

# **TCOM 515 IP Routing Lab Exercise 5**

## **BGP Routing**

*Name:*

*Lab Day:*

*Router Name:*

*Team Members:*

Objective: The purpose of this lab is to become familiar with routers and their configuration parameters. You will physically set-up the equipment, configure the routers with External and Internal BGP.

In this lab, you will execute the following tasks:

1. Make physical connectivity between devices
2. Login to the terminal server via telnet
3. Configure the router and its interfaces
4. Configure External BGP
5. Turn down one BGP session
6. Configure Internal BGP
7. Reset router configurations

References:

[How to use Cisco CLI](#)  
[Cisco Command Line Overview](#)  
[Configuring Interfaces](#)  
[Configuring BGP](#)

Equipment Used:

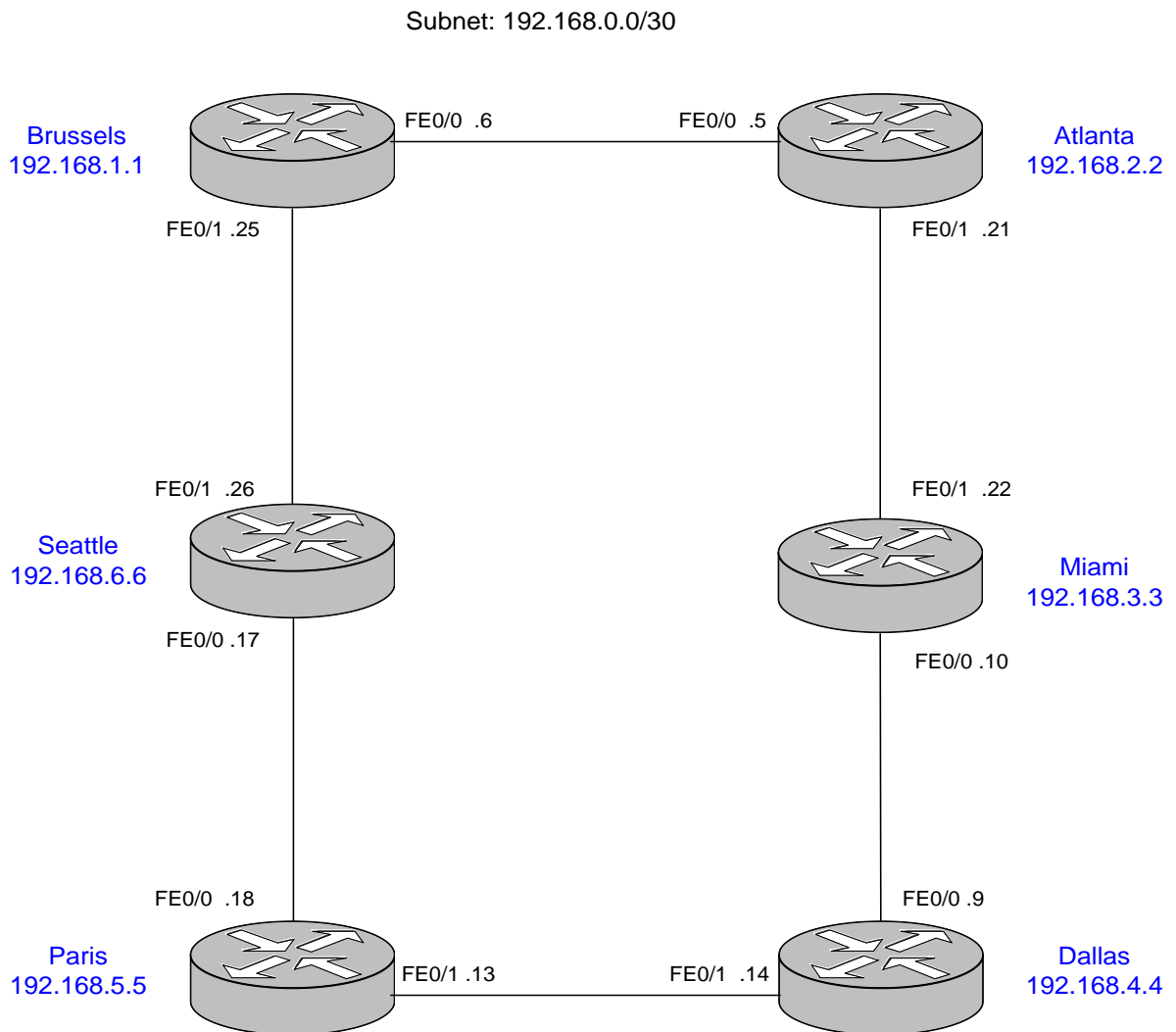
- Cisco router 2511 (terminal server)
- Six 2811 Cisco ISRs
- PC workstations for management

# Detailed Lab Steps

## 1. Make physical connectivity between devices

The first objective of this lab is to create the physical topology required. The physical connectivity is shown below in Figure 1 – Lab 3 Physical Connectivity. Each router will have a FastEthernet connection to two other routers.

**Figure 1 Lab 3 Physical Connectivity**



## 2. Login and reset the router

You must connect to your assigned router through the terminal server.

Connect to the router by choosing corresponding router from the list. Login using the following information,

- User: student
- Password: nocnoc

Now once you are on the appropriate router, type the following commands:

- *“enable”*
- *“nocnoc”* if prompted for password
- *“erase start”*
- *“reload”*

When the router reloads you will get the autoinstall menu, type “no” or “ctrl-c” to cancel the autoinstall program. Now you will see a prompt that look like this:

router>

Now enter the following commands:

- *“enable”*
- *“conf t”*
- *“hostname <your router’s name>”*
- *“no ip domain lookup”*
- *“line console 0”*
- *“logging synchronous”*

Enter “Ctrl+Z” to exit configuration mode.

### 3. Configure the router and its interfaces

Now that you have configured a few basic global parameters, you will configure the physical interfaces for your base topology.

The table below lists the IP addresses for the various router interfaces as they were identified in Figure 1. The AS number will be used for configuring BGP. Identify your interface from the table below:

Router Name	Loopback0	FastEthernet Interface 0/0 and mask	FastEthernet Interface 0/1 and mask	AS number
Brussels	192.168.1.1/32	192.168.0.6/30	192.168.0.25/30	1
Atlanta	192.168.2.2/32	192.168.0.5/30	192.168.0.21/30	2
Miami	192.168.3.3/32	192.168.0.10/30	192.168.0.22/30	3
Dallas	192.168.4.4/32	192.168.0.9/30	192.168.0.14/30	4
Paris	192.168.5.5/32	192.168.0.18/30	192.168.0.13/30	5
Seattle	192.168.6.6/32	192.168.0.17/30	192.168.0.26/30	6

To enter configuration mode again,

- Type *“config terminal”*

To enter the interface configuration mode from the global configuration mode,

- Type *“interface <your FastEthernet interface> ”*

Now type your FastEthernet description.

- Type *“description Link to <Other Router Name> <Network Address> ”*

Now you will assign the IP addresses to your interfaces.

- Type *“ip address <address number from chart> 255.255.255.252 ”*

Note that the 255.255.255.252 is the dotted decimal equivalent of the network mask listed a /30 in the chart.

To bring the interface up,

- Type *“no shut ”*

Repeat the last 4 commands for your other FastEthernet interface.

Now you will configure your loopback interface, which is logical rather than physical like the FastEthernet interfaces above.

- Type *“interface loop 0 ”*

Now you will assign the IP addresses to your loopback0 interface.

- Type *“ip address <address number from chart> 255.255.255.255 ”*

To bring the interface up,

- Type *“no shut ”*

Exit the interface configuration mode and the global configuration mode by typing either “ctrl-z” or “end”.

Type *“show ip interface brief”*

3.1 *Are each the interfaces you configured up that should be? Which ones?*

- Now type *“show ip route”*

3.3 *What does your route table look like, how many entries, what kind of entries?*

#### 4. Configure External BGP

Now you will turn BGP on your router. In global configuration mode:

```
Router bgp <AS number>
Network <loopback IP> mask 255.255.255.255
Network <Ethernet network address> mask 255.255.255.252
Neighbor <neighbor FastEthernet interface address> remote-as <neighbor AS number>
No auto-summary
```

Every subnet on the router needs to be advertised with the network statement and all neighbors need to be configured.

Here is a sample configuration for Dallas:

```
Router bgp 4
Network 192.168.4.4 mask 255.255.255.255
Network 192.168.0.12 mask 255.255.255.252
Network 192.168.0.8 mask 255.255.255.252
Neighbor 192.168.0.10 remote-as 3
Neighbor 192.168.0.13 remote-as 5
No auto-summary
```

Make sure all routers have BGP configured and all networks are reachable; use the following show commands on your router to answer the questions:

- *show IP route*
- *show IP protocols*
- *show IP BGP*
- *show IP BGP summary*
- *show IP BGP neighbor*
- *show IP BGP <network address>*
- *show IP BGP neighbor <neighbor address> routes*

*4.1 How many route entries are now visible in the IP route table? Is there a route entry to every IP subnet?*

*4.2 Who are your BGP neighbors? How many prefixes have you received from each neighbor?*

*4.3 How many entries in the BGP table? Which entry has the longest AS-path? Any route entry with more than one possible path? Take an entry with two possible paths and explain how the best path was selected.*

*4.4 Take one BGP route entry from the IP routing table and decipher each part of it.*

Now if you are on Paris, Seattle or Brussels, traceroute to Miami's loopback. If you are on Dallas, Miami or Atlanta, traceroute to Seattle's loopback. Save the output.

- Type “traceroute X.X.X.X”

*4.5 What are the attributes of the above destination? Please list all of these attributes. Which attribute was used as the tiebreaker in choosing the best path?*

**STOP and wait for class to finish before moving to section 5**

## 5. Internal BGP configuration

Remove all BGP configurations.

*Router(config)#no router BGP <AS number>*

Reconfigure BGP using new AS numbers per table below,

Router Name	Loopback0	AS number
Brussels	192.168.1.1	1
Atlanta	192.168.2.2	1
Miami	192.168.3.3	2
Dallas	192.168.4.4	2
Paris	192.168.5.5	3
Seattle	192.168.6.6	3

*Router bgp <AS number>*

*No synchronization*

*Redistribute connected*

*Neighbor <neighbor FastEthernet interface IP> remote-as <AS number>*

*Neighbor <neighbor FastEthernet interface IP> remote-as <AS number>*

*No auto-summary*

Here is a sample configuration from Brussels:

*Router bgp 1*

*No synchronization*

*Redistribute connected*

*Neighbor 192.168.0.5 remote-as 1*

*Neighbor 192.168.0.26 remote-as 3*

*No auto-summary*

Make sure all routers have BGP configured and all networks are reachable; use the following show commands on your router to answer the questions:

- *show IP route*
- *show IP BGP*
- *show IP protocols*
- *show IP BGP summary*
- *show IP BGP neighbor*
- *show IP BGP <network address>*
- *show IP BGP neighbor <neighbor address> routes*

5.1 How has the IP route table changed from section 4?



*5.2 Who are your neighbors and what kind of neighbors are they?*

*5.3 How has the BGP table changed from section 4?*

Now if you are on Paris, Seattle or Brussels, traceroute to Miami's loopback. If you are on Dallas, Miami or Atlanta, traceroute to Seattle's loopback. Save the output.

*5.4 Has this changed from section 4? If so, how?*

**STOP and wait for class to finish before moving to section 6**

**6. Power down the router and undo all cabling.**

**Lab Questions:** Answer these questions in addition to all questions contained within the lab itself. **2-3 sentence** answers should suffice.

1. *What was the most important piece of knowledge you took away from this lab?*
2. *What new command did you find most useful and why?*
3. *Identify at least one problem you experienced in this lab. How did you figure out the problem? How did you resolve it?*

*The lab included eBGP and iBGP. Explain **in your own words** the differences between eBGP and iBGP.*

*We turned off BGP synchronization for section 5. Explain **in your own words** what BGP synchronization is.*