

Design and configure dynamic routing protocols (RIP, OSPF, OR RIP, BGP) for an organization (business/educational/office) using Cisco Packet Tracer.

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Introduction

A network is the connecting of at least two computer systems via a cable or wireless connection. A network can be as simple as two computers connected by a cable. However, today's networks are more complicated and do not consist of merely two computers. Client-server networks are used in huge systems. Recently, attacks on banks have increased exposing the bank to legal accountability for the importance of protecting the valuable information held by banks. From this problem, all banks tend to design and implement a high-performance and secure banking system and continue to develop the system and increase security by identifying attacks in various ways.

There are 3 types of protocols, firstly, OSPF is a routing protocol that exchanges data with adjacent devices (neighbors) and distributes it to all AS in order to identify the next hop's address and choose the best path. Secondly, RIP is a dynamic routing protocol that employs certain algorithms to find the shortest path for packets to travel on a network. Finally, by sharing routing and information across edge routers, BGP regulates how packets are sent from one network to the next. BGP is a protocol that allows packets to be routed between independent computers (AS).

Hence banks must constantly increase security. Therefore, we need to use dynamic routing protocols (RIP and BGP). We will first talk about the use of the Border Gateway Protocol, which is responsible for searching all available paths through which data can travel and choosing the best path, which will increase the level of security. Routing Information Protocol will send routing update messages at regular intervals and when a RIP routing updater receives changes to an entry, the device updates its routing table to reflect the new route.

In this network, a banking network of three regions namely Central, Eastern and Western regions was designed, and memo protocols were previously implemented to communicate with each other. The comparison between using RIP and BGP will be discussed in order to clarify the differences between them in several aspects, including the percentage of packet loss and the use of memory in order to choose the best and most suitable for this network.

Methodology

In this project, a network was designed using Cisco Packet Tracer 8.0.1 virtualization software for ease of use and availability of all network requirements and simulated a secure and easy banking system in the scope of banking transactions from different regions where all bank branches provide banking services to customers.

The metrics used to make a network performance comparison are the CPU utilization and the memory usage of Routing Information Protocol and Border Gateway Protocol by the Activity Monitor.

Proposed model

- Network Topology of the proposed model

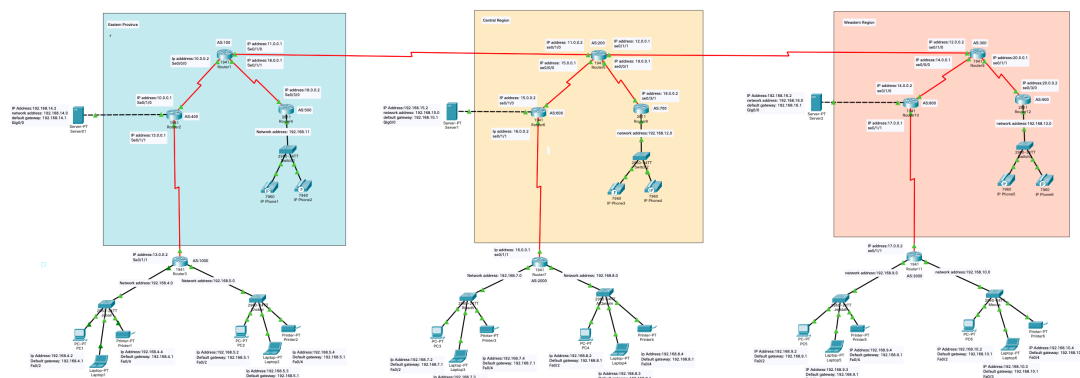


Figure 1 Network Topology

This network is designed from three main regions expressing a wide network connected to each other by serial connection. While In the network were installed 9 routers type 1941 and 3 type 2811. Devices such as computers, printers, servers, and IP phones are placed in local networks

- Addressing table

Device	Interface	IP Address	Subnet Mask	Default Gateway
Router1	Se0/0/0	10.0.0.2	255.0.0.0	N/A
	Se0/1/0	11.0.0.1	255.0.0.0	N/A
	Se0/1/1	18.0.0.1	255.0.0.0	N/A
Router2	Se0/1/0	10.0.0.1	255.0.0.0	N/A
	Se0/1/1	13.0.0.1	255.0.0.0	N/A
	Gig0/0	192.168.14.1	255.255.255.0	N/A
Router3	Se0/1/1	13.0.0.2	255.0.0.0	N/A
	Gig0/0	192.168.4.1	255.255.255.0	N/A
	Gig0/1	192.168.5.1	255.255.255.0	N/A
Router4	Se0/3/0	18.0.0.2	255.0.0.0	N/A
	Fa0/1	192.168.11.1	255.255.255.0	N/A
Router5	Se0/1/0	11.0.0.2	255.0.0.0	N/A
	Se0/0/0	15.0.0.1	255.0.0.0	N/A
	Se0/1/1	12.0.0.1	255.0.0.0	N/A
	Se0/0/1	19.0.0.1	255.0.0.0	N/A
Router6	Se0/1/0	15.0.0.2	255.0.0.0	N/A
	Se0/1/1	16.0.0.2	255.0.0.0	N/A
	Gig0/0	192.168.15.1	255.255.255.0	N/A
Router7	Se0/1/1	16.0.0.1	255.0.0.0	N/A
	Gig0/0	192.168.7.1	255.255.255.0	N/A
	Gig0/1	192.168.8.1	255.255.255.0	N/A
Router8	Se0/3/0	19.0.0.2	255.0.0.0	N/A
	Fa0/1	192.168.12.1	255.255.255.0	N/A

Router9	Se0/1/0	12.0.0.2	255.0.0.0	N/A
	Se0/0/0	14.0.0.1	255.0.0.0	N/A
	Se0/1/1	20.0.0.1	255.0.0.0	N/A
Router10	Se0/1/0	14.0.0.2	255.0.0.0	N/A
	Se0/1/1	17.0.0.1	255.0.0.0	N/A
	Gig0/0	192.168.16.1	255.255.255.0	N/A
Router11	Se0/1/1	17.0.0.2	255.0.0.0	N/A
	Gig0/0	192.168.9.1	255.255.255.0	N/A
	Gig0/1	192.168.10.1	255.255.255.0	N/A
Router12	Se0/3/0	20.0.0.2	255.0.0.0	N/A
	Fa0/1	192.168.13.1	255.255.255.0	N/A
Jubail	N/A	Vlan 1	N/A	N/A
Khobar	N/A	Vlan 1	N/A	N/A
Switch1	N/A	Vlan 1	N/A	N/A
Riyadh	N/A	Vlan 1	N/A	N/A
AlQassim	N/A	Vlan 1	N/A	N/A
Switch2	N/A	Vlan 1	N/A	N/A
Jeddah	N/A	Vlan 1	N/A	N/A
Mecca	N/A	Vlan 1	N/A	N/A
Switch3	N/A	Vlan 1	N/A	N/A
Server0	NIC	192.168.14.2	255.255.255.0	192.168.14.1
Server1	NIC	192.168.15.2	255.255.255.0	192.168.15.1
Server2	NIC	192.168.16.2	255.255.255.0	192.168.16.1
PC1	NIC	192.168.4.2	255.255.255.0	192.168.4.1
PC2	NIC	192.168.5.2	255.255.255.0	192.168.5.1
PC3	NIC	192.168.7.2	255.255.255.0	192.168.7.1
PC4	NIC	192.168.8.2	255.255.255.0	192.168.8.1
PC5	NIC	192.168.9.2	255.255.255.0	192.168.9.1
PC6	NIC	192.168.10.2	255.255.255.0	192.168.10.1
Laptop1	NIC	192.168.4.3	255.255.255.0	192.168.4.1
Laptop2	NIC	192.168.5.3	255.255.255.0	192.168.5.1
Laptop3	NIC	192.168.7.3	255.255.255.0	192.168.7.1
Laptop4	NIC	192.168.8.3	255.255.255.0	192.168.8.1
Laptop5	NIC	192.168.9.3	255.255.255.0	192.168.9.1
Laptop6	NIC	192.168.10.3	255.255.255.0	192.168.10.1
Printer1	NIC	192.168.4.4	255.255.255.0	192.168.4.1
Printer2	NIC	192.168.5.4	255.255.255.0	192.168.5.1
Printer3	NIC	192.168.7.4	255.255.255.0	192.168.7.1
Printer4	NIC	192.168.8.4	255.255.255.0	192.168.8.1
Printer5	NIC	192.168.9.4	255.255.255.0	192.168.9.1
Printer6	NIC	192.168.10.4	255.255.255.0	192.168.10.1

Table 1 Addressing Table

- **Devices configurations.**

Router1 Configurations:

```
Router>enable
Router# config terminal
Router(config)#int s0/0/0
Router(config-if)#ip address 10.0.0.2 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#int s0/1/0
Router(config-if)#ip address 11.0.0.1 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#
Router(config)#int s0/1/1
Router(config-if)#ip address 18.0.0.1 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#
Router(config)#int s0/0/0
Router(config-if)#clock rate 64000
Router(config-if)#exit
Router(config)#
Router(config)#int s0/1/0
Router(config-if)#clock rate 64000
Router(config-if)#exit
Router(config)#
Router(config)#int s0/1/1
Router(config-if)#clock rate 64000
Router(config-if)#exit
Router(config)#
```

Router2 Configurations:

```
Router>enable
Router# config terminal
Router(config)#int s0/1/0
Router(config-if)#ip address 10.0.0.1 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#
Router(config)#int s0/1/1
Router(config-if)#ip address 13.0.0.1 255.0.0.0
```

```
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#
Router(config)#int g0/0
Router(config-if)#ip address 192.168.14.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#
Router(config)#int s0/1/1
Router(config-if)#clock rate 64000
Router(config-if)#exit
Router(config)#
```

Router3 Configurations:

```
Router>enable
Router# config terminal
Router(config)#int s0/1/1
Router(config-if)#ip address 13.0.0.2 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#
Router(config)#int g0/0
Router(config-if)#ip address 192.168.4.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#
Router(config)#int g0/1
Router(config-if)#ip address 192.168.5.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#
```

Router4 Configurations(IP Phone):

```
Router>enable
Router# config terminal
Router(config)#int s0/3/0
Router(config-if)#ip address 18.0.0.2 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#
Router(config)#int f0/1
Router(config-if)#ip address 192.168.11.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#exit
```

```

Router(config)#ip dhcp pool phone
Router(dhcp-config)#network 192.168.11.0 255.255.255.0
Router(dhcp-config)#default-router 192.168.11.1
Router(dhcp-config)#option 150 ip 192.168.11.1
Router(dhcp-config)#exit
Router(config)#tele
Router(config-telephony)#max-dn 4
Router(config-telephony)#max-ephone 4
Router(config-telephony)#ip source-address 192.168.11.1 port 2000
Router(config-telephony)#auto assign 1 to 4
Router(config-telephony)#exit
Router(config)#ephone-dn 1
Router(config-ephone-dn)#number 12000
Router(config-ephone-dn)#ephone-dn 2
Router(config-ephone-dn)#number 12300
Router(config-ephone-dn)#exit
Router(config)#

```

Router5 Configurations:

```

Router>enable
Router# config terminal
Router(config)#int s0/0/0
Router(config-if)#ip address 15.0.0.1 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#int s0/1/0
Router(config-if)#ip address 11.0.0.2 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#
Router(config)#int s0/1/1
Router(config-if)#ip address 12.0.0.1 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#
Router(config)#int s0/0/1
Router(config-if)#ip address 19.0.0.1 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#
Router(config)#int s0/0/0
Router(config-if)#clock rate 64000
Router(config-if)#exit
Router(config)#
Router(config)#int s0/1/1

```

```
Router(config-if)#clock rate 64000
Router(config-if)#exit
Router(config)#
Router(config)#int s0/0/1
Router(config-if)#clock rate 64000
Router(config-if)#exit
Router(config)#
```

Router6 Configurations:

```
Router>enable
Router# config terminal
Router(config)#int s0/1/0
Router(config-if)#ip address 15.0.0.2 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#int s0/1/1
Router(config-if)#ip address 16.0.0.2 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#
Router(config)#int g0/0
Router(config-if)#ip address 192.168.15.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#
Router(config)#int s0/1/1
Router(config-if)#clock rate 64000
Router(config-if)#exit
Router(config)#
```

Router7 Configurations:

```
Router>enable
Router# config terminal
Router(config)#int s0/1/1
Router(config-if)#ip address 16.0.0.1 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#int g0/0
Router(config-if)#ip address 192.168.7.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#
Router(config)#int g0/1
Router(config-if)#ip address 192.168.8.1 255.255.255.0
```



```
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#
```

Router8 Configurations(IP Phone):

```
Router>enable
Router# config terminal
Router(config)#int s0/3/0
Router(config-if)#ip address 19.0.0.2 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#
Router(config)#int f0/1
Router(config-if)#ip address 192.168.12.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#ip dhcp pool phone
Router(dhcp-config)#network 192.168.12.0 255.255.255.0
Router(dhcp-config)#default-router 192.168.12.1
Router(dhcp-config)#option 150 ip 192.168.12.1
Router(dhcp-config)#exit
Router(config)#tele
Router(config-telephony)#max-dn 4
Router(config-telephony)#max-ephone 4
Router(config-telephony)#ip source-address 192.168.12.1 port 2000
Router(config-telephony)#auto assign 1 to 4
Router(config-telephony)#exit
Router(config)#ephone-dn 1
Router(config-ephone-dn)#number 13000
Router(config-ephone-dn)#ephone-dn 2
Router(config-ephone-dn)#number 13400
Router(config-ephone-dn)#exit
Router(config)#
```

Router9 Configurations:

```
Router>enable
Router# config terminal
Router(config)#int s0/0/0
Router(config-if)#ip address 14.0.0.1 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#int s0/1/0
Router(config-if)#ip address 12.0.0.2 255.0.0.0
Router(config-if)#no shutdown
```

```
Router(config-if)#exit
Router(config)#
Router(config)#int s0/1/1
Router(config-if)#ip address 20.0.0.1 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#
Router(config)#int s0/0/0
Router(config-if)#clock rate 64000
Router(config-if)#exit
Router(config)#
Router(config)#int s0/1/1
Router(config-if)#clock rate 64000
Router(config-if)#exit
Router(config)#
```

Router10 Configurations:

```
Router>enable
Router# config terminal
Router(config)#int s0/1/0
Router(config-if)#ip address 14.0.0.2 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#int s0/1/1
Router(config-if)#ip address 17.0.0.1 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#
Router(config)#int g0/0
Router(config-if)#ip address 192.168.16.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#
Router(config)#int s0/1/1
Router(config-if)#clock rate 64000
Router(config-if)#exit
Router(config)#
```

Router11 Configurations:

```
Router>enable
Router# config terminal
Router(config)#int s0/1/1
Router(config-if)#ip address 17.0.0.2 255.0.0.0
```

```

Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#int g0/0
Router(config-if)#ip address 192.168.9.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#
Router(config)#int g0/1
Router(config-if)#ip address 192.168.10.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#

```

Router12 Configurations(IP Phone):

```

Router>enable
Router# config terminal
Router(config)#int s0/3/0
Router(config-if)#ip address 20.0.0.2 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#
Router(config)#int f0/1
Router(config-if)#ip address 192.168.13.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#ip dhcp pool phone
Router(dhcp-config)#network 192.168.13.0 255.255.255.0
Router(dhcp-config)#default-router 192.168.13.1
Router(dhcp-config)#option 150 ip 192.168.13.1
Router(dhcp-config)#exit
Router(config)#tele
Router(config-telephony)#max-dn 4
Router(config-telephony)#max-ephone 4
Router(config-telephony)#ip source-address 192.168.13.1 port 2000
Router(config-telephony)#auto assign 1 to 4
Router(config-telephony)#exit
Router(config)#ephone-dn 1
Router(config-ephone-dn)#number 14000
Router(config-ephone-dn)#ephone-dn 2
Router(config-ephone-dn)#number 14500
Router(config-ephone-dn)#exit
Router(config)#

```

Switch Configurations:

for Switch1, Switch2 and Switch3

```
Switch>enable
Switch# config terminal
Switch(config)#int range f0/1-24
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#switchport voice vlan 1
Switch(config-if-range)#exit
Switch(config)#
```

- **Protocols configurations.**

Configuration Routing RIP Of Router1:

```
Router>enable
Router# config terminal
Router(config)#router rip
Router(config-router)#version 2
Router(config-router)#network 10.0.0.0
Router(config-router)#network 11.0.0.0
Router(config-router)#network 18.0.0.0
Router(config-router)#no auto-summary
```

Configuration Routing RIP Of Router2:

```
Router>enable
Router# config terminal
Router(config)#router rip
Router(config-router)#version 2
Router(config-router)#passive-interface g0/0
Router(config-router)#network 10.0.0.0
Router(config-router)#network 13.0.0.0
Router(config-router)#network 192.168.14.0
Router(config-router)#no auto-summary
```

Configuration Routing RIP Of Router3:

```
Router>enable
Router# config terminal
Router(config)#router rip
Router(config-router)#version 2
Router(config-router)#passive-interface g0/0
Router(config-router)#passive-interface g0/1
Router(config-router)#network 13.0.0.0
Router(config-router)#network 192.168.4.0
```

```
Router(config-router)#network 192.168.5.0
Router(config-router)#no auto-summary
```

Configuration Routing RIP Of Router4:

```
Router>enable
Router# config terminal
Router(config)#router rip
Router(config-router)#version 2
Router(config-router)#passive-interface f0/1
Router(config-router)#network 18.0.0.0
Router(config-router)#network 192.168.11.0
Router(config-router)#no auto-summary
```

Configuration Routing RIP Of Router5:

```
Router>enable
Router# config terminal
Router(config)#router rip
Router(config-router)#version 2
Router(config-router)#network 11.0.0.0
Router(config-router)#network 15.0.0.0
Router(config-router)#network 12.0.0.0
Router(config-router)#network 19.0.0.0
Router(config-router)#no auto-summary
```

Configuration Routing RIP Of Router6:

```
Router>enable
Router# config terminal
Router(config)#router rip
Router(config-router)#version 2
Router(config-router)#passive-interface g0/0
Router(config-router)#network 15.0.0.0
Router(config-router)#network 16.0.0.0
Router(config-router)#network 192.168.15.0
Router(config-router)#no auto-summary
```

Configuration Routing RIP Of Router7:

```
Router>enable
```

```
Router# config terminal
Router(config)#router rip
Router(config-router)#version 2
Router(config-router)#passive-interface g0/0
Router(config-router)#passive-interface g0/1
Router(config-router)#network 16.0.0.0
Router(config-router)#network 192.168.7.0
Router(config-router)#network 192.168.8.0
Router(config-router)#no auto-summary
```

Configuration Routing RIP Of Router8:

```
Router>enable
Router# config terminal
Router(config)#router rip
Router(config-router)#version 2
Router(config-router)#passive-interface f0/1
Router(config-router)#network 19.0.0.0
Router(config-router)#network 192.168.12.0
Router(config-router)#no auto-summary
```

Configuration Routing RIP Of Router9:

```
Router>enable
Router# config terminal
Router(config)#router rip
Router(config-router)#version 2
Router(config-router)#network 12.0.0.0
Router(config-router)#network 14.0.0.0
Router(config-router)#network 20.0.0.0
Router(config-router)#no auto-summary
```

Configuration Routing RIP Of Router10:

```
Router>enable
Router# config terminal
Router(config)#router rip
Router(config-router)#version 2
Router(config-router)#passive-interface g0/0
Router(config-router)#network 14.0.0.0
Router(config-router)#network 17.0.0.0
Router(config-router)#network 192.168.16.0
Router(config-router)#no auto-summary
```

Configuration Routing RIP Of Router11:

```
Router>enable
Router# config terminal
Router(config)#router rip
Router(config-router)#version 2
Router(config-router)#passive-interface g0/0
Router(config-router)#passive-interface g0/1
Router(config-router)#network 17.0.0.0
Router(config-router)#network 192.168.9.0
Router(config-router)#network 192.168.10.0
Router(config-router)#no auto-summary
```

Configuration Routing RIP Of Router12:

```
Router>enable
Router# config terminal
Router(config)#router rip
Router(config-router)#version 2
Router(config-router)#passive-interface f0/1
Router(config-router)#network 20.0.0.0
Router(config-router)#network 192.168.13.0
Router(config-router)#no auto-summary
```

Configuration Routing BGP Of Router1:

```
Router>enable
Router# config terminal
Router(config)#router bgp 100
Router(config-router)#neighbor 10.0.0.1 remote-as 400
Router(config-router)#neighbor 11.0.0.2 remote-as 200
Router(config-router)#neighbor 18.0.0.2 remote-as 500
```

Configuration Routing BGP Of Router2:

```
Router>enable
Router# config terminal
Router(config)#router bgp 400
Router(config-router)#neighbor 10.0.0.2 remote-as 100
Router(config-router)#neighbor 13.0.0.2 remote-as 1000
Router(config-router)#network 192.168.14.0 mask 255.255.255.0
```

Configuration Routing BGP Of Router3:

```
Router>enable
Router# config terminal
Router(config)#router bgp 1000
Router(config-router)#neighbor 13.0.0.1 remote-as 400
Router(config-router)#network 192.168.4.0 mask 255.255.255.0
Router(config-router)#network 192.168.5.0 mask 255.255.255.0
```

Configuration Routing BGP Of Router4:

```
Router>enable
Router# config terminal
Router(config)#router bgp 500
Router(config-router)#neighbor 18.0.0.1 remote-as 100
Router(config-router)#network 192.168.11.0 mask 255.255.255.0
```

Configuration Routing BGP Of Router5:

```
Router>enable
Router# config terminal
Router(config)#router bgp 200
Router(config-router)#neighbor 11.0.0.1 remote-as 100
Router(config-router)#neighbor 15.0.0.2 remote-as 600
Router(config-router)#neighbor 19.0.0.2 remote-as 700
Router(config-router)#neighbor 12.0.0.2 remote-as 300
```

Configuration Routing BGP Of Router6:

```
Router>enable
Router# config terminal
Router(config)#router bgp 600
Router(config-router)#neighbor 15.0.0.1 remote-as 200
Router(config-router)#neighbor 16.0.0.1 remote-as 2000
Router(config-router)#network 192.168.15.0 mask 255.255.255.0
```

Configuration Routing BGP Of Router7:

```
Router>enable
Router# config terminal
Router(config)#router bgp 2000
Router(config-router)#neighbor 16.0.0.2 remote-as 600
Router(config-router)#network 192.168.7.0 mask 255.255.255.0
Router(config-router)#network 192.168.8.0 mask 255.255.255.0
```


Configuration Routing BGP Of Router8:

```
Router>enable
Router# config terminal
Router(config)#router bgp 700
Router(config-router)#neighbor 19.0.0.1 remote-as 200
Router(config-router)#network 192.168.12.0 mask 255.255.255.0
```

Configuration Routing BGP Of Router9:

```
Router>enable
Router# config terminal
Router(config)#router bgp 300
Router(config-router)#neighbor 12.0.0.1 remote-as 200
Router(config-router)#neighbor 14.0.0.2 remote-as 800
Router(config-router)#neighbor 20.0.0.2 remote-as 900
```

Configuration Routing BGP Of Router10:

```
Router>enable
Router# config terminal
Router(config)#router bgp 800
Router(config-router)#neighbor 14.0.0.1 remote-as 300
Router(config-router)#neighbor 17.0.0.2 remote-as 3000
Router(config-router)#network 192.168.16.0 mask 255.255.255.0
```

Configuration Routing BGP Of Router11:

```
Router>enable
Router# config terminal
Router(config)#router bgp 3000
Router(config-router)#neighbor 17.0.0.2 remote-as 800
Router(config-router)#network 192.168.9.0 mask 255.255.255.0
Router(config-router)#network 192.168.10.0 mask 255.255.255.0
```

Configuration Routing BGP Of Router12:

```
Router>enable
Router# config terminal
Router(config)#router bgp 900
Router(config-router)#neighbor 20.0.0.1 remote-as 300
Router(config-router)#network 192.168.13.0 mask 255.255.255.0
```

Results and Discussion

Based on the chosen metrics, we find that the Border Gateway Protocol consumes a higher percentage of CPU and memory than the RIP and we conclude from figure1 that the most efficient and performance in the network is the RIP protocol.

Protocol type	BGP	RIP
CPU	29.78 %	16.57%
Real Memory Size	1.77 GB	1.38 GB
Virtual Memory Size	12.50 GB	12.63 GB
Shared Memory Size	56.3 MB	43.8 MG
Private Memory Size	242.4 MG	154.8 MG

Table 2 Performance of BGP and RIP

Moreover, one of the tests used to make a comparison is the packet loss rate of Routing Information Protocol and Border Gateway Protocol using the ping command, followed by the IP address of the respective device to check inter-network communication on the computer for each network.

1. Routing Information Protocol

No	Sender	Receiver	Input	Output	(%)
1	PC1	PC3	4	4	0
2	PC1	PC5	4	4	0
3	PC3	PC1	4	4	0
4	PC3	PC5	4	4	0
5	PC5	PC1	4	4	0
6	PC5	PC3	4	4	0

Table 3 Result of packet loos in RIP

2. Border Gateway Protocol

No	Sender	Receiver	Input	Output	(%)
1	PC1	PC3	4	4	0
2	PC1	PC5	4	4	0
3	PC3	PC1	4	4	0
4	PC3	PC5	4	4	0
5	PC5	PC1	4	4	0
6	PC5	PC3	4	4	0

Table 4 Result of packet loos in BGP

From the results of verifying the connection using a computer from one network to another, we can say after sending 24 packets from the sender to the receiver that the packet loss rate is 0% in both protocols used in the network.

3. Conclusion

The following conclusions may be drawn based on the results:

1. The routing performance of RIP and BGP is excellent; after transmitting messages numerous times, RIP and BGP routing have an average packet loss of 0%
2. The RIP routing method of using network space works effectively, resulting in quicker and more efficient information distribution
3. RIP consumes less memory.

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