Central America Workshop - Guatemala City

Guatemala

30January - 1 February '07

Multiprotocol BGP configuration

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Laboratory Exercise: *Multiprotocol BGP configuration*

Objectives

In this laboratory exercise you will complete the following tasks:

- *Establish IPv6 unicast BGP sessions;*
- *Check the exchanged routing information and perform application-level tests towards addresses received from the BGP sessions;*
- *Filter routes announced and received through peerings.*

Visual Objective

The following figure shows the configuration of the current laboratory

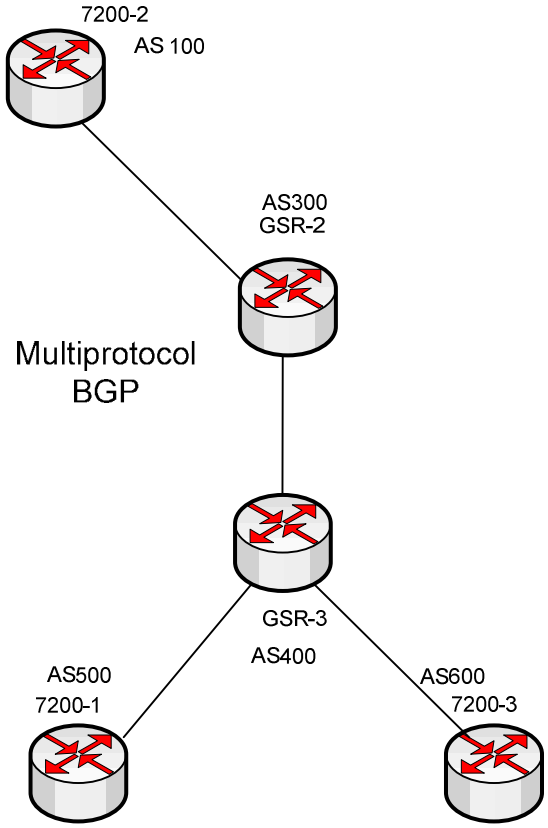

Figure 1 - Multiprotocol BGP

Setup/Scenario

The following figure shows the configuration of theMBGP laboratory:

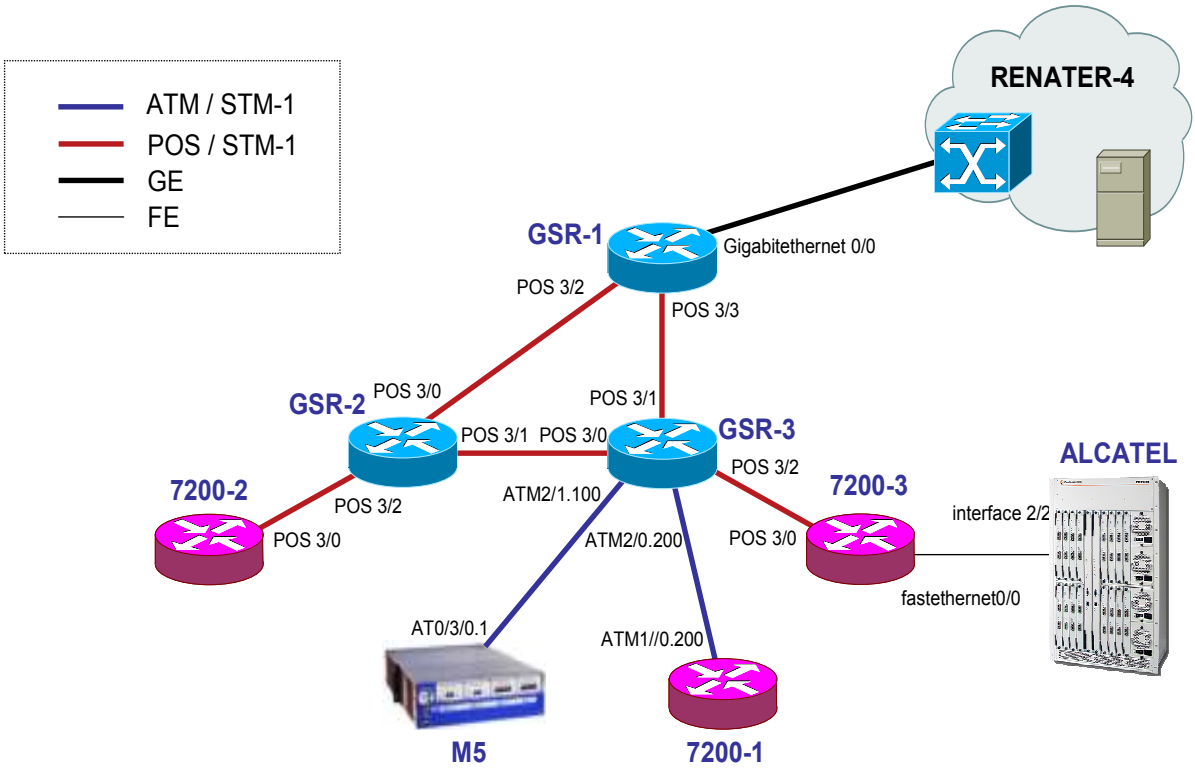

Figure 2: Scenario topology

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.

Preparing the LAB

There will be 2 groups per router.

Groups	Routers
Group 1	GSR 2
Group 2	
Group 3	GSR 3
Group 4	
Group 5	7200 – 1
Group 6	
Group 7	7200 – 2
Group 8	
Group 9	7200 – 3
Group 10	

Table 1: Groups per Routers

To connect to the router, you should use the fallowing 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
7500-1	194.254.101.9

Table 2 - Adddresses to connect

Bellow you'll find the IPv6 addresses you should use on your routers.

Loopback addresses:

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

Table 3 – Loopback addresses to use

IPv6 Interconnections:

Interconnecions (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 4 - Interconnection addresses

R1 has address = prefix::1

R2 has address = prefix::2

Task 1: *Enabling the MBGP*

Complete the following steps for creating a MBGP process on your router.

If your router still has OSPF configurations, remove them.

Step 1: Configuring the BGP process and router ID

Configure the eBGP main process on your router. Remember that in the case of MBGP you will have to create an IPv6 address family and configure a BGP router ID.

(**Tip**: router bgp <as_number>
address-fammily …)

(**Tip**: bgp router-id …)

For your AS number, you should use the following peering table:

Router	AS Number	Router ID	Peer With AS
GSR-2	300	3.3.3.3	100 and 400
GSR-3	400	4.4.4.4	300, 500 and 600
7200-1	500	5.5.5.5	400
7200-2	100	1.1.1.1	300
7200-3	600	6.6.6.6	400

Table 3 – Peering configuration

Step 3: Peering with the neighbours

Use

Table 3 to check your peer routers.

(**Tip**: neighbour X:X:X:X::X/<0-128> …)

You should use the addresses directly connected to your interface. If it was iBGP you could use the loopback addresses as they would be known by you IGP.

Step 4: Advertise your route

Now advertise your routes to your peers.

(**Tip**: network …)

The network you should use is listed in the following table:

Group	Advertised Network
1	2001:DB8:CAFE:1::/64
2	2001:DB8:CAFE:2::/64
3	2001:DB8:CAFE:3::/64
4	2001:DB8:CAFE:4::/64
5	2001:DB8:CAFE:5::/64
6	2001:DB8:CAFE:6::/64

Table 4 – Advertised Routes

Step 5: Check BGP Summary

See the status of your BGP process and how many routes you are receiving.

(**Tip**: show bgp ipv6 unicast …)

Note: In case you are having trouble, look at your synchronization and auto-summary configuration.

Step 6: Check advertised routes

Look at the route you are advertising to your peer. Are they correct?

(**Tip**: show bgp ipv6 unicast …)

Step 7: Check received routes

Verify the routes you are receiving from your peers.

- Are they correct?
- Is the AS Path for each route correct?
- Elaborate a query using the *regexp* expression, to find routes from a neighbour not directly connected to you.

Step 8: Reset a BGP neighbour

Add another route to announce to your peer according to the following table:

Group	Advertised Network

1	2001:DB8:CAFE:11::/64
2	2001:DB8:CAFE:12::/64
3	2001:DB8:CAFE:13::/64
4	2001:DB8:CAFE:14::/64
5	2001:DB8:CAFE:15::/64
6	2001:DB8:CAFE:16::/64

Table 5 - Advertised Routes

See if you are advertising the route.

- Now reset the BGP process.
- How long does it take to have the peers exchanging routes again?
- Perform a soft reset to the BGP process. What is the difference?

Step 9: iBGP configuration

With the same topology, now configure all routers in the same Autonomous System 100.

Which modifications do you have to do in your router's configuration?

Can you ping all routers?

Summary

After completing these exercises, you should be able to:

- *Configure the BGP Process*
- *Debug and analyse information from the process*
- *Reset the process*

Appendix

Step 1: Testing connectivity

From your PC ping the other routers or any PC from a computer not directly connected to your router.

Step 2: Configuring the BGP process and router ID

Configure the eBGP main process and router ID.

```
Router3# configure terminal
Router3(config)# router bgp 300
Router3(config-router)# address-family ipv6 unicast
Router3(config-router-af)# bgp router-id 3.3.3.3
```

Step 3: Peering with the neighbours

```
Router3(config)# router bgp 300
Router3(config-router)# address-family ipv6 unicast
Router3(config-router-af)# neighbor 2001:DB8:CAFE:13::1 remote-as 100
Router3(config-router-af)# neighbor 2001:DB8:CAFE:13::1 activate
Router3(config-router-af)# neighbor 2001:DB8:CAFE:34::4 remote-as 400
Router1(config-router-af)# neighbor 2001:DB8:CAFE:34::4 activate
```

Step 4: Advertise your routes

```
Router3(config)# router bgp 300
Router3(config-router)# address-family ipv6 unicast
Router3(config-router-af)# network 2001:690::/32
```

Step 5: Check BGP Summary

```
Router1# show bgp ipv6 unicast summary
BGP router identifier 3.3.3.3, local AS number 300
(…)
Neighbor V AS  MsgRcvd MsgSent TblVer InQ OutQ Up/Down  Ste/PfRd
2001:DB8:CAFE:13::1
         4 100 1117    1118    4       0   0    03:00:30 1
2001:DB8:CAFE:34::4
         4 400 148     150     4       0    0  02:23:48  1
```

Step 6: Check advertised routes

```
Router3#show bgp ipv6 unicast nei 2001:DB8:CAFE:34::4 advertised-routes
(...)
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
              r RIB-failure, S Stale
Origin codes: i - IGP, e - EGP, ? - incomplete
Network       Next Hop            Metric LocPrf Weight Path
*> 2001:DB8:CAFE:1::/64
              2001:DB8:CAFE:13::1  0             0      100 i
*> 2001:DB8:CAFE:3::/64
                    ::             0             32768   i
*> 2001:DB8:CAFE:4::/64
                    2001:DB8:CAFE:34::4
                                   0             0       400  i
Total number of prefixes 3
```

You might be having trouble and find out that your route is not being announced. If this happens, try:

```
Router1(config-router)# no synchronization
Router1(config-router)# no auto-summary
```

Remember that you can only advertise routes that you are able to announce. So if the network you are advertising is not being used, you must force it to be up. For example, to force the route on router 3, do:

```
Router3#(config)# ipv6 route 2001:DB8:CAFE:3::/64 Null0
```

Step 7: Check received routes

```
Router4# show bgp ipv6 unicast nei 2001:DB8:CAFE:34::4 routes
BGP table version is 4, local router ID is 3.3.3.3
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
              r RIB-failure, S Stale
Origin codes: i - IGP, e - EGP, ? - incomplete

Network     Next Hop            Metric LocPrf Weight Path
*> 2001:DB8:CAFE:1::/64
              2001:DB8:CAFE:34::3               0      300 100 i
*> 2001:DB8:CAFE:3::/64
              2001:DB8:CAFE:34::3 0              0      300   i
Total number of prefixes 2
```

Here you can see the routes received, the AS-Path (in bold), and check the origin of the routes. You can also filter using regular expressions.

Eg: filter the ones from AS 300 appears:

```
Router4# show bgp ipv6 unicast regexp 300
(...)
Network          Next Hop            Metric LocPrf Weight Path
*> 2001:DB8:CAFE:1::/64
                 2001:DB8:CAFE:34::3                  0      300 100 i
```

Step 8: Reset a BGP neighbour

```
Router4# clear bgp ipv6 unicast 2001:DB8:CAFE:34::3
Router4# clear bgp ipv6 unicast 2001:DB8:CAFE:34::3 soft
```

Step 9: iBGP configuration

With iBGP you should not calculate the next-hop. So all iBGP neighbours must be configured with *next-hop-self* option.

```
Router3(config-router-af)# neighbor 2001:DB8:CAFE:13::1 next-hop-self
Router3(config-router-af)# neighbor 2001:DB8:CAFE:34::4 next-hop-self
```

Now try putting all routers in AS300. See if in your router you see al the routes? Do you know why? Your "transit" routers must reflect the addresses that they are receiving. They must be reflector routers. Eg:

```
Router3(config-router-af)# neighbor 2001:DB8:CAFE:13::1 route-reflector-client
Router3(config-router-af)# neighbor 2001:DB8:CAFE:34::4 route-reflector-client
```

Some useful commands

```
Router1(config)# alias exec bgp6 show bgp ipv6 unicast summary
```

Debug commands

- **debug bgp ipv6 updates**
- **debug bgp ipv6 neighbour 2001:DB8:CAFE:<Y>::1 updates in**
- **debug bgp ipv6 neighbour 2001:DB8:CAFE:<Y>::1 updates out**

How to Filter Announcements

When receiving nothing from your peer, first you have to create the prefix list and then, apply this filter to the neighbor you wish.

Eg:

```
Router1# config term
Router1(config)# ipv6 prefix-list NOTHING seq 5 deny ::/0 le 128
Router1(config)# router bgp 300
Router1(config-router)# address-family ipv6 unicast
Router1(config-router-af)# neighbor 2001:DB8:CAFE:<X>::1 prefix-list
NOTHING in
```

If you have time, create a prefix-list to guarantee that you are only announcing your network *2001:DB8:CAFE:<router_number>::/64* to your neighbors.

```
Router1(config)# ipv6 prefix-list <router_number>ANNOUNCE seq 5 accept
2001:DB8:CAFE:<VLAN>::/64
Router1(config)# ipv6 prefix-list < router_number >ANNOUNCE seq 10 deny ::/0 le 128
Router1(config)# router bgp <AS>
Router1(config-router)# neighbor 2001:DB8:CAFE:<X>::1 prefix-list <router_number >
ANNOUNCE out
Router1(config-router)# exit
Router1(config)# exit
Router1# exit
```