6DISS

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Router Configuration #2

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Laboratory Exercise: *IPv6 Router's configuration #2*

Objectives

In this laboratory exercise you will complete the following tasks:

- *Visualize some information regarding IPv6*
- *Configure IPv6 static routes*

Visual Objective

The following figure shows the configuration of the current laboratory:

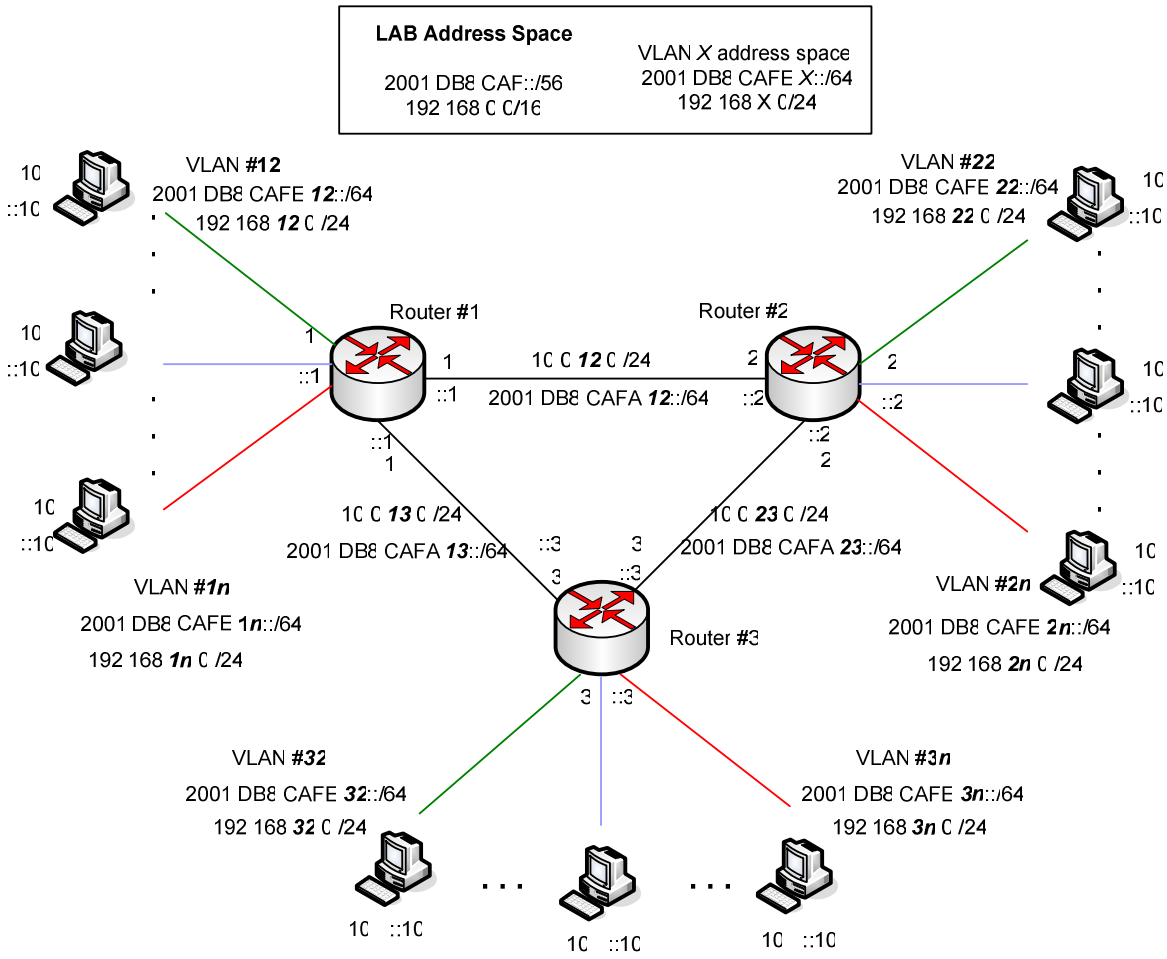

Figure 1: Scenario Topology

Setup/Scenario

This scenario is very similar to the previous scenarios (Router configuration #1 and Host configuration). In this case, the 3 Cisco routers are connected to each other using the layer 3 Fast Ethernet Interfaces as shown in the following tables:

Router 1:

Interface	Addresses	Connects to:
FastEthernet **0**	10.0.***12***.1 /24 2001:DB8:CAFA:***12***::1 /64	Router 2 (fe 0)
FastEthernet **1**	10.0.***13***.1 /24 2001:DB8:CAFA:***13***::1 /64	Router 3 (fe 0)

Table 1: Router 1 interfaces

Router 2:

Interface	Addresses	Connects to:
FastEthernet **0**	10.0.***12***.2 /24 2001:DB8:CAFA:***12***::2 /64	Router 1 (fe 0)
FastEthernet **1**	10.0.***23***.2 /24 2001:DB8:CAFA:***23***::2 /64	Router 3 (fe 1)

Table 2: Route 2 interfaces

Router 3:

Interface	Addresses	Connects to:
FastEthernet **0**	10.0.***13***.3 /24 2001:DB8:CAFA:***13***::3 /64	Router 1 (fe 1)
FastEthernet **1**	10.0.***23***.3 /24 2001:DB8:CAFA:***23***::3 /64	Router 2 (fe 1)

Table 3: Router 3 interfaces

If you didn't unplug the Ethernet cable from the router (or if you unplugged it and then connected to your previous port) you should be on the same VLAN as in the previous scenarios and your addresses should be the same.

*You can always check your IPv4 address using the command line. The third octet will be your group's number and also the VLAN number you will be using for this exercise. You can see that the VLAN = (router_number * 10) + port_number.*

Check if your router is configured according to the previous tables. If it isn't please call one of the trainers.

*Your IPv4 address is assigned by DHCPv4. Verify your PC's IPv6 address. Check if you have one manually configured address on the correct VLAN and with the host part equal to ::10. I.e. with the following format: 2001:DB8:CAFE:**vlan_number**::**10***

If you don't have one, please configure it. This is very IMPORTANT !!!

*Through the scenario we are going to use the term **twin hosts**. We'll use this term when we are referring to hosts on an equal PORT number, but on a different router.* E.g. these 3 hosts are twin hosts:

2001:DB8:CAFE:***12***::10 (Router **1**, PORT **2** -> VLAN ***12***)

2001:DB8:CAFE:***22***::10 (Router **2**, PORT **2** -> VLAN ***22***)

2001:DB8:CAFE:***32***::10 (Router **3**, PORT **2** -> VLAN ***32***)

In the following table, **on each row**, you can visualize some more examples of twin hosts:

Twin Hosts		
2001:DB8:CAFE:***12***::10 192.168.***12***.10	2001:DB8:CAFE:***22***::10 192.168.***22***.10	2001:DB8:CAFE:***32***::10 192.168.***32***.10

2001:DB8:CAFE:***13***::10 192.168.***13***.10	2001:DB8:CAFE:***23***::10 192.168.***23***.10	2001:DB8:CAFE:***33***::10 192.168.***33***.10
…	…	…
2001:DB8:CAFE:***17***::10 192.168.***17***.10	2001:DB8:CAFE:***27***::10 192.168.***27***.10	2001:DB8:CAFE:***37***::10 192.168.***37***.10
2001:DB8:CAFE:***18***::10 192.168.***18***.10	2001:DB8:CAFE:***28***::10 192.168.***28***.10	2001:DB8:CAFE:***38***::10 192.168.***38***.10

Table 4: twin hosts – example

One final note, the IPv4 routes are already configured so you should be able to ping, via IPv4, any address in the scenario. But the IPv6 routes aren't configured.

Task 1: *Visualize some IPv6 related information*

On this task you'll be asked to gather some information related to IPv6 in your router.

Complete the following exercise's steps

Step 1: IPv6 neighbours

- On the router, check your IPv6 neighbours. (**Tip:** `Router`***`X`***`# show ipv6 …`)
- Check if the IP of your PC appears there and in the correct VLAN.
  - Can you describe the meaning of the several addresses?
  - Can you see the other router's address?

Step 2: Using the CEF (Cisco Express Forwarding) feature

- Activate the CEFv6 on your router (**Tip:** `Router`***`X`***`# ipv6 cef`)

(`See appendix A for more information regarding CEF feature`).

- Check the CEFv6 table and compare it with the IPv6 neighbor table. (**Tip:** `Router`***`X`***`# show ipv6 cef`).

Task 2: *Creating IPv6 static routes*

On this task you'll be asked to create IPv6 static routes.

Complete the following exercise's steps:

Step 1: Check connectivity to your twin hosts

- From your host, use the **`ping`** command to check if you have IPv4 connectivity with your twin hosts. Did you complete the test successfully?
- Now check it with the correspondent IPv6 addresses. Did you obtain different results on IPv4 and IPv6? Did you get a "destination network unreachable" error? Why?
- Display your router's current IPv6 routing table (**Tip**: `router`***`X`***`#` **`show ipv6 …`**)

Step 2: Add IPv6 static routes

You don't have IPv6 connectivity to twin hosts (or any other hosts behind a router different from yours) because, until now, the routers don't have the appropriated IPv6 routes configured.

Each group must configure **two** static routes in order to connect to theirs twin hosts. E.g. the group on the host 2001:DB8:CAFE:***22***::10 should configure static routes to the following networks:

- 2001:DB8:CAFE:***12***::/64
- 2001:DB8:CAFE:***32***::/64

(**Tip:** `router`*`X`*`#` **`ipv6 route`** `prefix/prefixlen next_hop`).

Display your router's current IPv6 routing table (**Tip:** Use command `router`***`X`***`#` **`show ipv6 route`**) Can you identify the network you have just inserted?

REMEMBER that you are only going to have connectivity after your twin groups configure the routes.

With the routes configured, repeat the ping tests.

Summary

After completing these exercises, you should be able to:

- *Visualize some IPv6 related information*
- *Create IPv6 static routes*

Appendix A

Task 1

Step1: Output example

```
Router2#show ipv6 neighbors
IPv6 Address                            Age Link-layer Addr State Interface
FE80::2E0:FF:FE98:802D                  87  00e0.0098.802d  STALE Vl19
2001:DB8:CAFE::2                        87  0016.c830.5fc4  STALE Fa0
2001:DB8:CAFE:19:E1CC:FCFA:6B06:121F 87  00e0.0098.802d  STALE Vl19
FE80::216:C8FF:FE30:5FC4                87  0016.c830.5fc4  STALE Fa0
2001:DB8:CAFE:19:2E0:FF:FE98:802D    90  00e0.0098.802d  STALE Vl19
```

Step2: CEF

Improving performance on the Router

Cisco routers have some features that allow increasing performance, while using less processing power. This feature is called *CEF* (Cisco Express Forwarding). This feature is vailable for both IPv4 and IPv6 forwarding. To use it for IPv6, first of all, enable IPv6 unicast routing (see Router Configuration #1). Then, you must configure *CEF* for IPv4 use:

```
ip cef
```

Now enable IPv6 *CEF*:

```
ipv6 cef
```

If you want to see the IPv6 *CEF* table, do:

```
show ipv6 cef
```

Note: The *CEF* command, as in IPv4 has more configuration options, depending on the model of the router. If the router has distributed processing, then you should also use distributed *CEF* or dCEFv6 (*ipv6 cef distributed* command). See the equipment's manual for more details.

Output example (router3)

```
Router3#sh ipv6 cef
2001:DB8:CAFA:13::1/128
     attached to FastEthernet0
2001:DB8:CAFA:13::3/128
  Receive
2001:DB8:CAFA:13::/64
     attached to FastEthernet0
2001:DB8:CAFA:23::2/128
     attached to FastEthernet1
2001:DB8:CAFA:23::3/128
```

```
  Receive
2001:DB8:CAFA:23::/64
     attached to FastEthernet1
2001:DB8:CAFE:34::3/128
  Receive
2001:DB8:CAFE:34:2A0:D1FF:FE32:80F5/128
     attached to Vlan34
2001:DB8:CAFE:34::/64
     attached to Vlan34
FE80::/10
  Receive
FF00::/8
  Receive
```

Task 2

Step1: For example, let's configure static routes between the following VLANs:

- 2001:DB8:CAFE:***18***::/64
- 2001:DB8:CAFE:***28***::/64
- 2001:DB8:CAFE:***38***::/64

On router 1:

```
Router1# configure terminal
Router1(config)# ipv6 route 2001:db8:cafe:28::0/64 2001:db8:cafa:12::2
Router1(config)# ipv6 route 2001:db8:cafe:38::0/64 2001:db8:cafa:13::3
```

On router 2:

```
Router1# configure terminal
Router1(config)# ipv6 route 2001:db8:cafe:18::0/64 2001:db8:cafa:12::1
Router1(config)# ipv6 route 2001:db8:cafe:38::0/64 2001:db8:cafa:23::3
```

On router 3:

```
Router1# configure terminal
Router1(config)# ipv6 route 2001:db8:cafe:18::0/64 2001:db8:cafa:13::1
Router1(config)# ipv6 route 2001:db8:cafe:28::0/64 2001:db8:cafa:23::2
```

To show the IPv6 routing table:

```
router2#show ipv6 route
  IPv6 Routing Table - 8 entries
  Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
         U - Per-user Static route
         I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary
         O - OSPF intra, OI - OSPF inter, OE1 - OSPF ext 1, OE2 - OSPF ext
  2
         ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
  C   2001:DB8:CAFA:12::/64 [0/0]
       via ::, FastEthernet0
```

```
L   2001:DB8:CAFA:12::2/128 [0/0]
     via ::, FastEthernet0
C   2001:DB8:CAFA:23::/64 [0/0]
     via ::, FastEthernet1
L   2001:DB8:CAFA:23::2/128 [0/0]
     via ::, FastEthernet1
S   2001:DB8:CAFE:18::/64 [1/0]
     via 2001:DB8:CAFA:12::1
S   2001:DB8:CAFE:38::/64 [1/0]
     via 2001:DB8:CAFA:23::3
L   FE80::/10 [0/0]
     via ::, Null0
L   FF00::/8 [0/0]
     via ::, Null0
```