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***IPv6 Router's Configuration***

Pedro Lorga ([lorga@fccn.pt](mailto:lorga@fccn.pt))

Simon Moyal ([muyal@renater.pt](mailto:muyal@renater.pt))

Piers O'Hanlon ([p.ohanlon@cs.ucl.ac.uk](mailto:p.ohanlon@cs.ucl.ac.uk))

## **Laboratory Exercise: *IPv6 Router's configuration #1***

### **Objectives**

In this laboratory exercise you will complete the following tasks:

- *Enable and configure IPv6 on a Cisco's router interface*
- *Visualize some information regarding IPv6*
- *Configure the Router Advertisement (RA) on a Cisco's router interface*

## Visual Objective

The following figure shows the configuration of the current laboratory:

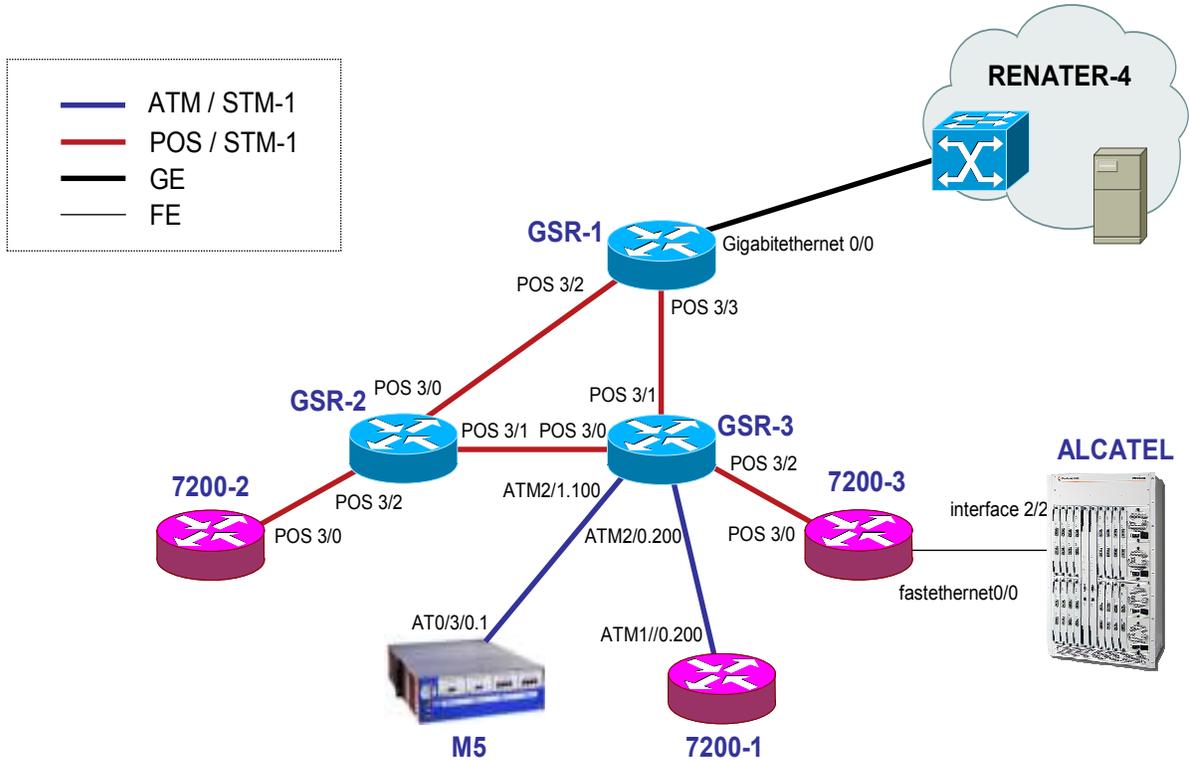


Figure 1: Scenario topology

## 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:**

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

**Table 2 - IPv4 Interconnection addresses**

## Task 1: *Enabling and configuring IPv6 on a Cisco Router*

Complete the following steps:

### Step 1: Checking IPv6 capability

Until the moment, all routers only have IPv4 addresses. Now it's time to configure IPv6 on the routers interfaces. Telnet your router using IPv4 (see Table 1).

Login: **6diss**

Password: **6diss**

After you typed the password, the prompt of the router should be like this:

```
routerX#
```

Now check the configuration to see if the lines appear:

- `ipv6 enable`
- `ipv6 unicast-routing`

(Tip: `routerX> show running-config`)

- The `ipv6 enable` command configures IPv6 link local addresses on the interface while enabling the interface for IPV6 processing. The `ipv6 unicast-routing` enables IPv6 routing on the Cisco router. If this line was not configured the router should not forward any IPv6 packets.

### Step 2: Enabling IPv6 on your interface

- Enter configuration mode (Tip: `routerX# configure terminal`)
- Enter interface configuration mode for the interface. (Tip: `routerX(config)# interface ...`)
- Enable IPv6 on that interface. (Tip: `routerX(config-if)# ipv6 enable`)

**Step 3: Configure an IPv6 address**

Now that you have enabled IPv6, you must assign it an IPv6 address, according to the following table:

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

**Table 1 - Point-to-point addresses to use**

(**Tip:** RouterX(config-if) # **ipv6 address** ipv6\_address/mask)

**Task 2: Visualize some IPv6 related information**

Complete the following exercise's steps

**Step 1: Check your IPv6 address**

Now that you have an IPv6 address on your VLAN interface, you should be able to ping it successfully. Test it.

**Task 3: Modify some parameters on Router Advertisement messages**

Complete the following exercise's steps

**Step 1: Suppress Router Advertisement messages**

On Cisco routers, after you configured an IPv6 address on an interface, the router will start sending router advertisement messages. These messages will carry a network prefix equal to the network prefix configured on the

routers' interface. If you don't want to have Router Advertisement messages on a link you can disable it on the router's interface.

- Enter on your VLAN interface configuration mode and disable the RA messages. (Tip: `routerX(config-if)# ipv6 nd suppress` or `ipv6 nd suppress-ra`).

### **Step 2: Change the time interval between Router Advertisement messages**

By default, on Cisco routers, router advertisements are sent every 200 seconds.

If you have an Ethernet switch, check the interval.

Now, change the time interval of RA messages to 30 seconds.

(Tip: `RouterX(config-if)# ipv6 nd ra-interval ...`)

## **Summary**

After completing these exercises, you should be able to:

- *Enable and configure IPv6 addresses on a Cisco's router interface*
- *Enable and Configure Router Advertisement messages*

## Appendix A

### Task 1

**Step 1:** To see the configuration of the router use the `show running-config` command.

Use the space key to go for the following page or `enter` to see the next line.

**Step 2:** Let's see an example of how to configure the interface Vlan 28

Enter configuration mode:

```
RouterX# configure terminal
RouterX(config)#
```

Enter interface configuration mode:

```
RouterX(config)# interface posX
RouterX(config-if)# ipv6 enable
```

This feature enables IPv6 link-local addresses on the interface, thus enabling IPv6 on that interface.

**Step 3:** To configure an IPv6 address on the interface do:

Then configure the IPv6 address on it:

```
RouterX(config-if)# ipv6 2001:db8:cafe:28::2/64
```

### Task 2

**Step 1:** Output example

```
RouterX# ping 2001:db8:cafe:28::2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:DB8:CAFE:34::3, timeout is
2 seconds:
!!!!!
```

**Note:** if you have a switch, you can see the IPv6 information on your vlan using the command `show ipv6 interface vlan X`

Output example:

```
switch# show ipv6 interface vlan 28

Vlan28 is up, line protocol is up
  IPv6 is enabled, link-local address is FE80::216:C8FF:FE30:5E4A
  No Virtual link-local address(es):
  Global unicast address(es):
```

```

2001:DB8:CAFE:28::2, subnet is 2001:DB8:CAFE:28::/64
Joined group address(es):
FF02::1
FF02::2
FF02::1:FF00:1
FF02::1:FF30:5E4A
MTU is 1500 bytes

```

The multicast joined groups are:

**FF02::1**

All link-local hosts.

**FF02::2**

All link-local routers.

**FF02::1:FEXX:XXXX**

Solicited-node address. A node must configure this multicast address for each of its IPv6 unicast and anycast addresses. The address is formed from the 104-bit prefix **FF02:0000:0000:0000:0000:0001:FF** concatenated with the final 24 bits of the unicast or anycast address.

Output example for a short info on IPv6 interfaces:

```

routerX# show ipv6 interface brief

FastEthernet0          [up/up]
FastEthernet1          [up/up]
... (Output omitted) ...
FastEthernet2          [up/down]
FastEthernet3          [up/up]
...
Vlan1                  [administratively down/down]
Vlan22                 [up/down]
    FE80::217:E0FF:FED6:A12
    2001:DB8:CAFE:22::2
Vlan23                 [up/up]
    FE80::217:E0FF:FED6:A12
    2001:DB8:CAFE:23::2
Vlan24                 [up/down]
    FE80::217:E0FF:FED6:A12
    2001:DB8:CAFE:24::2
Vlan25                 [up/down]
    FE80::217:E0FF:FED6:A12
    2001:DB8:CAFE:25::2
Vlan26                 [up/down]
    FE80::217:E0FF:FED6:A12
    2001:DB8:CAFE:26::2
Vlan27                 [up/down]
    FE80::217:E0FF:FED6:A12
    2001:DB8:CAFE:27::2

```

```
Vlan28                                [up/down]
FE80::217:E0FF:FED6:A12
2001:DB8:CAFE:28::2
...
```

### Task 3

#### Step 1: Disable Router Advertisement messages on the interface:

```
RouterX# configure terminal
RouterX(config)#
RouterX(config)# interface interface 28
RouterX(config-if)# ipv6 nd ra-suppress
```

#### Output example from an ethernet switch with IPv6 capabilities:

```
switch# show ipv6 interface vlan 28 command output
```

```
Router2#sh ipv6 interface vlan 28
Vlan33 is up, line protocol is up
IPv6 is enabled, link-local address is FE80::217:E0FF:FED6:A12
No Virtual link-local address(es):
Global unicast address(es):
  2001:DB8:CAFE:28::2, subnet is 2001:DB8:CAFE:28::/64
Joined group address(es):
  FF02::1
  FF02::2
  FF02::1:FF00:3
  FF02::1:FFD6:A12
MTU is 1500 bytes
ICMP error messages limited to one every 100 milliseconds
ICMP redirects are enabled
ICMP unreachable are sent
ND DAD is enabled, number of DAD attempts: 1
ND reachable time is 30000 milliseconds
Hosts use stateless autoconfig for addresses.
```

#### You can check if RA messages are disabled using:

```
switch# show running-config | beg interface VlanX

interface Vlan28
 ip address 192.168.28.2 255.255.255.0
 ipv6 address 2001:DB8:CAFE:28::2/64
 ipv6 enable
 ipv6 nd suppress-ra
```

Now let's enable Router advertisement messages on interface

```
Router2# configure terminal
Router2(config)#
Router2(config)# interface interface 28
Router2(config-if)# no ipv6 nd suppress-ra
```

Output example:

```
Router2# show ipv6 interface vlan 28

Vlan28 is up, line protocol is up
  IPv6 is enabled, link-local address is FE80::217:E0FF:FED6:A12
...
(Output omitted)
...
  ND reachable time is 30000 milliseconds
  ND advertised reachable time is 0 milliseconds
  ND advertised retransmit interval is 0 milliseconds
  ND router advertisements are sent every 200 seconds
  ND router advertisements live for 1800 seconds
  ND advertised default router preference is Medium
  Hosts use stateless autoconfig for addresses.
```

## Step 2:

Check current time interval (only on a switch)

```
Router2# show ipv6 interface vlan X

Vlan28 is up, line protocol is up
  IPv6 is enabled, link-local address is FE80::217:E0FF:FED6:A12
...
(Output omitted)
...
  ND router advertisements are sent every 200 seconds
  ND router advertisements live for 1800 seconds
  ND advertised default router preference is Medium
  Hosts use stateless autoconfig for addresses.
```

Change the time interval between Router Advertisement on the interface:

```
RouterX# configure terminal
RouterX(config)#
RouterX(config)# interface interface 28
```

```
RouterX(config-if)# ipv6 nd ra-interval 30
```

Let's check the current time interval (on an ethernet switch)

```
switch# show ipv6 interface vlan 28  
  
Vlan28 is up, line protocol is up  
IPv6 is enabled, link-local address is FE80::217:E0FF:FED6:A12  
...  
(Output omitted)  
...  
ND router advertisements are sent every 30 seconds  
ND router advertisements live for 1800 seconds  
ND advertised default router preference is Medium  
Hosts use stateless autoconfig for addresses.
```

Or

```
switch# show running-config | beg interface Vlan28  
  
interface Vlan28  
ip address 192.168.28.2 255.255.255.0  
ipv6 address 2001:DB8:CAFE:28::2/64  
ipv6 enable  
ipv6 nd ra interval 30
```