Configure Static IPv6 Routing

Introduction

In this lab, you will build this network as shown in the following topology. Configure IP settings, IP host table, passwords and Telnet services on each router. You will then configure static routing on all routers to reach each LAN not directly connected to the specific router you are configuring. Finally, you will verify your static routing configuration using a variety of show commands and testing end-to-end connectivity.

## Objective(s)

In this lab the student will:

- Implement routing protocols for correct data forwarding across a communication network environment
- Configure and test static routes

Equipment/Supplies Needed

If working in a physical environment:
- 3 Cisco 2911 Routers
- 3 Cisco Switches
- 3 Lab workstations (may be VPCs)

- Your Computer workstation
- Cisco Packet Tracer
- Configure Static IPv6 Routing.pkt

Topology
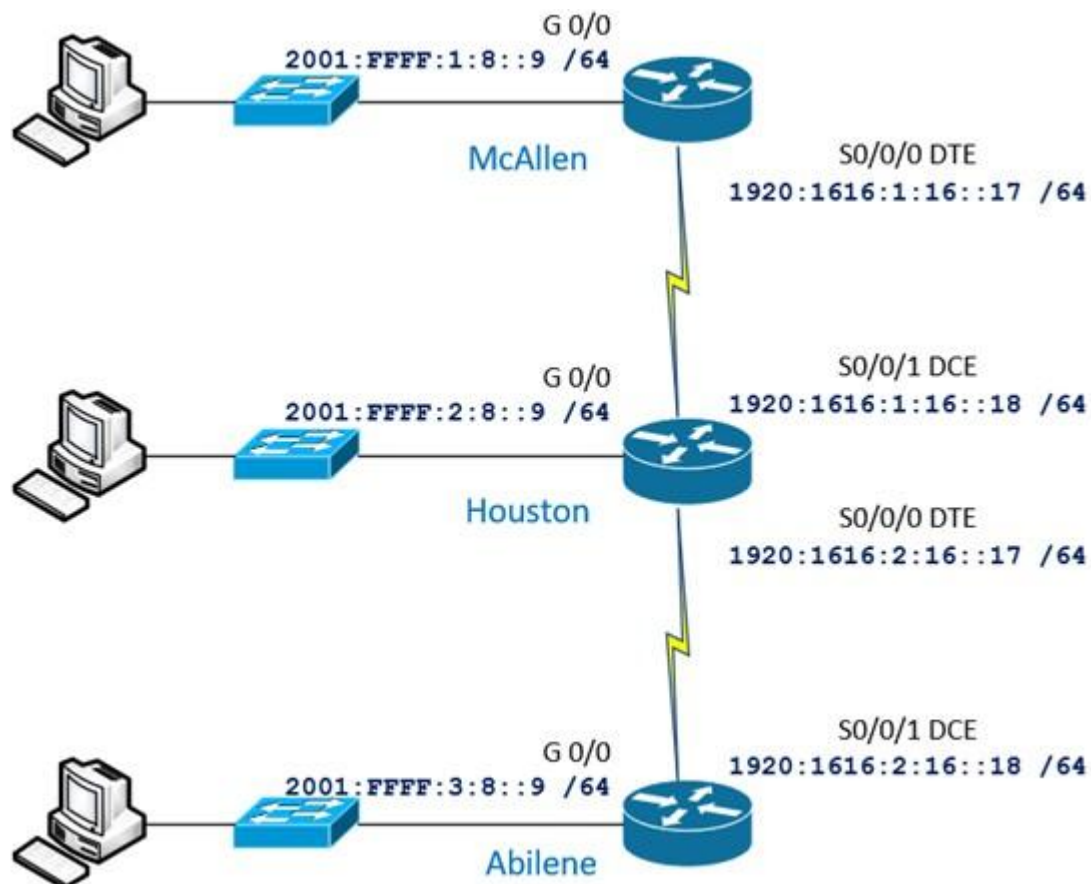
Addressing Table

Device	Interface	IPv6 Address	Default Gateway
McAllen	G0/0	2001:FFFF:1:8::9/64	n/a
	S0/0/0	1920:1616:1:16::17/64	n/a
	Link-local	FE80::1 (All interfaces on McAllen Router)	n/a
Houston	G0/0	2001:FFFF:2:8::9/64	n/a
	S0/0/1	1920:1616:1:16::18/64	n/a

	S0/0/0	1920:1616:2:16::17/64	n/a
	Link-local	FE80::2 (All interfaces on Houston Router)	n/a
Abilene	G0/0	2001:FFFF:3:8::9/64	n/a
	S0/0/1	1920:1616:2:16::18/64	n/a
	Link-local	FE80::3 (All interfaces on Abilene Router)	n/a
PC-A	NIC	2001:FFFF:1:8::3/64	FE80::1
PC-B	NIC	2001:FFFF:2:8::3/64	FE80::2
PC-C	NIC	2001:FFFF:3:8::3/64	FE80::3

Procedure

Perform the steps in this lab in the order they are presented to you. Answer all questions and record the requested information in a file.

Part 1: Set up Network Configuration

1. Use the CLI to set up initial configuration on the city's routers as shown in the figure above.
2. Set your privileged EXEC mode password to **security** (this password is not encrypted!)
3. Configure your router to allow login to telnet sessions on all 5 telnet lines. Set the telnet password to **cyber**.

Part 2: Configure Static Routing

Create static routes to all networks shown in the diagram above, so there is full connectivity between all sites. There is no need to enter a route to a directly-connected interface because the router has an interface in that network.

Note: Cisco routers do not have IPv6 routing enabled by default. Enable IPv6 routing on a Cisco router using the **ipv6 unicast-routing** global configuration command. This

Example: The below example shows how to configure a static route on Router B to reach Network 2001:1600:ACAD:10::1/64 (RouterD's interface) on the other side of Router C.
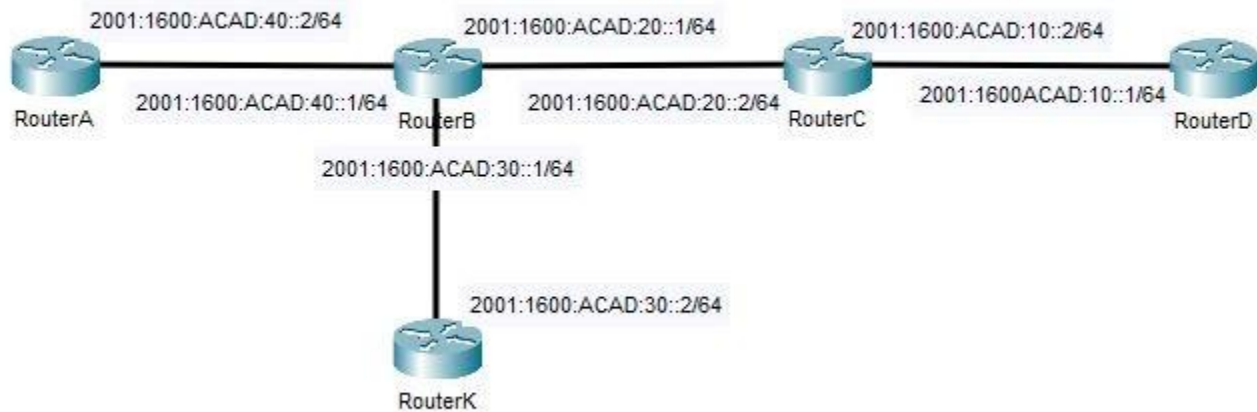
RouterB(config)#ipv6 route 2001:1600:ACAD:10::/64 2001:1600:ACAD:20::2

Destination   Subnet Mask   Next Hop Address

Note: Static routes are unidirectional. So, in order to have full connectivity, a static route on Router D is required in order to reach RouterB to complete the connection.

Part 3: Troubleshoot and Verify Network Routes

Step 1: Enter show ipv6 route to confirm the routes you have entered.

Step 2: Create an ipv6 host lookup table for each PC on each router, so that you may ping to that PC by city name.

For example, (in global configuration)"linking" RouterD in above example in RouterA's configuration.

RouterA#ipv6 host RouterD 2001:1600:ACAD:10::1

<<TIP: In your host lookup table, you may name the city something shorter than its actual name to save keystrokes. Just remember what city the short name stands for!>>

Step 3: Test connectivity to all other cities in the internetwork using ping and traceroute to the host name. Try to telnet into another city by name. Do not make any configuration changes to other city routers.

Step 4: Troubleshoot any connectivity issues with neighboring cities. Use the show ipv6 route command to verify routed networks.

Once all routers can reach all networks, **record the routing table using the show ipv6 route command.**

```
Abilene#show ipv6 route
IPv6 Routing Table - 8 entries
Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
       U - Per-user Static route, M - MIPv6
       I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary
       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
       D - EIGRP, EX - EIGRP external
S    1920:1616:1:16::/64 [1/0]
      via 1920:1616:2:16::17
C    1920:1616:2:16::/64 [0/0]
      via Serial0/0/1, directly connected
L    1920:1616:2:16::18/128 [0/0]
      via Serial0/0/1, receive
S    2001:FFFF:1:8::/64 [1/0]
      via 1920:1616:2:16::17
S    2001:FFFF:2:8::/64 [1/0]
      via 1920:1616:2:16::17
C    2001:FFFF:3:8::/64 [0/0]
      via GigabitEthernet0/0, directly connected
L    2001:FFFF:3:8::9/128 [0/0]
      via GigabitEthernet0/0, receive
L    FF00::/8 [0/0]
      via Null0, receive
Abilene#
Abilene#show host
Default Domain is not set
Name/address lookup uses domain service
Name servers are 255.255.255.255

Codes: UN - unknown, EX - expired, OK - OK, ?? - revalidate
       temp - temporary, perm - permanent
       NA - Not Applicable None - Not defined

Host                      Port  Flags      Age Type  Address(es)
Mc                        None  (perm, OK)  0   IPV6   2001:FFFF:1:8::9
ab                        None  (perm, OK)  0   IPV6   2001:FFFF:3:8::9
hou          .            None  (perm, OK)  0   IPV6   2001:FFFF:2:8::9
```

```
Houston#show ipv6 route
IPv6 Routing Table - 9 entries
Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
       U - Per-user Static route, M - MIPv6
       I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary
       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
       D - EIGRP, EX - EIGRP external
C   1920:1616:1:16::/64 [0/0]
     via Serial0/0/1, directly connected
L   1920:1616:1:16::18/128 [0/0]
     via Serial0/0/1, receive
C   1920:1616:2:16::/64 [0/0]
     via Serial0/0/0, directly connected
L   1920:1616:2:16::17/128 [0/0]
     via Serial0/0/0, receive
S   2001:FFFF:1:8::/64 [1/0]
     via 1920:1616:1:16::17
C   2001:FFFF:2:8::/64 [0/0]
     via GigabitEthernet0/0, directly connected
L   2001:FFFF:2:8::9/128 [0/0]
     via GigabitEthernet0/0, receive
S   2001:FFFF:3:8::/64 [1/0]
     via 1920:1616:2:16::18
L   FF00::/8 [0/0]
     via Null0, receive
Houston#
Houston#show host
Default Domain is not set
Name/address lookup uses domain service
Name servers are 255.255.255.255

Codes: UN - unknown, EX - expired, OK - OK, ?? - revalidate
       temp - temporary, perm - permanent
       NA - Not Applicable None - Not defined

Host                     Port  Flags      Age Type  Address(es)
Mc                       None  (perm, OK)  0   IPV6   2001:FFFF:1:8::9
ab                       None  (perm, OK)  0   IPV6   2001:FFFF:3:8::9
hou                      None  (perm, OK)  0   IPV6   2001:FFFF:2:8::9
```

```
McAllen#show ipv6 route
IPv6 Routing Table - 8 entries
Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
       U - Per-user Static route, M - MIPv6
       I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary
       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
       D - EIGRP, EX - EIGRP external
C   1920:1616:1:16::/64 [0/0]
     via Serial0/0/0, directly connected
L   1920:1616:1:16::17/128 [0/0]
     via Serial0/0/0, receive
S   1920:1616:2:16::/64 [1/0]
     via 1920:1616:1:16::18
C   2001:FFFF:1:8::/64 [0/0]
     via GigabitEthernet0/0, directly connected
L   2001:FFFF:1:8::9/128 [0/0]
     via GigabitEthernet0/0, receive
S   2001:FFFF:2:8::/64 [1/0]
     via 1920:1616:1:16::18
S   2001:FFFF:3:8::/64 [1/0]
     via 1920:1616:1:16::18
L   FF00::/8 [0/0]
     via Null0, receive
McAllen#
McAllen#show host
Default Domain is not set
Name/address lookup uses domain service
Name servers are 255.255.255.255

Codes: UN - unknown, EX - expired, OK - OK, ?? - revalidate
       temp - temporary, perm - permanent
       NA - Not Applicable None - Not defined

Host                    Port  Flags      Age Type   Address(es)
Mc                      None  (perm, OK)  0  IPV6   2001:FFFF:1:8::9
ab                      None  (perm, OK)  0  IPV6   2001:FFFF:3:8::9
hou                     None  (perm, OK)  0  IPV6   2001:FFFF:2:8::9
```

Answer the following question and submit answer to your instructor:

What can be determined from the line of "show ipv6 route" output shown below?

R 10.10.10.8 [120/2] via 10.10.10.6, 00:00:25, Serial0/1

choose two:

1. The ip address 10.10.10.8 is configured on S0/1

2. The 10.10.10.8 network is 2 hops away from this router

3. The next routing update can be expected in 35 seconds

4. This route is using the default administrative distance

==5. The ip address 10.10.10.6 is configured on S0/1==

Submit Your Work:

Submit all text files, screenshots, or answers to questions to your instructor Using the most appropriate method below.

<u>Packet Tracer</u>:

Submit Packet Tracer file as well as your text file with your findings and notes.

Commands to Note:

Ipv6 route show ipv6
route show ipv6
interfaces brief show ipv6
protocols
Ping Traceroute show
controllers <interface> clock
rate 64000 write terminal
ip host <hostname> <ip addr>
Ctrl + Shift + 6 (release) x
show sessions

Rubric

<u>Concerns</u> Working Towards Proficiency	<u>Criteria</u> Standards for This Competency	<u>Accomplished</u> Evidence of Mastering Competency
	Criteria #1: Basic router configs (20 pts)	Configure basic router configs needed for all 3 routers. Passwords and ip addressing (20 pts)

	Criteria #2: Configure static routes needed for all 3 routers to have full connectivity between all networks. (50 pts)	Configure static routes needed for all 3 routers to have full connectivity between all remote networks. (50 pts)
	Criteria #3: Created host lookup table (10 pts)	Create an ipv6 host lookup table on each router so that you may ping to that city by name. (10 pts)
	Criteria #4: Test connectivity between all remote networks using ping. (10 pts)	Test connectivity between all remote networks using ping. (10 pts)
	Criteria #5: Document and submit routing tables of each router and running configs. (10 pts)	Document and submit routing tables of each router, and their running configs using notepad and/or screenshots. (10 pts)