

National University of Computer and Emerging Sciences



Laboratory Manuals
for
Computer Networks - Lab

(CL -3001)

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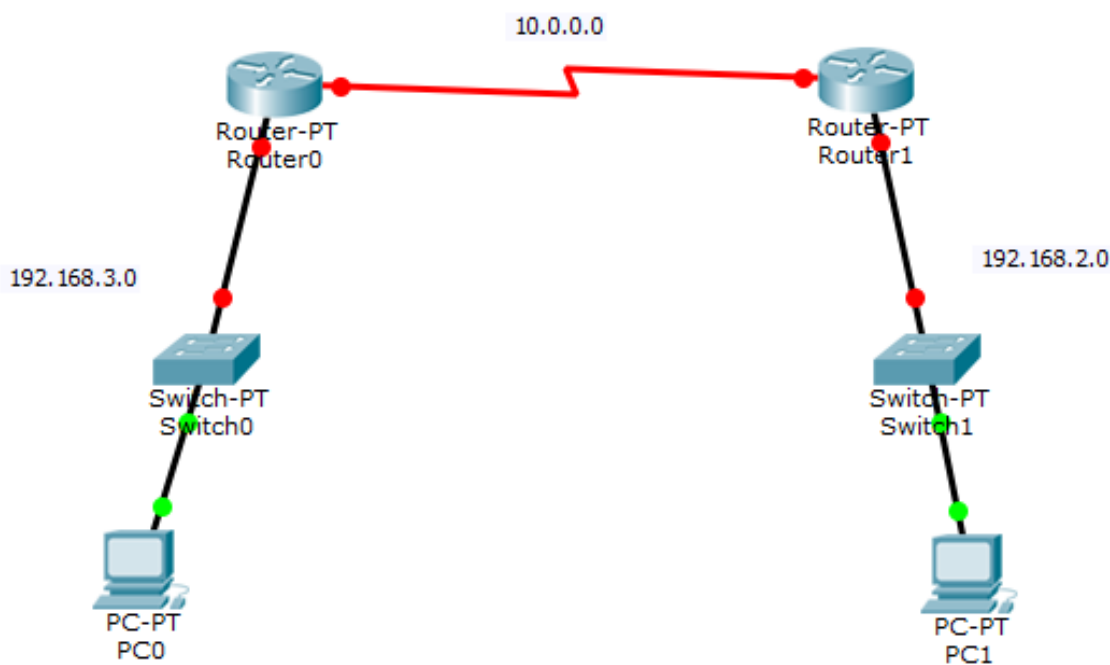
Lab Manual 11

Objective:

- Establishing Serial Connection Between Two Routers using RIP
- Development of FAST NU Network Topology using Packet tracer
- Configuring Router using CLI of the Router

Serial Connection between Routers:

We will establish serial connection between different Routers using Routing Information Protocol (RIP)

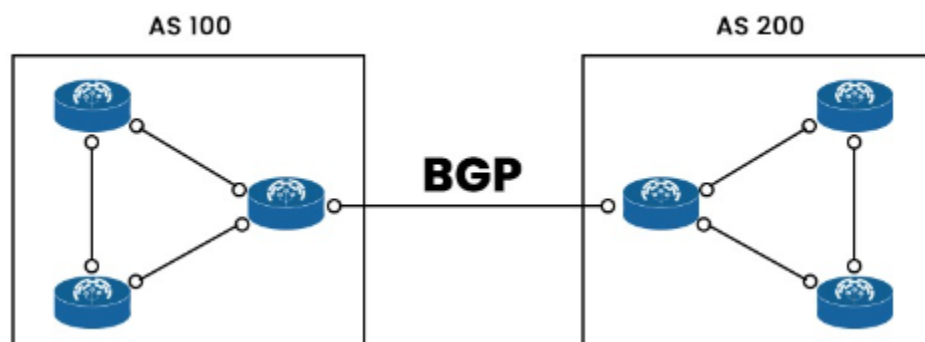


Networks Available:

- 192.168.2.0
- 192.168.3.0
- 10.0.0.0

Introduction to BGP Protocol

Border Gateway Protocol (BGP) is a critical protocol used in the internet routing infrastructure to facilitate communication between different autonomous systems (AS). Unlike interior gateway protocols (IGP) such as OSPF or EIGRP, which focus on routing within a single autonomous system, BGP is an exterior gateway protocol designed for routing between autonomous systems. It plays a crucial role in ensuring efficient and reliable routing across the global internet.



Key Features of BGP:

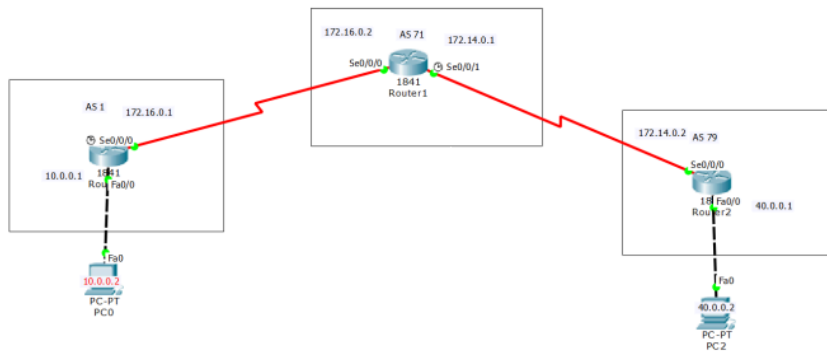
Path Vector Protocol: BGP is a path vector protocol, which means it makes routing decisions based on the path attributes (such as AS path, next hop, etc.) rather than just the shortest path to a destination. This enables BGP to make complex routing decisions and support policy-based routing.

Policy-Based Routing: BGP allows network administrators to implement sophisticated routing policies. These policies can control how routes are learned, advertised, and manipulated based on various criteria like AS paths, prefix lengths, communities, and local preferences.

Reliability and Scalability: BGP is designed to handle the scale and complexity of the global internet. It can manage a large number of routes and adapt to changes in network topology dynamically while maintaining stable routing tables.

Lab Task:

In this lab task we will configure bgp protocol using Cisco packet tracer. We will implement the following topology:



PC0

Physical Config Desktop Custom Interface

IP Configuration

IP Configuration

☐ DHCP ☒ Static

IP Address: 10.0.0.2

Subnet Mask: 255.0.0.0

Default Gateway: 10.0.0.1

DNS Server:

IPv6 Configuration

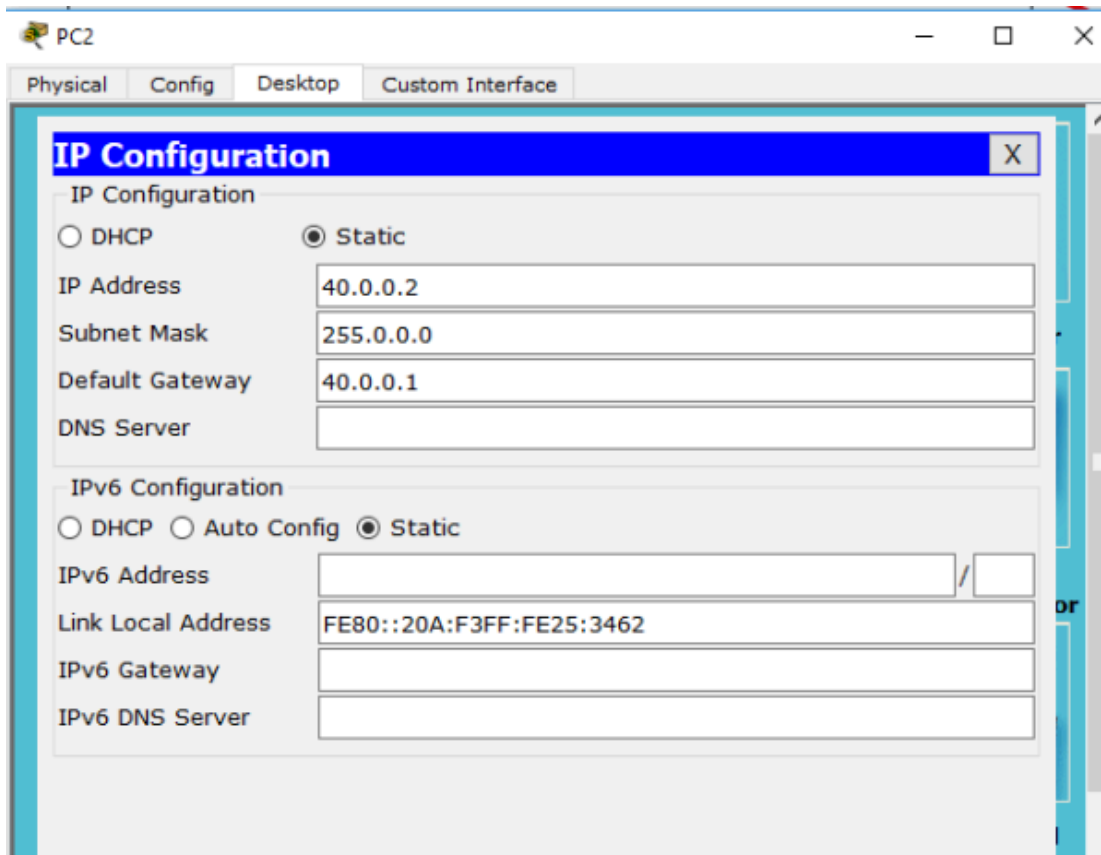
☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address: /

Link Local Address: FE80::201:C7FF:FE54:466

IPv6 Gateway:

IPv6 DNS Server:



Step 3: bgp configuration on Router R1:

```
R1(config)#router bgp 1
R1(config-router)#neighbor 172.16.0.2 remote-as 71
R1(config-router)#network 10.0.0.0 mask 255.0.0.0
R1(config-router)#exit
R1(config)#do write
Building configuration...[OK]
R1(config)#
```

Step 4: bgp configuration on Router R2:

```
R2(config)#router bgp 71
R2(config-router)#neighbor 172.16.0.1 remote-as 1
R2(config-router)#neighbor 172.14.0.2 remote-as 79
R2(config-router)#network 40.0.0.0 mask 255.0.0.0
```

```
R2(config-router)#exit
R2(config)#do write
Building configuration...[OK]
R2(config)#
```

Step 5: bgp configuration on Router R3:

```
R3(config)#router bgp 79
R3(config-router)#neighbor 172.14.0.1 remote-as 71
R3(config-router)#network 40.0.0.0 mask 255.0.0.0
R3(config-router)#exit
R3(config)#do write
Building configuration...[OK]
R3(config)#
```

Step 6: bgp configuration Testing and troubleshooting.

For bgp testing we will ping both pc and check the network communication.

Now I am on PC2:

```
PC>ipconfig
PC>ping 10.0.0.2
```

Step 7: check bgp route on router R1:

```
R1#show ip route
```

Step 8: Check whether bgp protocols configure or not on Route R1:

```
R1#show ip protocols
```

Step 9: Show BGP Status

```
R1#show ip bgp summary
```

Show bgp neighbors status:

```
R1#show ip bgp neighbors
```

Similarly we check bgp route on Router R2:

```
R2#show ip route
```

R2#show ip protocols

Similarly check bgp route on Router R3:

R3#show ip route

R3#show ip protocols

In lab Statement 2:

[20]

You have to design a network solution for the Fast-NU three **Labs, Staff and Faculty members**.

- All the three Labs, Staff and faculty members should be on **different Sub networks**.
- There are total **15 computers** divided in this way
 - 3 for Staff
 - 3 for Faculty
 - 3 for Lab-1 ,
 - 3 for Lab-2 and
 - 3 for Lab-3.
- Assume that FAST-NU is given a **Network Class B** address having first two octets of IP address fixed as **172.19.X.X**. You can change the next two octets in order to make desired number of subnets and desired number of hosts in each subnet for the above given topology.

Make sure that you optimally design the network considering the number of devices (switches, routers etc.) used and how you are assigning the IP addresses to different subnets in your design. (You can consult the slides for sub netting provided to you in case you have no idea about sub netting or you have forgotten it)

1. Use wires (**straight through and cross over** where necessary and applicable) – no wireless LAN is required for this submission.
2. Use **2911 Router**
3. Use **2950-24 switches**.
4. **You can connect a maximum of two networks with a single router (except router-to-router connection)**

5. You have to assign IPs to the machines using **static IP allocation**.
6. Use ping from the command prompt of computers to check your network design is working.
7. Make your design as neat as possible and properly add the IPs of all the PCs and router **interfaces using comments** in your design to get the full credit. (You can insert comments in the design area using a sticky note sign in the right sidebar of Cisco Packet Tracer)

For RIP Classless Configuration:

```
Router>enable
Router#configure terminal // Global configuration mode
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router rip
Router(config-router)#version 2
Router(config-router)#no auto-summary
Router(config-router)#network 172.19.0.0
Router(config-router)#network 172.19.32.0
Router(config-router)#network 172.19.160.0
Router(config-router)#exit
Router(config)#exit
```

LINKS

https://www.youtube.com/watch?v=_ISu9f8ofZk
<https://www.youtube.com/watch?v=DqU3KVCyFNg>
<https://www.youtube.com/watch?v=krM9GprN6qA>
<https://www.youtube.com/watch?v=oet-s1xDLOA>