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IPv6 Router's 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:

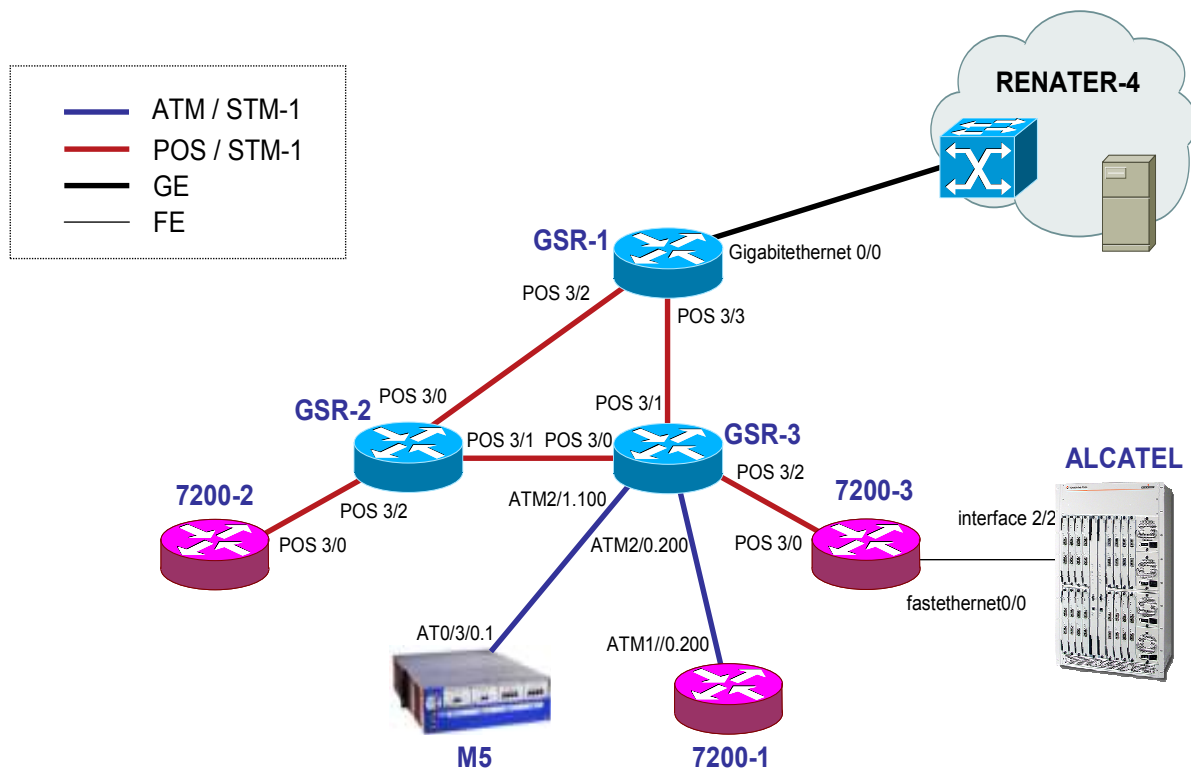


Figure 1: Scenario Topology

Setup/Scenario

In this scenario there are two Cisco GSR routers and three 7200 that you will use. The routers are connected by ATM or POS ports to each other. At the moment the routers only have IPv4 addresses.

To connect to the router, you should use the following IPv4 addresses:

Name	How to connect
GSR-2	194.254.101.5
GSR-3	194.254.101.6
7200-1	194.254.101.12
7200-2	194.254.101.8
7200-3	194.254.101.9

Table 1 - Addresses to connect

IPv4 Configured Interconnections:

Router #1 (IPv4 address)	Router #2 (IPv4 address)	Interconnection prefix
GSR-1 (194.254.101.73)	GSR-2 (194.254.101.74)	194.254.101.72/30
GSR-1 (194.254.101.77)	GSR-3 (194.254.101.78)	194.254.101.76/30
7200-2 (194.254.101.45)	GSR-2 (194.254.101.46)	194.254.101.44/30
GSR-2 (194.254.101.49)	GSR-3 (194.254.101.50)	194.254.101.48/30
GSR-3 (194.254.101.53)	7200-3 (194.254.101.54)	194.254.101.52/30
7200-3 (194.254.101.57)	ALCATEL (194.254.101.58)	194.254.101.56/30
GSR-3 (194.254.101.65)	M5 (194.254.101.66)	194.254.101.64/30
GSR-3 (194.254.101.69)	7200-1 (194.254.101.70)	194.254.101.68/30

Table 2 - IPv4 Interconnection addresses

IPv6 interconnection addresses

Interconecions (R1 - R2)	Prefix
GSR-1 - GSR-2	2001:660:3007:8101::/64
GSR-1 - GSR-3	2001:660:3007:8102::/64
7200-2 - GSR-2	2001:660:3007:8103::/64
GSR-2 - GSR-3	2001:660:3007:8104::/64
GSR-3 - 7200-3	2001:660:3007:8105::/64
GSR-3 - 7200-1	2001:660:3007:8108::/64

Table 3 - Point-to-point addresses to use

R1 has address = prefix::1

R2 has address = prefix::2

Loopbacks (for loopback0):

Name	Loopback address
GSR-2	2001:660:3007:8005::1/64
GSR-3	2001:660:3007:8006::1/64
7200-1	2001:660:3007:8012::1/64
7200-2	2001:660:3007:8008::1/64
7200-3	2001:660:3007:8009::1/64

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: Using the CEF (Cisco Express Forwarding) feature

- Activate the CEFv6 on your router (**Tip:** RouterX# `ipv6 cef`)
(See appendix A for more information regarding CEF feature).
- Check the CEFv6 table and compare it with the IPv6 neighbor table.
(**Tip:** RouterX# `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 router, use the `ping` command to check if you have IPv6 connectivity with a remote router
- Display your router's current IPv6 routing table (**Tip:** routerX# `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.

Look at the other router's address (loopback and point-to-point). Configure their routes on your router, so that you can reach them.

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

Display your router's current IPv6 routing table (**Tip:** Use command routerX# `show ipv6 route`) Can you identify the networks 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.

Try showing the IPv6 CEF table now.

Summary

After completing these exercises, you should be able to:

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

Appendix A

Task 1

Step1: 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 available 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:

```
RouterX#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, to configure static routes:

- 2001:DB8:CAFE:18::/64 for router with IPv6 address 2001:db8:cafa:12::2
- 2001:DB8:CAFE:28::/64 for router with IPv6 address 2001:db8:cafa:13::3

Router:

```

RouterX# configure terminal
RouterX(config)# ipv6 route 2001:db8:cafe:18::0/64 2001:db8:cafa:12::2
RouterX(config)# ipv6 route 2001:db8:cafe:28::0/64 2001:db8:cafa:13::3

```

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

```


Tunnels

In the beginning of IPv6, there were IPv6 islands with some PC that wanted to connect to other ones. As there was no global IPv6 connectivity, the solution usually was to connect them using the existing IPv4 infrastructure using IPv6/IPv4 tunnels. You can still use this if you don't have native IPv6 connection.

On a Cisco router, you can create a tunnel interface and configure it accordingly. Follow the steps:

1. **interface tunnel** tunnel-number
This will initiate the tunnel's creation.
2. **tunnel source** ipv4-address
You must assign an IPv4 address to your side of the tunnel. The source address must be a router's IPv4 global address.
3. **tunnel destination** ipv4-address
Next, you must point out the other side's IPv4 address. The address must also be a global reachable IPv4 address.
4. **ipv6 address** ipv6-prefix/prefix-length
You must assign an IPv6 address to your side of the tunnel. The addresses on both sides must be in the same IPv6 address segment. Eg: one side 2001::1/64 and the other 2001::2/64
5. **tunnel mode** ipv6ip
Finally configure the tunnel mode. In this case IPv6 over IPv4

Don't forget that you'll also need to configure the routing on both sides, so that the IPv6 islands are reachable. You can use static or dynamic routing for this.