6DISS

South America Workshop

WALC 2006 (Quito, Ecuador – 26-28 July '06)

RIP for IPv6 Configuration

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Laboratory Exercise: *RIP for IPv6 configuration*

Objectives

In this laboratory exercise you will complete the following tasks:

- *Enable RIP for IPv6 on a Cisco router*
- *Gather information regarding RIPng protocol*
- *Debug RIP for IPv6*

Visual Objective

The following figure shows the configuration of the RIPng laboratory:

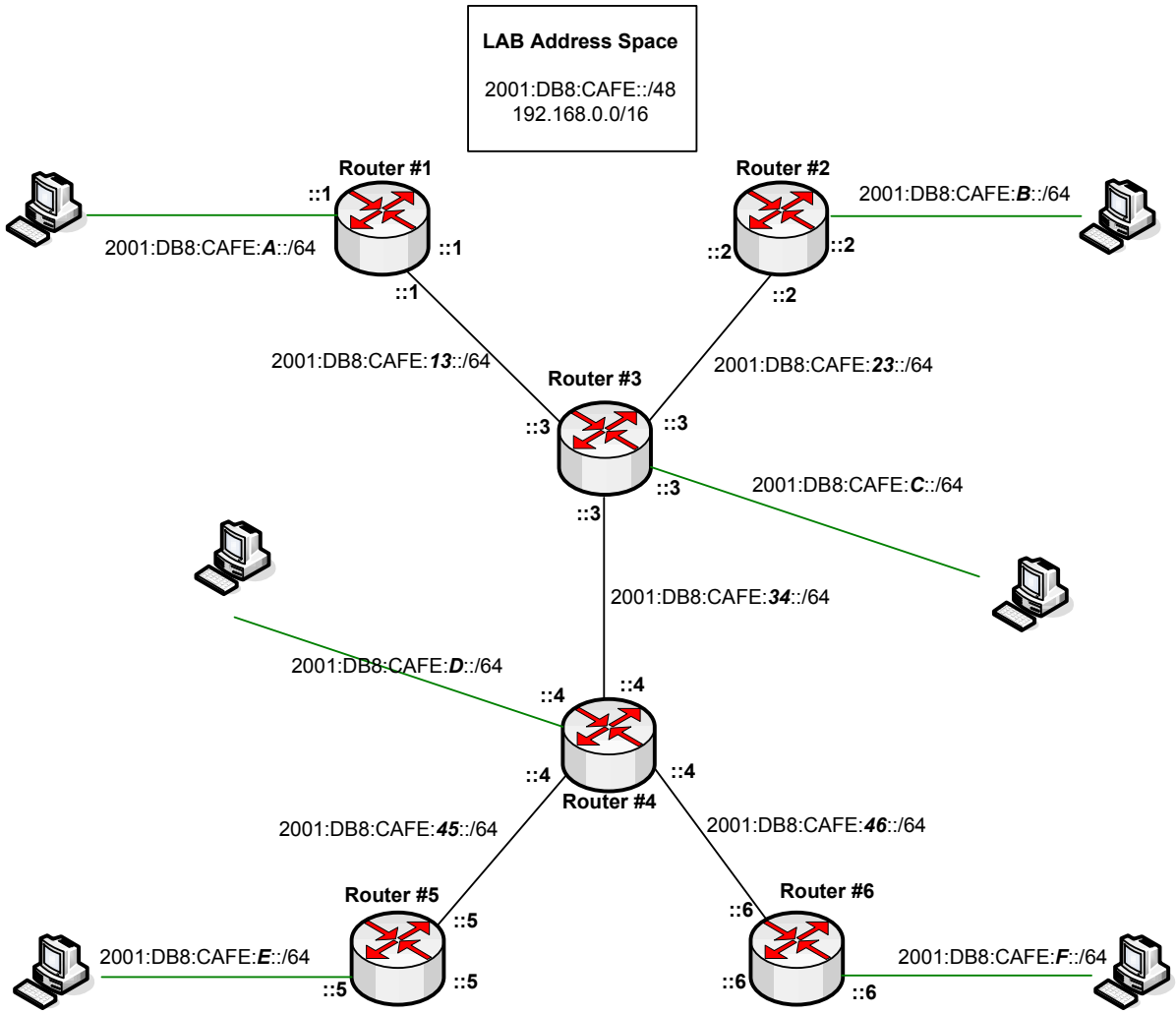

Figure 1: Scenario topology

Setup/Scenario

In this scenario there are six Cisco 1800 routers. Each router has 2 Fast Ethernet layer 3 capable ports (FE0 and FE1) and 8 Fast Ethernet Switch ports (FE2 to FE9). As Routers 3 and 4 will have three layer 3 connections to other routers, the FastEthernet Port 2 must be configured as a *no switchport* in order to connect to other router.

Preparing the LAB

There will be 2 groups per router.

Groups	Routers
Group 1	Router 1
Group 2	
…	…
Group 11	Router 6
Group 12	

Table 1: Groups per Routers

The routers must already have IPv6 enabled. If your router does not have this configuration, load it from the flash:

```
RouterX# copy flash:initv6-config running-config
RouterX# wr
```

Bellow you'll find one table per router with the addresses for each of the router's interfaces:

Router 1:

Interface	IPv6 Address
FastEthernet **0**	2001:DB8:CAFE:***12***::1 /64
FastEthernet **1**	2001:DB8:CAFE:***13***::1 /64
FastEthernet **5**	2001:DB8:CAFE:***A***::1 /64

Table 2: Addresses for each interface on router 1

Router 2:

Interface	IPv6 Address
FastEthernet **0**	2001:DB8:CAFE:***12***::2 /64
FastEthernet **1**	2001:DB8:CAFE:***23***::2 /64
FastEthernet **5**	2001:DB8:CAFE:***B***::2 /64

Table 3: Addresses for each interface on router 2

Router 3:

Interface	IPv6 Address
FastEthernet **0**	2001:DB8:CAFE:***13***::3 /64
FastEthernet **1**	2001:DB8:CAFE:***23***::3 /64
FastEthernet **2**	2001:DB8:CAFE:***34***::3 /64
FastEthernet **5**	2001:DB8:CAFE:***C***::3 /64

Table 4: Addresses for each interface on router 3

Router 4:

Interface	IPv6 Address
FastEthernet **0**	2001:DB8:CAFÉ:***34***::4 /64
FastEthernet **1**	2001:DB8:CAFÉ:***45***::4 /64
FastEthernet **2**	2001:DB8:CAFÉ:***46***::4 /64
FastEthernet **5**	2001:DB8:CAFE:***D***::4 /64

Table 5: Addresses for each interface on router 4

Router 5:

Interface	IPv6 Address
FastEthernet **0**	2001:DB8:CAFE:***45***::5 /64
FastEthernet **1**	2001:DB8:CAFE:***56***::5 /64
FastEthernet **5**	2001:DB8:CAFE:***E***::5 /64

Table 6: Addresses for each interface on router 5

Router 6:

Interface	IPv6 Address

FastEthernet **0**	2001:DB8:CAFE:***46***::6 /64
FastEthernet **1**	2001:DB8:CAFE:***56***::6 /64
FastEthernet **5**	2001:DB8:CAFE:***F***::6 /64

Table 7: Addresses for each interface on router 6

Task 1: *Enabling RIPng*

Step 1: Testing connectivity

Connect to your router. Use the IPv6 auto configuration and plug your PC to a FastEthernet port on the router and telnet to it using the following authentication data:

```
Login: ipv6
Password: is
Enable secret: great
```

The first step is to check if your router has IPv6 routing enabled. The global **`ipv6 unicast-routing`** command should appear in the running configuration.

Try to ping another router that is not directly connected to yours. Did you succeed?

Step 2: Enable protocol on the interface

Now, configure the RIP protocol on the interfaces in which you want to enable IPv6.

(**Tip:** `routerX(config-if)# ipv6 …`)

- Routers 1, 2, 5 and 6 should enable RIPng on the FastEthernet0 interface;
- Routers 3 and 4 should enable RIPng on interfaces FastEthernet0, FastEthernet1 and FastEthernet2.

Step 3: Enabling RIPng process

Create a RIP process, named *quitorip* on your router.

(**Tip:** `routerX(config)# ipv6 …`)

Step 4: Defining maximum number of paths

Enter into your RIPng process, and configure it so that two paths are available for each destination.

(**Tip1**: RouterX(config)# **`ipv6 router`**)

(**Tip2: `routerX(config-rtr)# maximum`**…)

Step 5: Redistributing routes

Now that the process is running, try again to ping another router not directly connected. Did you get a reply? Why?

On the RIPng process configuration, redistribute the connected and static routes.

(**Tip:** `routerX(config-rtr)#` **`redistribute`** …)

Step 6: Check your connectivity

Try to *ping* again the routers and PCs.

Step 7: Originate the default Route (only for router 4)

Consider that the router is the gateway for your entire network. This router should originate the default gateway.

(**Tip:** `routerX(config-rtr)#` **`ipv6 rip <name> default-information`** …)

Task 2: *Verifying RIP configuration*

On Task 1 you've configured the RIPng protocol, now you will gather information in order to debug any problem.

Step 1: Using the *show* command

The RIPng process is now running on all routers, but are you receiving the information from all of them?

- Collect the information from the RIP process you are running and see if all routers are participating by looking at the RIP database. Also see the next-hop information.
- Check the routing table from RIP
- Now disconnect router 3 and 4. What changes do you see in the database?
- Look again at the RIP process information and routing table. What differences do you see?

  (**Tip:** `router`***x***`# show ipv6 rip …`)

Step 2: Debug the RIPng process

RIPng also has debugging facilities on the IOS software. This provides more detailed information than the delivered by the *show* command.

- Initiate the debugging process of RIPng process
- Debug RIPng on one interface in which you are running the protocol

(**Tip:** `router`***x***`# debug ipv6 rip …`)

What do you see?

Change the *maximum paths* value in your router. What do you see?

Summary

After completing these exercises, you should be able to:

- *Configure RIPng*
- *Debug and analyze information from the RIPng*

Appendix A

Task 1: *Enabling RIPng*

Step 2: Enable protocol on the interface

To configure RIPng on the interfaces you want to run the protocol, you can use the following command lines:

```
RouterX# enable
RouterX# configure terminal
RouterX(config)# interface fastethernet[X]
RouterX(config-if)# ipv6 rip process_name enable
```

Where *process_name* is the specific name of the RIPng process you will configure.

Eg:

```
Router1# enable
Router1# configure terminal
Router1(config)# interface fastethernet0
Router1(config-if)# ipv6 rip quitorip enable
```

Step 3: Enabling RIPng process

```
RouterX# configure terminal
RouterX(config)# ipv6 router rip quitorip
Note: on some models the command line might be
      ipv6 rip quitorip
```

Step 4: Defining maximum number of paths

Enter in the protocol configuration command line and type the appropriate commands:

Router*X*(config)# **ipv6 router rip quitorip**

Router*X* (config-rtr)#**maximum-paths 2**

Step 5: Redistributing routes

To redistribute the connected and static routes enter into the RIPng process and type the appropriate commands:

Router*X*(config)# **ipv6 router rip quitorip**

Router*X* (config-rtr)# **redistribute connected**

Router*X* (config-rtr)# **redistribute static**

To redistribute routes from another protocol use the same approach.

Step 7: Originate the default Route

To originate the default route, in the interface where you want to send this advertisement, you must type the commands:

```
Router#X configure terminal
Router#X(config)# interface fastethernet0
Router#X(config-if)# ipv6 rip quitorip default-information originate
```

The other way to do this is using the following command:

```
Router#X(config-if)# ipv6 rip quitorip default-information only
```

This will make the router to only announce the *default route*, and no other routes or updates. The *originate* option will announce the updates and routes, plus the default route. You can also have more them one default route and define a metric to choose between each other:

Router*X*#(config-if)# **ipv6 rip quitorip default-information [only|originate] [metric** value]

Task 2: *Verifying RIP configuration*

Step 1: Using the *show* command

- Collect the information from the RIP process

  Router1# **show ipv6 rip database**

```
RIP process "quitorip", local RIB
 2001:DB8:CAFE:4::1/128, metric 3, installed
   FastEthernet1/FE80::216:C8FF:FE30:5FC4, expires in 170 secs
 2001:DB8:CAFE:4::/64, metric 3, installed
   FastEthernet1/FE80::216:C8FF:FE30:5FC4, expires in 170 secs
 2001:DB8:CAFE:D::/64, metric 3, installed
   FastEthernet1/FE80::216:C8FF:FE30:5FC4, expires in 170 secs
 2001:DB8:CAFE:13::/64, metric 2
   FastEthernet1/FE80::216:C8FF:FE30:5FC4, expires in 170 secs
 2001:DB8:CAFE:34::/64, metric 2, installed
   FastEthernet1/FE80::216:C8FF:FE30:5FC4, expires in 170 secs
 ::/0, metric 2, installed
   FastEthernet1/FE80::216:C8FF:FE30:5FC4, expires in 170 secs
```

Router3# **show ipv6 rip next-hops**

```
RIP process "quitorip", Next Hops
 FE80::217:E0FF:FED6:7D3/FastEthernet0 [4 paths]
 FE80::218:19FF:FE18:964C/Vlan32 [4 paths]Check the routing table
```

Router1# **show ipv6 route rip**

```
IPv6 Routing Table - 13 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
       D - EIGRP, EX - EIGRP external
R   ::/0 [120/2]
     via FE80::216:C8FF:FE30:5FC4, FastEthernet1
R   2001:DB8:CAFE:4::/64 [120/3]
     via FE80::216:C8FF:FE30:5FC4, FastEthernet1
R   2001:DB8:CAFE:4::1/128 [120/3]
     via FE80::216:C8FF:FE30:5FC4, FastEthernet1
R   2001:DB8:CAFE:D::/64 [120/3]
     via FE80::216:C8FF:FE30:5FC4, FastEthernet1
R   2001:DB8:CAFE:34::/64 [120/2]
     via FE80::216:C8FF:FE30:5FC4, FastEthernet1
```

Step 2: Debug the RIPng process

- Send the output from debug to your monitor:

  Router1# **terminal monitor**

- Debug the RIPng

  Router1# **debug ipv6 rip**

```
*Jul 12 08:39:36.479: RIPng: response received from
FE80::217:E0FF:FED6:7D3 on FastEthernet0 for quitorip
*Jul 12 08:39:36.479: src=FE80::217:E0FF:FED6:7D3 (FastEthernet0)
*Jul 12 08:39:36.479: dst=FF02::9
*Jul 12 08:39:36.479: sport=521, dport=521, length=92
*Jul 12 08:39:36.479: command=2, version=1, mbz=0, #rte=4
*Jul 12 08:39:36.479: tag=0, metric=1, prefix=2001:DB8:CAFE:1::1/128
*Jul 12 08:39:36.479: tag=0, metric=1, prefix=2001:DB8:CAFE:A::/64
*Jul 12 08:39:36.479: tag=0, metric=1, prefix=2001:DB8:CAFE:13::/64
(...)
```

- Debug RIPng on an interface

  Router1# **debug ipv6 rip FastEhternet0**