
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4b3a30
2022/09/28 09:21:25 OSPF: LSA[Type1:1.1.9.7]: data freed 0x55f2ab421ad0
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4b3a30
2022/09/28 09:21:25 OSPF: LSA[Type1:1.1.11.10]: data freed 0x55f2ab421ad0
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4b3a30
2022/09/28 09:21:25 OSPF: LSA[Type1:1.1.12.20]: data freed 0x55f2ab421ad0
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4b3a30
2022/09/28 09:21:25 OSPF: LSA[Type1:1.1.13.30]: data freed 0x55f2ab421ad0
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4b3a30
2022/09/28 09:21:25 OSPF: LSA[Type1:1.1.14.40]: data freed 0x55f2ab421ad0
```



vcmd@nwen302-core

```
2022/09/28 09:21:25 OSPF: LSA[Type1:1.1.1.1]: data freed 0x55f2ab421ad0
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4b3a30
2022/09/28 09:21:25 OSPF: LSA[Type1:1.1.1.2]: data freed 0x55f2ab421ad0
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4b3a30
2022/09/28 09:21:25 OSPF: LSA[Type1:1.1.2.3]: data freed 0x55f2ab421ad0
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4b3a30
2022/09/28 09:21:25 OSPF: LSA[Type1:1.1.4.5]: data freed 0x55f2ab421ad0
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4b3a30
2022/09/28 09:21:25 OSPF: LSA[Type1:1.1.5.4]: data freed 0x55f2ab421ad0
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4b3a30
2022/09/28 09:21:25 OSPF: LSA[Type1:1.1.6.6]: data freed 0x55f2ab421ad0
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4b3a30
2022/09/28 09:21:25 OSPF: LSA[Type1:1.1.9.7]: data freed 0x55f2ab421ad0
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4b3a30
2022/09/28 09:21:25 OSPF: LSA[Type1:1.1.11.10]: data freed 0x55f2ab421ad0
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4b3a30
2022/09/28 09:21:25 OSPF: LSA[Type1:1.1.12.20]: data freed 0x55f2ab421ad0
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4b3a30
2022/09/28 09:21:25 OSPF: LSA[Type1:1.1.13.30]: data freed 0x55f2ab421ad0
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4b3a30
2022/09/28 09:21:25 OSPF: LSA[Type1:1.1.14.40]: data freed 0x55f2ab421ad0
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4b3a30
2022/09/28 09:21:25 OSPF: LSA[Type2:1.1.1.2]: data freed 0x55f2ab421ad0
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4b3a30
2022/09/28 09:21:25 OSPF: LSA[Type2:1.1.3.3]: data freed 0x55f2ab421ad0
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4b3a30
2022/09/28 09:21:25 OSPF: LSA[Type2:1.1.4.5]: data freed 0x55f2ab421ad0
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4b3a30
2022/09/28 09:21:25 OSPF: LSA[Type2:1.1.5.4]: data freed 0x55f2ab421ad0
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4b3a30
2022/09/28 09:21:25 OSPF: LSA[Type2:1.1.6.6]: data freed 0x55f2ab421ad0
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4b3a30
2022/09/28 09:21:25 OSPF: LSA[Type2:1.1.7.6]: data freed 0x55f2ab421ad0
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4b3a30
2022/09/28 09:21:25 OSPF: LSA[Type2:1.1.8.6]: data freed 0x55f2ab421ad0
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4b3a30
2022/09/28 09:21:25 OSPF: LSA[Type2:1.1.9.7]: data freed 0x55f2ab421ad0
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4b3a30
2022/09/28 09:21:25 OSPF: LSA[Type2:1.1.10.7]: data freed 0x55f2ab421ad0
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4b3a30
2022/09/28 09:21:25 OSPF: LSA[Type2:1.1.11.10]: data freed 0x55f2ab421ad0
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4b3a30
2022/09/28 09:21:25 OSPF: LSA[Type2:1.1.12.20]: data freed 0x55f2ab421ad0
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4b3a30
2022/09/28 09:21:25 OSPF: LSA[Type2:1.1.13.30]: data freed 0x55f2ab421ad0
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4b3a30
2022/09/28 09:21:25 OSPF: LSA[Type2:1.1.14.40]: data freed 0x55f2ab421ad0
2022/09/28 09:21:25 OSPF: nsm_change_state(1.1.1.1, Exchange -> Full): scheduling new router-LSA origination
2022/09/28 09:21:25 OSPF: LSA[Type1]: Create router-LSA instance
2022/09/28 09:21:25 OSPF: LSA[Type1]: Interface eth0 has a DR. Adding transit interface
2022/09/28 09:21:25 OSPF: LSA[Type1]: Interface eth1 has a DR. Adding transit interface
2022/09/28 09:21:25 OSPF: LSA[Type1]: Interface eth2 has a DR. Adding transit interface
```



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```
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4b3a30
2022/09/28 09:21:25 OSPF: LSA[Type2:1.1.14.40]: data freed 0x55f2ab421ad0
2022/09/28 09:21:25 OSPF: nsm_change_state(1.1.1.1, Exchange -> Full): scheduling new router-LSA origination
2022/09/28 09:21:25 OSPF: LSA[Type1]: Create router-LSA instance
2022/09/28 09:21:25 OSPF: LSA[Type1]: Interface eth0 has a DR. Adding transit interface
2022/09/28 09:21:25 OSPF: LSA[Type1]: Interface eth1 has a DR. Adding transit interface
2022/09/28 09:21:25 OSPF: LSA[Type1]: Interface eth2 has a DR. Adding transit interface
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4b7ba0
2022/09/28 09:21:25 OSPF: LSA[Type1:1.1.2.3]: data freed 0x55f2ab4b2e10
2022/09/28 09:21:25 OSPF: LSA[Refresh]: lsa 1.1.2.3 with age 0 added to index 214
2022/09/28 09:21:25 OSPF: LSA[Refresh:1.1.2.3]: ospf_refresher_register_lsa(): setting refresh_list on lsa 0x55f2ab4b5800 (slod 214)
2022/09/28 09:21:25 OSPF: SPF: Scheduled in 0 msec
2022/09/28 09:21:25 OSPF: LSA[Type1,id(1.1.2.3),ar(1.1.2.3)]: Install router-LSA to Area 0.0.0.0
2022/09/28 09:21:25 OSPF: RXmtL(1)++, NBR(1.1.1.1), LSA[Type1,id(1.1.2.3),ar(1.1.2.3)]
2022/09/28 09:21:25 OSPF: RXmtL(0)++, NBR(1.1.1.2), LSA[Type1,id(1.1.2.3),ar(1.1.2.3)]
2022/09/28 09:21:25 OSPF: RXmtL(0)++, NBR(1.1.6.6), LSA[Type1,id(1.1.2.3),ar(1.1.2.3)]
4 2022/09/28 09:21:25 OSPF: LSA[Type1:1.1.2.3]: router-LSA refresh
2022/09/28 09:21:25 OSPF:   LSA Header
2022/09/28 09:21:25 OSPF:     LS age 0
2022/09/28 09:21:25 OSPF:     Options 2 (*|-|-|-|-|-|E|-)
2022/09/28 09:21:25 OSPF:     LS type 1 (router-LSA)
2022/09/28 09:21:25 OSPF:     Link State ID 1.1.2.3
2022/09/28 09:21:25 OSPF:     Advertising Router 1.1.2.3
2022/09/28 09:21:25 OSPF:     LS sequence number 0x8000000e
2022/09/28 09:21:25 OSPF:     LS checksum 0x299a
2022/09/28 09:21:25 OSPF:     length 60
2022/09/28 09:21:25 OSPF: LSA[Type2]: Create network-LSA instance
2022/09/28 09:21:25 OSPF: RXmtL(2)--, NBR(1.1.1.1), LSA[Type2,id(1.1.2.3),ar(1.1.2.3)]
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4b2760
2022/09/28 09:21:25 OSPF: LSA[Type2:1.1.2.3]: data freed 0x55f2ab4b34b0
2022/09/28 09:21:25 OSPF: LSA[Refresh]: lsa 1.1.2.3 with age 0 added to index 220
2022/09/28 09:21:25 OSPF: LSA[Refresh:1.1.2.3]: ospf_refresher_register_lsa(): setting refresh_list on lsa 0x55f2ab4b2df0 (slod 220)
2022/09/28 09:21:25 OSPF: LSA[Type2,id(1.1.2.3),ar(1.1.2.3)]: Install network-LSA to Area 0.0.0.0
2022/09/28 09:21:25 OSPF: RXmtL(1)++, NBR(1.1.1.1), LSA[Type2,id(1.1.2.3),ar(1.1.2.3)]
2022/09/28 09:21:25 OSPF: RXmtL(1)++, NBR(1.1.1.2), LSA[Type2,id(1.1.2.3),ar(1.1.2.3)]
2022/09/28 09:21:25 OSPF: RXmtL(1)++, NBR(1.1.6.6), LSA[Type2,id(1.1.2.3),ar(1.1.2.3)]
2022/09/28 09:21:25 OSPF: LSA[Type2:1.1.2.3]: Originate network-LSA 0x55f2ab4b2d f0
2022/09/28 09:21:25 OSPF:   LSA Header
```



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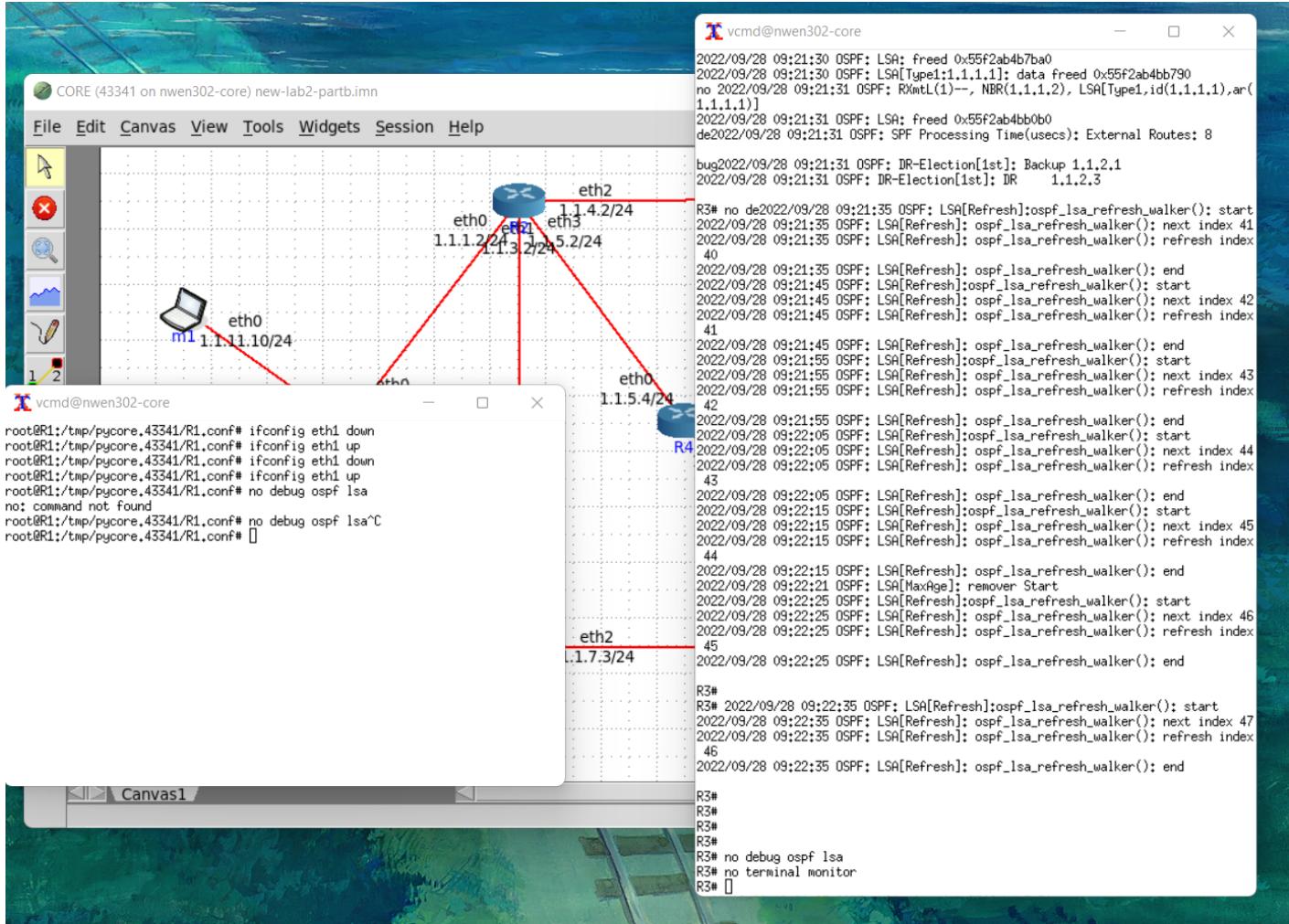
```
2022/09/28 09:21:25 OSPF: LSA Header
2022/09/28 09:21:25 OSPF: LS age 0
2022/09/28 09:21:25 OSPF: Options 2 (*I-I-I-I-I-EI-)
2022/09/28 09:21:25 OSPF: LS type 2 (network-LSA)
2022/09/28 09:21:25 OSPF: Link State ID 1.1.2.3
2022/09/28 09:21:25 OSPF: Advertising Router 1.1.2.3
2022/09/28 09:21:25 OSPF: LS sequence number 0x80000003
2022/09/28 09:21:25 OSPF: LS checksum 0x7cc2
2022/09/28 09:21:25 OSPF: length 32
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4b8870
2022/09/28 09:21:25 OSPF: LSA[Type1:1.1.1.1]: data freed 0x55f2ab4b93a0
2022/09/28 09:21:25 OSPF: RXmtL(2)--, NBR(1.1.1.2), LSA[Type1,id(1.1.2.3),ar(1.1
.2.3)]
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4b8870
2022/09/28 09:21:25 OSPF: LSA[Type1:1.1.2.3]: data freed 0x55f2ab4b93a0
2022/09/28 09:21:25 OSPF: RXmtL(1)--, NBR(1.1.1.2), LSA[Type2,id(1.1.2.3),ar(1.1
.2.3)]
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4baf30
2022/09/28 09:21:25 OSPF: LSA[Type2:1.1.2.3]: data freed 0x55f2ab4b1ec0
2022/09/28 09:21:25 OSPF: LSA: freed 0x55f2ab4b1a30
2022/09/28 09:21:25 OSPF: LSA[Type1:1.1.1.1]: data freed 0x55f2ab4b05b0
2022/09/28 09:21:26 OSPF: RXmtL(2)--, NBR(1.1.6.6), LSA[Type1,id(1.1.2.3),ar(1.1
.2.3)]
2022/09/28 09:21:26 OSPF: LSA: freed 0x55f2ab4b7ba0
2022/09/28 09:21:26 OSPF: RXmtL(1)--, NBR(1.1.6.6), LSA[Type2,id(1.1.2.3),ar(1.1
.2.3)]
2022/09/28 09:21:26 OSPF: LSA: freed 0x55f2ab4b7ba0
2022/09/28 09:21:26 OSPF: LSA: freed 0x55f2ab4b7ba0
2022/09/28 09:21:26 OSPF: LSA: freed 0x55f2ab4b7ba0
2022/09/28 09:21:26 OSPF: RXmtL(2)--, NBR(1.1.1.1), LSA[Type1,id(1.1.2.3),ar(1.1
.2.3)]
2022/09/28 09:21:26 OSPF: LSA: freed 0x55f2ab4b7ba0
2022/09/28 09:21:26 OSPF: RXmtL(1)--, NBR(1.1.1.1), LSA[Type2,id(1.1.2.3),ar(1.1
.2.3)]
2022/09/28 09:21:26 OSPF: LSA: freed 0x55f2ab4b7ba0
2022/09/28 09:21:26 OSPF: SPF Processing Time(usecs): External Routes: 4
```

```
R3# 2022/09/28 09:21:30 OSPF: Skip this neighbor: inbr == onbr
2022/09/28 09:21:30 OSPF: RXmtL(0)++, NBR(1.1.1.2), LSA[Type1,id(1.1.1.1),ar(1.1
.1.1)]
2022/09/28 09:21:30 OSPF: RXmtL(0)++, NBR(1.1.6.6), LSA[Type1,id(1.1.1.1),ar(1.1
.1.1)]
2022/09/28 09:21:30 OSPF: LSA: freed 0x55f2ab4b2900
2022/09/28 09:21:30 OSPF: LSA[Type1:1.1.1.1]: data freed 0x55f2ab4b63b0
2022/09/28 09:21:30 OSPF: SPF: Scheduled in 0 msec
2022/09/28 09:21:30 OSPF: LSA[Type1,id(1.1.1.1),ar(1.1.1.1)]: Install router-LSA
to Area 0.0.0.0
2022/09/28 09:21:30 OSPF: LSA[Type2:1.1.2.1]: Lookup by header, NO MATCH
2022/09/28 09:21:30 OSPF: Link State Update[Type2,id(1.1.2.1),ar(1.1.1.1)]: LS a
ge is equal to MaxAge.
2022/09/28 09:21:30 OSPF: LSA: freed 0x55f2ab4b7ba0
2022/09/28 09:21:30 OSPF: LSA[Type2:1.1.2.1]: data freed 0x55f2ab4b5c20
2022/09/28 09:21:30 OSPF: RXmtL(1)--, NBR(1.1.6.6), LSA[Type1,id(1.1.1.1),ar(1.1
.1.1)]
2022/09/28 09:21:30 OSPF: LSA: freed 0x55f2ab4b7ba0
```

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```
.1.1)]
2022/09/28 09:21:30 OSPF: RXmtL(0)++, NBR(1.1.6.6), LSA[Type1,id(1.1.1.1),ar(1.1.1.1)]
2022/09/28 09:21:30 OSPF: LSA: freed 0x55f2ab4b2900
2022/09/28 09:21:30 OSPF: LSA[Type1:1.1.1.1]: data freed 0x55f2ab4b63b0
2022/09/28 09:21:30 OSPF: SPF: Scheduled in 0 msec
2022/09/28 09:21:30 OSPF: LSA[Type1,id(1.1.1.1),ar(1.1.1.1)]: Install router-LSA
to Area 0.0.0.0
2022/09/28 09:21:30 OSPF: LSA[Type2:1.1.2.1]: Lookup by header, NO MATCH
2022/09/28 09:21:30 OSPF: Link State Update[Type2,id(1.1.2.1),ar(1.1.1.1)]: LS age is equal to MaxAge.
2022/09/28 09:21:30 OSPF: LSA: freed 0x55f2ab4b7ba0
2022/09/28 09:21:30 OSPF: LSA[Type2:1.1.2.1]: data freed 0x55f2ab4b5c20
2022/09/28 09:21:30 OSPF: RXmtL(1)--, NBR(1.1.6.6), LSA[Type1,id(1.1.1.1),ar(1.1.1.1)]
2022/09/28 09:21:30 OSPF: LSA: freed 0x55f2ab4b7ba0
2022/09/28 09:21:30 OSPF: LSA[Type1:1.1.1.1]: data freed 0x55f2ab4bb790
no 2022/09/28 09:21:31 OSPF: RXmtL(1)--, NBR(1.1.1.2), LSA[Type1,id(1.1.1.1),ar(1.1.1.1)]
2022/09/28 09:21:31 OSPF: LSA: freed 0x55f2ab4bb0b0
de2022/09/28 09:21:31 OSPF: SPF Processing Time(usecs): External Routes: 8
bug2022/09/28 09:21:31 OSPF: DR-Election[1st]: Backup 1.1.2.1
2022/09/28 09:21:31 OSPF: DR-Election[1st]: DR 1.1.2.3

R3# no de2022/09/28 09:21:35 OSPF: LSA[Refresh]:ospf_lsa_refresh_walker(): start
4 2022/09/28 09:21:35 OSPF: LSA[Refresh]: ospf_lsa_refresh_walker(): next index 41
2022/09/28 09:21:35 OSPF: LSA[Refresh]: ospf_lsa_refresh_walker(): refresh index
40
2022/09/28 09:21:35 OSPF: LSA[Refresh]: ospf_lsa_refresh_walker(): end
2022/09/28 09:21:45 OSPF: LSA[Refresh]:ospf_lsa_refresh_walker(): start
2022/09/28 09:21:45 OSPF: LSA[Refresh]: ospf_lsa_refresh_walker(): next index 42
2022/09/28 09:21:45 OSPF: LSA[Refresh]: ospf_lsa_refresh_walker(): refresh index
41
2022/09/28 09:21:45 OSPF: LSA[Refresh]: ospf_lsa_refresh_walker(): end
2022/09/28 09:21:55 OSPF: LSA[Refresh]:ospf_lsa_refresh_walker(): start
2022/09/28 09:21:55 OSPF: LSA[Refresh]: ospf_lsa_refresh_walker(): next index 43
2022/09/28 09:21:55 OSPF: LSA[Refresh]: ospf_lsa_refresh_walker(): refresh index
42
2022/09/28 09:21:55 OSPF: LSA[Refresh]: ospf_lsa_refresh_walker(): end
2022/09/28 09:22:05 OSPF: LSA[Refresh]:ospf_lsa_refresh_walker(): start
2022/09/28 09:22:05 OSPF: LSA[Refresh]: ospf_lsa_refresh_walker(): next index 44
2022/09/28 09:22:05 OSPF: LSA[Refresh]: ospf_lsa_refresh_walker(): refresh index
43
2022/09/28 09:22:05 OSPF: LSA[Refresh]: ospf_lsa_refresh_walker(): end
2022/09/28 09:22:15 OSPF: LSA[Refresh]:ospf_lsa_refresh_walker(): start
2022/09/28 09:22:15 OSPF: LSA[Refresh]: ospf_lsa_refresh_walker(): next index 45
2022/09/28 09:22:15 OSPF: LSA[Refresh]: ospf_lsa_refresh_walker(): refresh index
44
2022/09/28 09:22:15 OSPF: LSA[Refresh]: ospf_lsa_refresh_walker(): end
2022/09/28 09:22:21 OSPF: LSA[MaxAge]: remover Start
2022/09/28 09:22:25 OSPF: LSA[Refresh]:ospf_lsa_refresh_walker(): start
2022/09/28 09:22:25 OSPF: LSA[Refresh]: ospf_lsa_refresh_walker(): next index 46
2022/09/28 09:22:25 OSPF: LSA[Refresh]: ospf_lsa_refresh_walker(): refresh index
45
2022/09/28 09:22:25 OSPF: LSA[Refresh]: ospf_lsa_refresh_walker(): end
```



Conclusions

I felt I was successful in completing the OSPFv2 and OSPFv3 routing associations but struggled with implementing the Zebra routing paths with my own link associations. As the OSPF services implement the correct routing information to the zebra it's process was automatic with the correct necessary paths. Next time I would ensure I am able to do my own Zebra routing paths before moving forward so I am able to sufficiently do it manually before relying on other tools.