Using Manual IPv6 Tunnels
(Optional – Not to be graded)

Equipments – Same as in the Preliminary Lab.
Each reservation is for a 2-hour period. (This is a relatively simple lab and a 2-hour period should be more than enough)

The Assignment:

The complete assignment follows this page. From the experience in the previous labs you should be able make reservations and access the devices. Note that the assignment may not state every step (such as using *enable* to get into the privileged mode and *configure terminal* to get into the configuration mode. You should be able to figure that out from the handouts on Cisco configurations). It's a good idea to read through the assignment first and have a good understanding before attempting the lab. Have fun!

Deliverables (No need to submit but this is what I would ask for if this is to be graded):

- For steps include screen shots or outputs which demonstrate you have completed the step.
- When you are done with all the configurations, do a "show run" for each router and copy them into a text file.
- Please put all the above in a single file, or in separate files and submit a zip file.

Support:

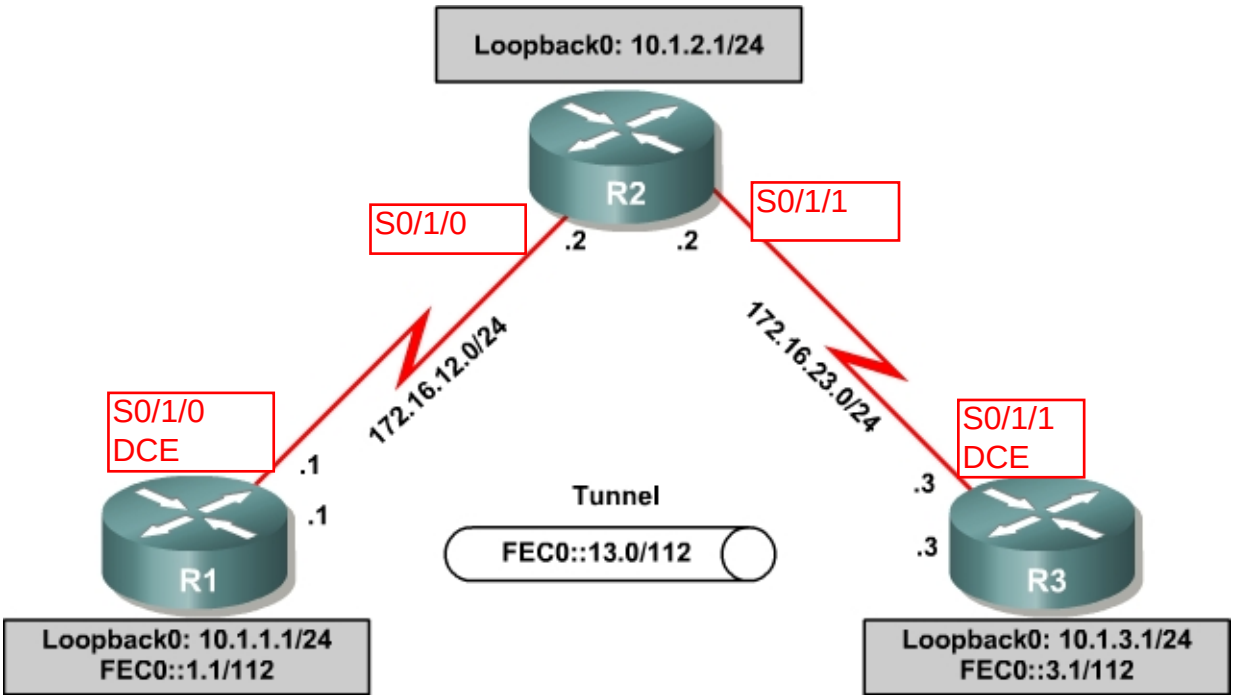
- Useful information can be found under the Lab Resources link on http://lanlab.cdm.depaul.edu)
- If you encounter problems with the DLPods, please check the following pages first: FAQs and Lab Documentation, as they provide guidelines for fixing some common problems.
- If a problem still cannot be solved after consulting the aforementioned pages, email an error report to lanlab@cdm.depaul.edu and cc me, achung@cdm.depaul.edu **Please clearly indicate the course (TDC 563) and lab number in the subject line.** Responses normally given during lab hours. Lab assistants will be available if you work in the lab.
- **Lab hours are: 12-10pm M-F, 12-6pm Sa and Su. You may work on the DL Pods any time, but lab assistants are only available during the lab hours.**

Lab 8-2 Using Manual IPv6 Tunnels (Modified from Cisco Manual)

Learning Objectives

- Configure EIGRP for IPv4
- Create a manual IPv6 tunnel
- Configure OSPFv3

Topology Diagram



Scenario

For this lab, you will configure EIGRP for full connectivity between all IPv4 subnets. Then you will create a manual IPv6 tunnel and run OSPFv3 over it.

Step 1: Lab Preparation

Start this lab by clearing out your configurations and reloading your routers. Once your routers are reloaded, set up the appropriate hostnames.

Step 2: Configure Loopbacks and Physical Interfaces

Configure the loopback interfaces with IPv4 addresses and IPv6 addresses where appropriate. Also configure the serial interfaces with the IPv4 addresses

shown in the diagram. Set the clockrates on the appropriate interfaces and issue **no shutdown** on all serial connections. Verify that you have local subnet connectivity with **ping**.

```
R1(config)# interface loopback0
R1(config-if)# ip address 10.1.1.1 255.255.255.0
R1(config-if)# ipv6 address FEC0::1:1/112
R1(config-if)# interface serial0/1/0
R1(config-if)# ip address 172.16.12.1 255.255.255.0
R1(config-if)# clockrate 64000
R1(config-if)# no shutdown

R2(config)# interface loopback0
R2(config-if)# ip address 10.1.2.1 255.255.255.0
R2(config-if)# interface serial0/1/0
R2(config-if)# ip address 172.16.12.2 255.255.255.0
R2(config-if)# no shutdown
R2(config-if)# interface serial0/1/1
R2(config-if)# ip address 172.16.23.2 255.255.255.0
R2(config-if)# no shutdown

R3(config)# interface loopback0
R3(config-if)# ip address 10.1.3.1 255.255.255.0
R3(config-if)# ipv6 address FEC0::3:1/112
R3(config-if)# interface serial0/1/1
R3(config-if)# ip address 172.16.23.3 255.255.255.0
R3(config-if)# clockrate 64000
R3(config-if)# no shutdown
```

Step 3: Configure EIGRP

Configure EIGRP for AS 1 for the major networks 172.16.0.0 and 10.0.0.0 on all three routers. Make sure you disable auto-summarization. You should have full IPv4 connectivity after this.

```
R1(config)# router eigrp 1
R1(config-router)# no auto-summary
R1(config-router)# network 10.0.0.0
R1(config-router)# network 172.16.0.0

R2(config)# router eigrp 1
R2(config-router)# no auto-summary
R2(config-router)# network 10.0.0.0
R2(config-router)# network 172.16.0.0

R3(config)# router eigrp 1
R3(config-router)# no auto-summary
R3(config-router)# network 10.0.0.0
R3(config-router)# network 172.16.0.0
```

Step 4: Configure a Manual IPv6 Tunnel

A tunnel is a logical interface that acts as a logical connection between two endpoints. It is similar to a loopback interface in that there is no corresponding physical interface, but it is different in that there is more than one router involved. An IPv6 manual tunnel is a type of tunnel that has hard-coded source and destination addresses, with an IPv6 address on the tunnel itself. To

configure a manual IPv6 tunnel, first issue the **interface tunnel** *number* command. For simplicity, use tunnel number 0 on both routers.

Next configure the tunnel mode for a manual tunnel with the **tunnel mode ipv6ip** command. Then configure an IPv6 address with the **ipv6 address** *address/mask* command. Finally, assign source and destination addresses for the tunnel using the **tunnel source** *address* and **tunnel destination** *address* commands. You can also specify the source by interface.

```
R1(config)# int tunnel0
R1(config-if)# tunnel mode ipv6ip
R1(config-if)# tunnel source s0/1/0
R1(config-if)# tunnel destination 172.16.23.3
R1(config-if)# ipv6 add FEC0::13:1/112

R3(config)# int tunnel0
R3(config-if)# tunnel mode ipv6ip
R3(config-if)# tunnel source s0/1/1
R3(config-if)# tunnel destination 172.16.12.1
R3(config-if)# ipv6 add FEC0::13:3/112
```

Verify that you can ping across the tunnel to the other side.

```
R1#ping FEC0::13:3

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to FEC0::13:3, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 64/66/68 ms

R3#ping FEC0::13:1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to FEC0::13:1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 64/66/68 ms
```

Step 5: Configure OSPFv3 over a Tunnel

Enable IPv6 routing with the **ipv6 unicast-routing** command on R1 and R3. Configure OSPFv3 on those routers to run over the tunnel and advertise the loopback interfaces into OSPFv3. Verify the configuration using the **show ipv6 ospf neighbor** command and verifying that you can ping the remote loopback interfaces.

```
R1(config)# ipv6 unicast-routing
R1(config)# interface loopback0
R1(config-if)# ipv6 ospf 1 area 0
R1(config-if)# interface tunnel0
R1(config-if)# ipv6 ospf 1 area 0

R3(config)# ipv6 unicast-routing
R3(config)# interface loopback0
R3(config-if)# ipv6 ospf 1 area 0
R3(config-if)# interface tunnel0
R3(config-if)# ipv6 ospf 1 area 0
```



```
R1#show ipv6 ospf neighbor

Neighbor ID     Pri   State           Dead Time   Interface ID    Interface
10.1.3.1          1   FULL/  -        00:00:37    18              Tunnel0

R3#show ipv6 ospf neighbor

Neighbor ID     Pri   State           Dead Time   Interface ID    Interface
10.1.1.1          1   FULL/  -        00:00:39    21              Tunnel0


R1#ping FEC0::3:1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to FEC0::3:1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 64/64/68 ms

R3#ping FEC0::1:1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to FEC0::1:1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 64/66/68 ms
```

