

## Practical No 6

**Aim:** Using Packet Tracer to create a network with three routers with RIPv2 and each router associated network will have minimum three PC and show the connectivity

**Theory:**

RIPv2 is an enhancement to the original RIP protocol developed in 1994. RIPv2 is also a distance vector routing protocol but has a few enhancements to make it more efficient than RIPv1.

RIPv2 is more efficient than RIPv1, but is not suitable for larger, more complex networks. It simply provides more flexibility on smaller networks.

RIPv2 uses the same routing metric as RIPv1, the hop count. Updates with RIPv2 are sent via multicasts and not broadcasts. RIPv2 can also be configured to do classless routing. When configured for classless routing, RIPv2 will transmit subnet masks when it sends routing updates. This allows for the use of subnetting and discontinuous networks.

RIPv2 allows for authentication to be required for updates. When authentication is enabled, each router is configured with the RIP update password. The password sent with the RIP update must match the password configured on the destination router. If the passwords do not match, then the receiving router will not process the update.

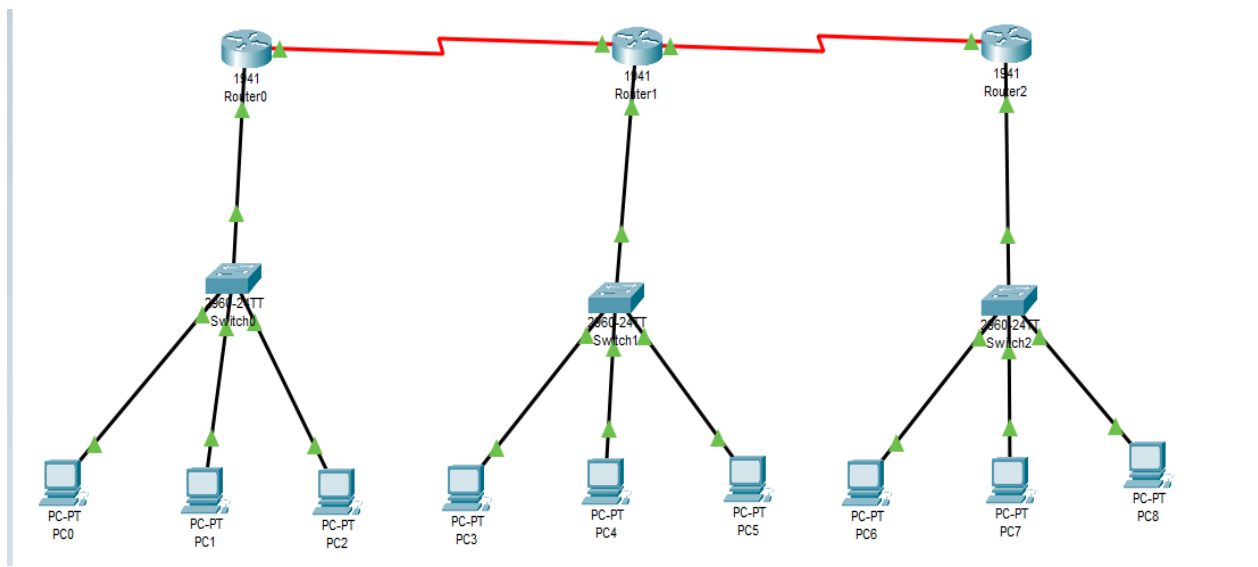
### Advantages of RIPv2

- 1) It's a standardized protocol.
- 2) It's VLSM compliant.
- 3) Provides fast convergence.
- 4) It sends triggered updates when the network changes.
- 5) Works with snapshot routing – making it ideal for dial networks.

### Disadvantage of RIPv2

- 1) Max hop count of 15, due to the 'count-to-infinity' vulnerability.
- 2) No concept of neighbors.
- 3) Exchanges entire table with all neighbors every 30 seconds (except in the case of a triggered update).

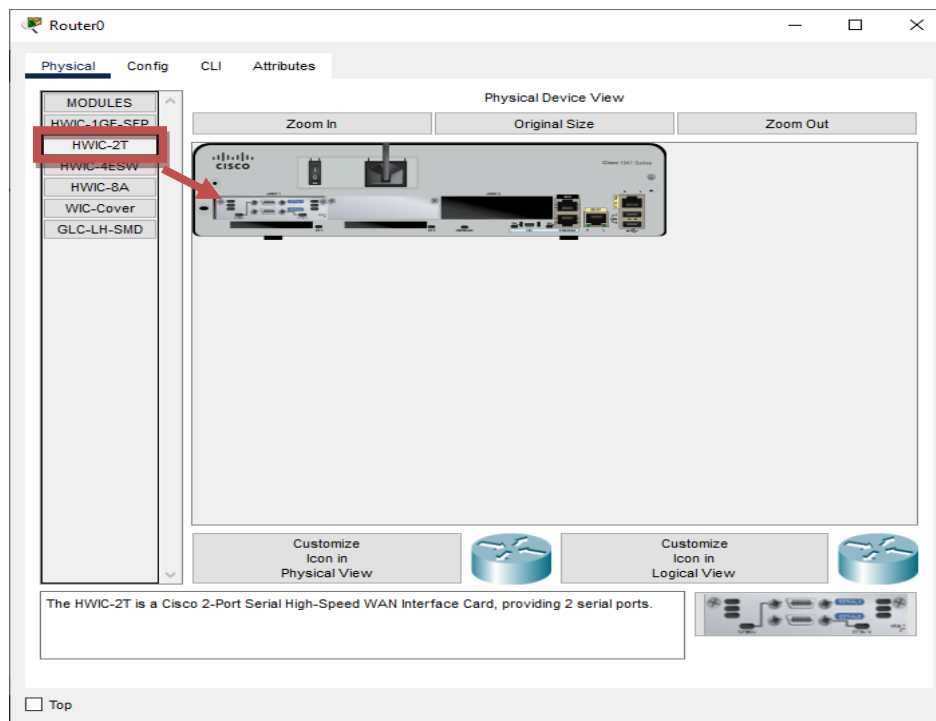
We use the following topology for the present case



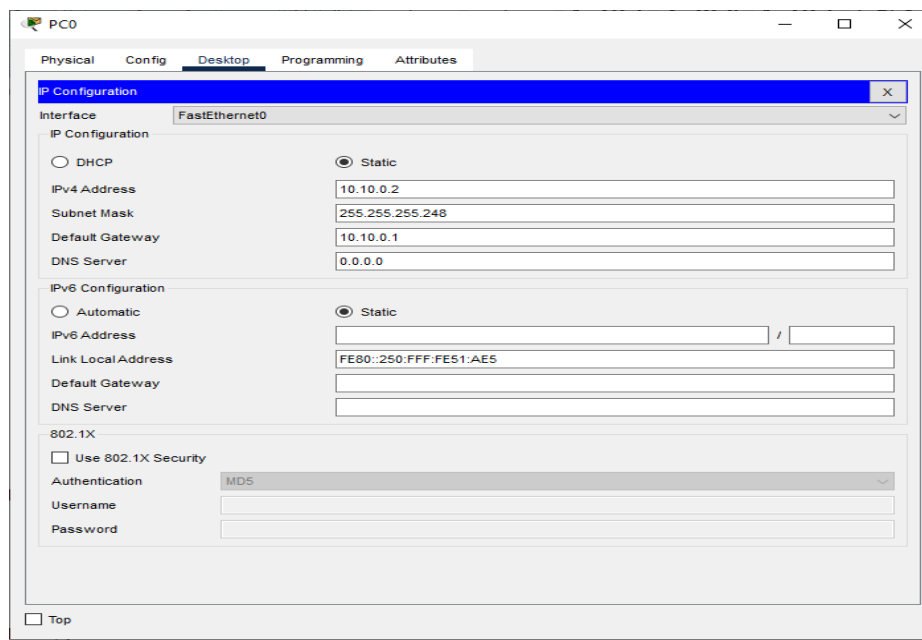
We configure the above network using the following IP addresses

Host	Interface	IP address	Subnet Mask	Network Address	Default Gateway
Router 0	G0/0	10.10.0.1	255.255.255.248	10.10.0.0	
	S0/1/0	192.168.0.1	255.255.255.252	192.168.0.0	
Router 1	G0/0	10.20.0.1	255.255.255.248	10.20.0.0	
	S0/1/0	192.168.0.2	255.255.255.252	192.168.0.0	
	S0/1/1	192.168.1.1	255.255.255.252	192.168.1.0	
Router 2	G0/0	10.30.0.1	255.255.255.248	10.30.0.0	
	S0/1/1	192.168.1.2	255.255.255.252	192.168.1.0	
PC0	FastEthernet0	10.10.0.2	255.255.255.248	10.10.0.0	10.10.0.1
PC1	FastEthernet0	10.10.0.3	255.255.255.248	10.10.0.0	10.10.0.1
PC2	FastEthernet0	10.10.0.4	255.255.255.248	10.10.0.0	10.10.0.1
PC3	FastEthernet0	10.20.0.2	255.255.255.248	10.20.0.0	10.20.0.1
PC4	FastEthernet0	10.20.0.3	255.255.255.248	10.20.0.0	10.20.0.1
PC5	FastEthernet0	10.20.0.4	255.255.255.248	10.20.0.0	10.20.0.1
PC6	FastEthernet0	10.30.0.2	255.255.255.248	10.30.0.0	10.30.0.1
PC7	FastEthernet0	10.30.0.3	255.255.255.248	10.30.0.0	10.30.0.1
PC8	FastEthernet0	10.30.0.4	255.255.255.248	10.30.0.0	10.30.0.1

## Adding Serial Interface in each Router



## Configuring PC0:



## Configuring PC1:

The screenshot shows the 'PC1' configuration window with the 'Desktop' tab selected. The 'IP Configuration' section is expanded, showing settings for the 'FastEthernet0' interface. The 'Static' radio button is selected under 'IP Configuration'. The IPv4 Address is set to 10.10.0.3, Subnet Mask to 255.255.255.248, Default Gateway to 10.10.0.1, and DNS Server to 0.0.0.0. The 'IPv6 Configuration' section is also expanded, showing 'Static' selected, with an empty IPv6 Address field, a Link Local Address of FE80::2D0:BAFF:FEA4:5B72, and empty fields for Default Gateway and DNS Server. The '802.1X' section is collapsed. A 'Top' button is at the bottom left.

Interface	FastEthernet0
<b>IP Configuration</b>	
<input type="radio"/> DHCP	<input checked="" type="radio"/> Static
IPv4 Address	10.10.0.3
Subnet Mask	255.255.255.248
Default Gateway	10.10.0.1
DNS Server	0.0.0.0
<b>IPv6 Configuration</b>	
<input type="radio"/> Automatic	<input checked="" type="radio"/> Static
IPv6 Address	
Link Local Address	FE80::2D0:BAFF:FEA4:5B72
Default Gateway	
DNS Server	
<b>802.1X</b>	
<input type="checkbox"/> Use 802.1X Security	
Authentication	MDS
Username	
Password	

☐ Top

## Configuring PC2:

The screenshot shows the 'PC2' configuration window with the 'Desktop' tab selected. The 'IP Configuration' section is expanded, showing settings for the 'FastEthernet0' interface. The 'Static' radio button is selected under 'IP Configuration'. The IPv4 Address is set to 10.10.0.4, Subnet Mask to 255.255.255.248, Default Gateway to 10.10.0.1, and DNS Server to 0.0.0.0. The 'IPv6 Configuration' section is also expanded, showing 'Static' selected, with an empty IPv6 Address field, a Link Local Address of FE80::2D0:BCFF:FE33:A758, and empty fields for Default Gateway and DNS Server. The '802.1X' section is collapsed. A 'Top' button is at the bottom left.

Interface	FastEthernet0
<b>IP Configuration</b>	
<input type="radio"/> DHCP	<input checked="" type="radio"/> Static
IPv4 Address	10.10.0.4
Subnet Mask	255.255.255.248
Default Gateway	10.10.0.1
DNS Server	0.0.0.0
<b>IPv6 Configuration</b>	
<input type="radio"/> Automatic	<input checked="" type="radio"/> Static
IPv6 Address	
Link Local Address	FE80::2D0:BCFF:FE33:A758
Default Gateway	
DNS Server	
<b>802.1X</b>	
<input type="checkbox"/> Use 802.1X Security	
Authentication	MDS
Username	
Password	

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## Configuring PC3:

The screenshot shows the configuration window for PC3. The 'Desktop' tab is selected. The 'IP Configuration' section is expanded, showing the 'FastEthernet0' interface. The 'Static' radio button is selected for both IPv4 and IPv6 configurations. The IPv4 address is 10.20.0.2, subnet mask is 255.255.255.248, default gateway is 10.20.0.1, and DNS server is 0.0.0.0. The IPv6 address is empty, link local address is FE80::2E0:8FFF:FE7E:6379, and default gateway and DNS server are empty. The '802.1X' section is also visible, with 'Use 802.1X Security' unchecked, authentication set to MD5, and username and password fields empty.

PC3

Physical Config Desktop Programming Attributes

IP Configuration

Interface: FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IPv4 Address: 10.20.0.2

Subnet Mask: 255.255.255.248

Default Gateway: 10.20.0.1

DNS Server: 0.0.0.0

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address: /

Link Local Address: FE80::2E0:8FFF:FE7E:6379

Default Gateway:

DNS Server:

802.1X

☐ Use 802.1X Security

Authentication: MD5

Username:

Password:

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## Configuring PC4:

The screenshot shows the configuration window for PC4. The 'Desktop' tab is selected. The 'IP Configuration' section is expanded, showing the 'FastEthernet0' interface. The 'Static' radio button is selected for both IPv4 and IPv6 configurations. The IPv4 address is 10.20.0.3, subnet mask is 255.255.255.248, default gateway is 10.20.0.1, and DNS server is 0.0.0.0. The IPv6 address is empty, link local address is FE80::2D0:FFFF:FE8B:2C17, and default gateway and DNS server are empty. The '802.1X' section is also visible, with 'Use 802.1X Security' unchecked, authentication set to MD5, and username and password fields empty.

PC4

Physical Config Desktop Programming Attributes

IP Configuration

Interface: FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IPv4 Address: 10.20.0.3

Subnet Mask: 255.255.255.248

Default Gateway: 10.20.0.1

DNS Server: 0.0.0.0

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address: /

Link Local Address: FE80::2D0:FFFF:FE8B:2C17

Default Gateway:

DNS Server:

802.1X

☐ Use 802.1X Security

Authentication: MD5

Username:

Password:

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## Configuring PC5:

The screenshot shows the configuration window for PC5. The 'Desktop' tab is selected. Under 'IP Configuration', the 'Static' radio button is chosen. The IPv4 Address is set to 10.20.0.4, Subnet Mask to 255.0.0.0, Default Gateway to 10.20.0.1, and DNS Server to 0.0.0.0. Under 'IPv6 Configuration', the 'Static' radio button is also chosen. The IPv6 Address field is empty, and the Link Local Address is set to FE80::230:F2FF:FE77:CBE7. The '802.1X' section has 'Use 802.1X Security' unchecked, 'Authentication' set to MD5, and empty fields for Username and Password. A 'Top' button is at the bottom left.

Field	Value
Interface	FastEthernet0
IP Configuration	Static
IPv4 Address	10.20.0.4
Subnet Mask	255.0.0.0
Default Gateway	10.20.0.1
DNS Server	0.0.0.0
IPv6 Configuration	Static
IPv6 Address	
Link Local Address	FE80::230:F2FF:FE77:CBE7
Default Gateway	
DNS Server	
802.1X	
Use 802.1X Security	<input type="checkbox"/>
Authentication	MD5
Username	
Password	

## Configuring PC6:

The screenshot shows the configuration window for PC6. The 'Desktop' tab is selected. Under 'IP Configuration', the 'Static' radio button is chosen. The IPv4 Address is set to 10.30.0.2, Subnet Mask to 255.255.255.248, Default Gateway to 10.30.0.1, and DNS Server to 0.0.0.0. Under 'IPv6 Configuration', the 'Static' radio button is also chosen. The IPv6 Address field is empty, and the Link Local Address is set to FE80::200:CFE:FE40:DCD0. The '802.1X' section has 'Use 802.1X Security' unchecked, 'Authentication' set to MD5, and empty fields for Username and Password. A 'Top' button is at the bottom left.

Field	Value
Interface	FastEthernet0
IP Configuration	Static
IPv4 Address	10.30.0.2
Subnet Mask	255.255.255.248
Default Gateway	10.30.0.1
DNS Server	0.0.0.0
IPv6 Configuration	Static
IPv6 Address	
Link Local Address	FE80::200:CFE:FE40:DCD0
Default Gateway	
DNS Server	
802.1X	
Use 802.1X Security	<input type="checkbox"/>
Authentication	MD5
Username	
Password	

## Configuring PC7:

The screenshot shows the configuration window for PC7. The 'Desktop' tab is selected. Under 'IP Configuration', the 'Interface' is 'FastEthernet0'. The 'IP Configuration' section has 'Static' selected. The fields are: IPv4 Address: 10.30.0.3, Subnet Mask: 255.0.0.0, Default Gateway: 10.30.0.1, DNS Server: 0.0.0.0. The 'IPv6 Configuration' section has 'Static' selected. The fields are: IPv6 Address: (empty), Link Local Address: FE80::202:4AFF:FE4A:9D36, Default Gateway: (empty), DNS Server: (empty). The '802.1X' section has 'Use 802.1X Security' unchecked, Authentication: MD5, Username: (empty), Password: (empty). A 'Top' button is at the bottom left.

## Configuring PC8:

The screenshot shows the configuration window for PC8. The 'Desktop' tab is selected. Under 'IP Configuration', the 'Interface' is 'FastEthernet0'. The 'IP Configuration' section has 'Static' selected. The fields are: IPv4 Address: 10.30.0.4, Subnet Mask: 255.0.0.0, Default Gateway: 10.30.0.1, DNS Server: 0.0.0.0. The 'IPv6 Configuration' section has 'Static' selected. The fields are: IPv6 Address: (empty), Link Local Address: FE80::240:BFF:FE65:D944, Default Gateway: (empty), DNS Server: (empty). The '802.1X' section has 'Use 802.1X Security' unchecked, Authentication: MD5, Username: (empty), Password: (empty). A 'Top' button is at the bottom left.

## Configuring IP addresses on Router 0

### i) Interface G0/0

The screenshot shows the configuration window for Router0, specifically the 'Config' tab for the GigabitEthernet0/0 interface. The left sidebar lists various configuration categories: GLOBAL, Settings, Algorithm Settings, ROUTING, Static, RIP, SWITCHING, VLAN Database, and INTERFACE. Under the INTERFACE category, GigabitEthernet0/0 is selected. The main configuration area for GigabitEthernet0/0 includes the following settings:

- Port Status: ☒ On
- Bandwidth: ☐ 1000 Mbps ☒ 100 Mbps ☐ 10 Mbps ☒ Auto
- Duplex: ☐ Half Duplex ☒ Full Duplex ☒ Auto
- MAC Address: 0090.0C15.A101
- IP Configuration:
  - IPv4 Address: 10.10.0.1
  - Subnet Mask: 255.255.255.248
- Tx Ring Limit: 10

### ii) Interface S0/1/0

The screenshot shows the configuration window for Router0, specifically the 'Config' tab for the Serial0/1/0 interface. The left sidebar lists various configuration categories: GLOBAL, Settings, Algorithm Settings, ROUTING, Static, RIP, SWITCHING, VLAN Database, and INTERFACE. Under the INTERFACE category, Serial0/1/0 is selected. The main configuration area for Serial0/1/0 includes the following settings:

- Port Status: ☒ On
- Duplex: ☒ Full Duplex
- Clock Rate: 1200
- IP Configuration:
  - IPv4 Address: 192.168.0.1
  - Subnet Mask: 255.255.255.252
- Tx Ring Limit: 10



## Configuring IP addresses on Router 1

### i) Interface G0/0

The screenshot shows the configuration window for Router1, specifically for the GigabitEthernet0/0 interface. The left sidebar lists various configuration categories: GLOBAL, Settings, Algorithm Settings, ROUTING, Static, RIP, SWITCHING, VLAN Database, and INTERFACE. Under the INTERFACE category, GigabitEthernet0/0 is selected. The main panel displays the configuration for GigabitEthernet0/0. The Port Status is set to On. The Bandwidth is set to 100 Mbps. The Duplex is set to Full Duplex. The MAC Address is 0001.9670.9B01. The IP Configuration section shows the IPv4 Address as 10.20.0.1 and the Subnet Mask as 255.255.255.248. The Tx Ring Limit is set to 10.

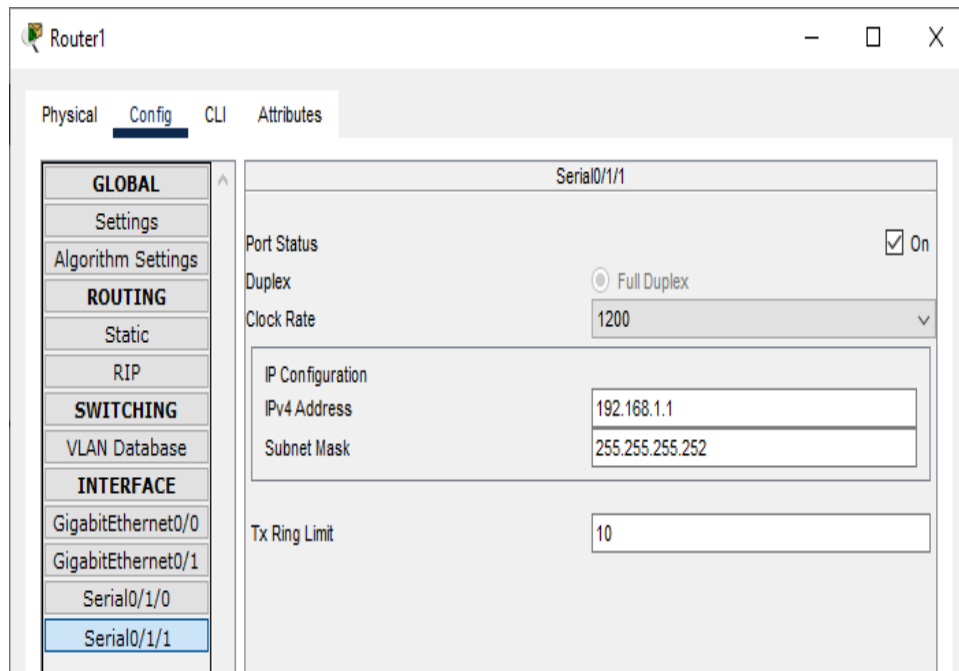
Parameter	Value
Port Status	On
Bandwidth	100 Mbps
Duplex	Full Duplex
MAC Address	0001.9670.9B01
IPv4 Address	10.20.0.1
Subnet Mask	255.255.255.248
Tx Ring Limit	10

### ii) Interface S0/1/0

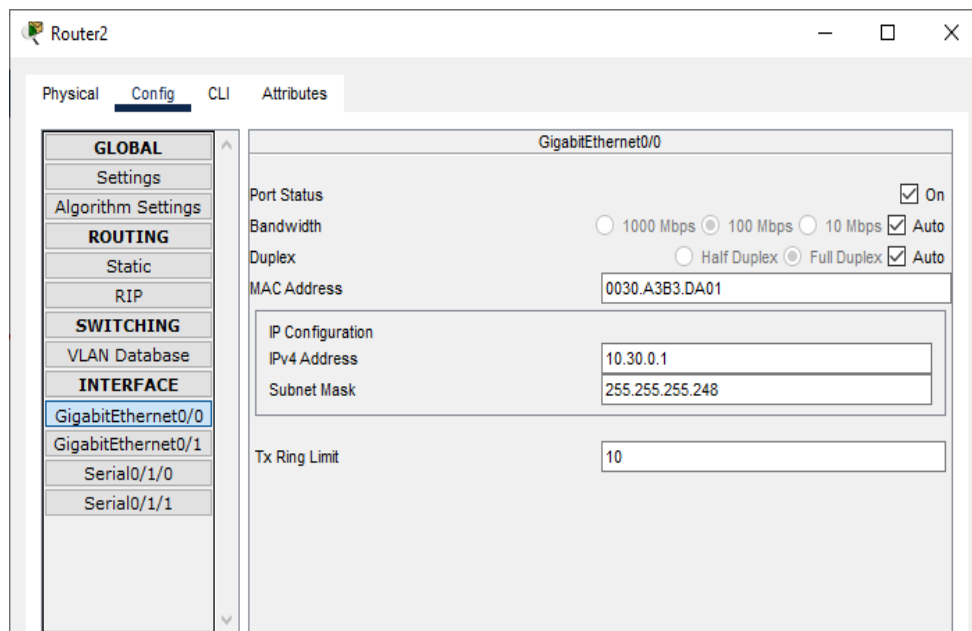
The screenshot shows the configuration window for Router1, specifically for the Serial0/1/0 interface. The left sidebar lists various configuration categories: GLOBAL, Settings, Algorithm Settings, ROUTING, Static, RIP, SWITCHING, VLAN Database, and INTERFACE. Under the INTERFACE category, Serial0/1/0 is selected. The main panel displays the configuration for Serial0/1/0. The Port Status is set to On. The Duplex is set to Full Duplex. The Clock Rate is set to 2000000. The IP Configuration section shows the IPv4 Address as 192.168.0.2 and the Subnet Mask as 255.255.255.252. The Tx Ring Limit is set to 10.

Parameter	Value
Port Status	On
Duplex	Full Duplex
Clock Rate	2000000
IPv4 Address	192.168.0.2
Subnet Mask	255.255.255.252
Tx Ring Limit	10

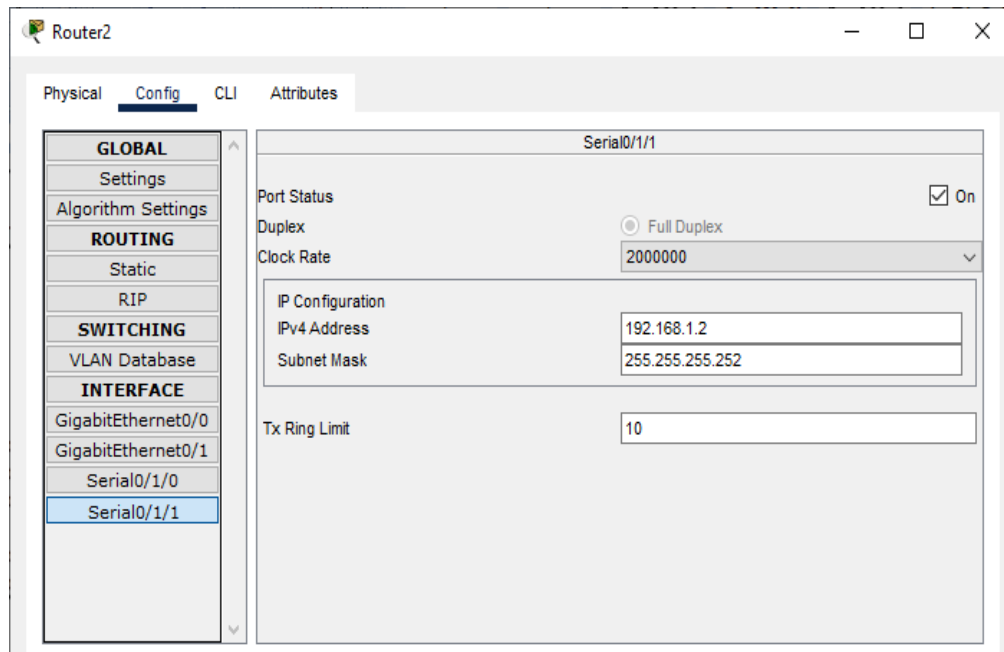
## iii) Interface S0/1/1

**Configuring IP addresses on Router 2**

## i) Interface G0/0



## ii) Interface S0/1/1

**Configuring Router 0 for RIPv2 (using the CLI mode)**

```
Router>enable
Router#configure terminal
Router(config)#router rip
Router(config-router)#version 2
Router(config-router)#network 10.10.0.0
Router(config-router)#network 192.168.0.0
Router(config-router)#exit
Router(config)#
```

**Configuring Router 1 for RIPv2 (using the CLI mode)**

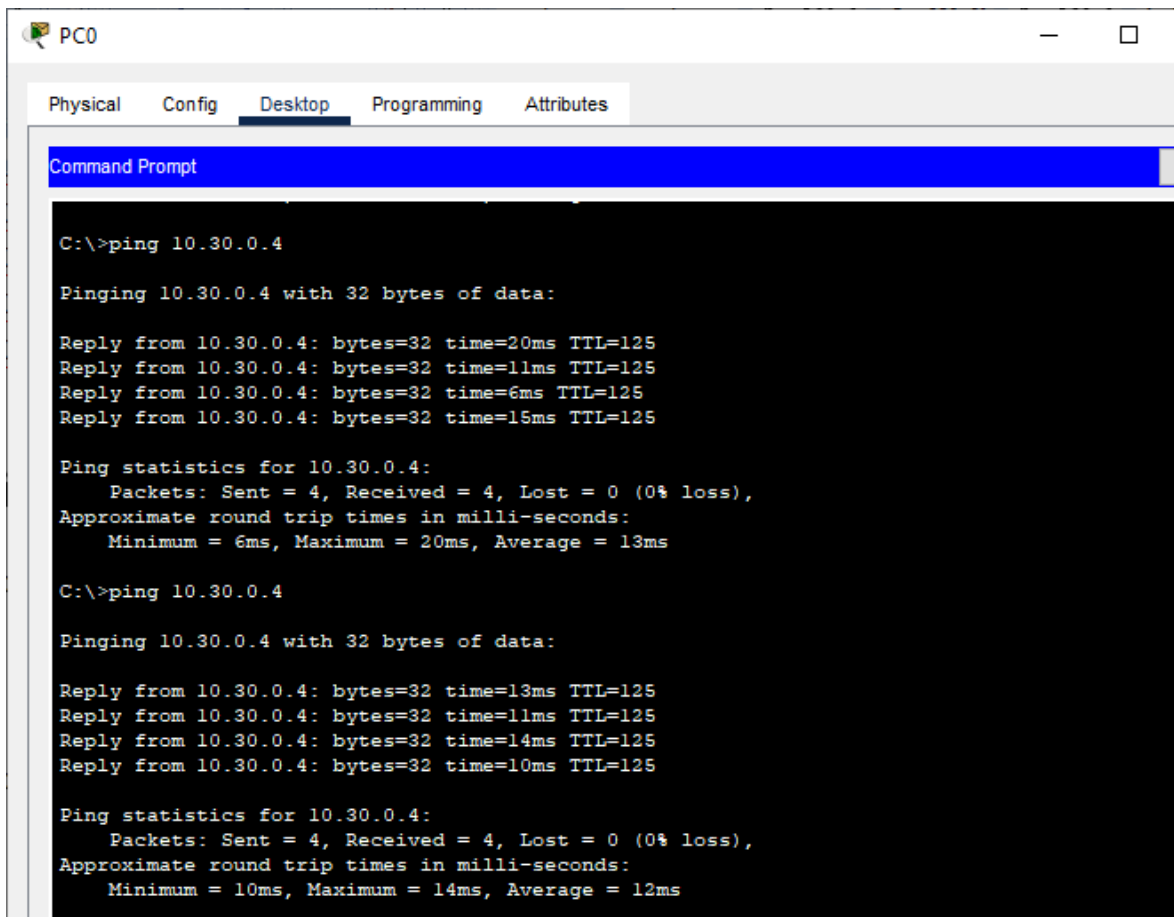
```
Router>enable
Router#configure terminal
Router(config)#router rip
Router(config-router)#version 2
Router(config-router)#network 10.20.0.0
Router(config-router)#network 192.168.0.0
Router(config-router)#network 192.168.1.0
Router(config-router)#exit
Router(config)#
```

## Configuring Router 2 for RIPv2 (using the CLI mode)

```
Router>enable
Router#configure terminal
Router(config)#router rip
Router(config-router)#version 2
Router(config-router)#network 10.30.0.0
Router(config-router)#network 192.168.1.0
Router(config-router)#exit
Router(config)#
```

## Checking the connectivity by using the ping command

- i) Pinging PC8 (ip address 10.30.0.4) from PC0



The screenshot shows a PC0 desktop environment with a window titled 'PC0'. The 'Desktop' tab is selected, displaying a 'Command Prompt' window. The command prompt shows two successful ping operations to the IP address 10.30.0.4. The first ping shows a 0% loss and an average round trip time of 13ms. The second ping also shows a 0% loss and an average round trip time of 12ms.

```
C:\>ping 10.30.0.4

Pinging 10.30.0.4 with 32 bytes of data:

Reply from 10.30.0.4: bytes=32 time=20ms TTL=125
Reply from 10.30.0.4: bytes=32 time=11ms TTL=125
Reply from 10.30.0.4: bytes=32 time=6ms TTL=125
Reply from 10.30.0.4: bytes=32 time=15ms TTL=125

Ping statistics for 10.30.0.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 6ms, Maximum = 20ms, Average = 13ms

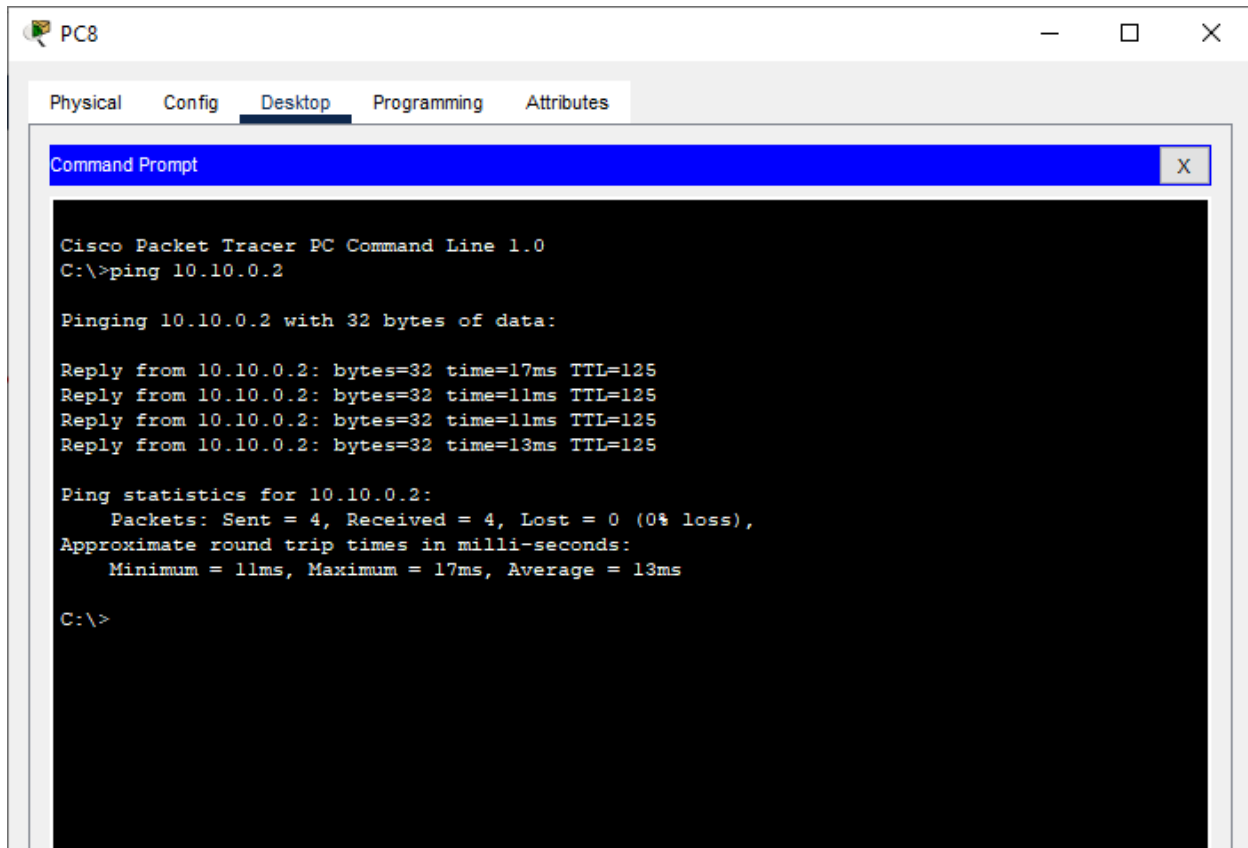
C:\>ping 10.30.0.4

Pinging 10.30.0.4 with 32 bytes of data:

Reply from 10.30.0.4: bytes=32 time=13ms TTL=125
Reply from 10.30.0.4: bytes=32 time=11ms TTL=125
Reply from 10.30.0.4: bytes=32 time=14ms TTL=125
Reply from 10.30.0.4: bytes=32 time=10ms TTL=125

Ping statistics for 10.30.0.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 10ms, Maximum = 14ms, Average = 12ms
```

ii) Pinging PC0 (ip address 10.10.0.2) from PC8



```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 10.10.0.2

Pinging 10.10.0.2 with 32 bytes of data:

Reply from 10.10.0.2: bytes=32 time=17ms TTL=125
Reply from 10.10.0.2: bytes=32 time=11ms TTL=125
Reply from 10.10.0.2: bytes=32 time=11ms TTL=125
Reply from 10.10.0.2: bytes=32 time=13ms TTL=125

Ping statistics for 10.10.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 11ms, Maximum = 17ms, Average = 13ms

C:\>
```

### Result:

Hence the RIPv2 has been studied and verified through the given network

**Link for the video demonstration of the practical:**

<https://youtu.be/qrBpjaxSkZY8>