

## Practical No 5

**Aim:** Using Packet Tracer to create a network with three routers with RIPv1 and each router associated network will have minimum three PC and show the connectivity

**Theory:**

RIP is one of the dynamic routing protocols and the first distance-vector routing protocol that uses the hop count as a routing metric. A lower hop count is preferred.

Each router between the source and destination network is counted as one hop. RIP prevents routing loops by imposing a maximum number of hops on the path between source and destination.

In RIP, Every 30 seconds, each router broadcasts its entire routing table to its nearest neighbors.

### Pros and Cons of RIP Protocol

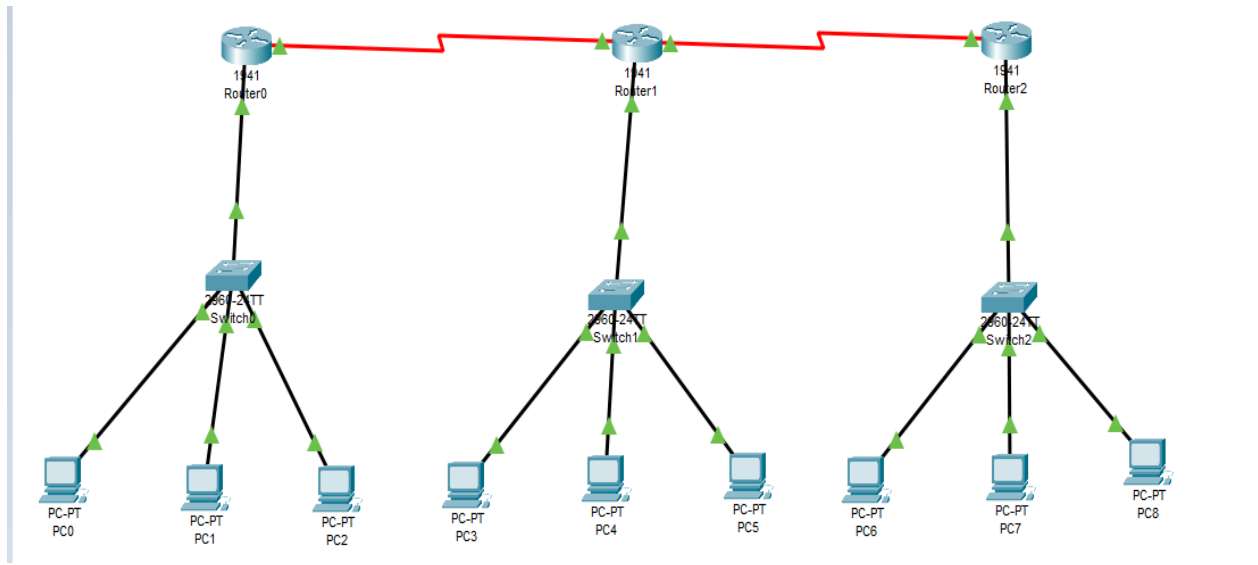
**Pros:**

1. The RIP protocol is ideal for small networks since it is simple to learn and configure.
2. RIP routing is guaranteed to work with nearly all routers.
3. When the network topology changes, RIP does not require an update.

**Cons:**

1. RIP does not support variable length subnet masks
2. RIP transmits updates every 30 seconds, which cause traffic and consumes bandwidth.
3. RIP hop counts are restricted to 15, hence any router beyond that distance is deemed infinity and becomes unreachable.
4. The rate of convergence is slow in RIP compared to other routing protocols. When a link fails, finding alternate network paths takes a long time.
5. RIP does not support multiple paths on the same route, which may result in extra routing loops.

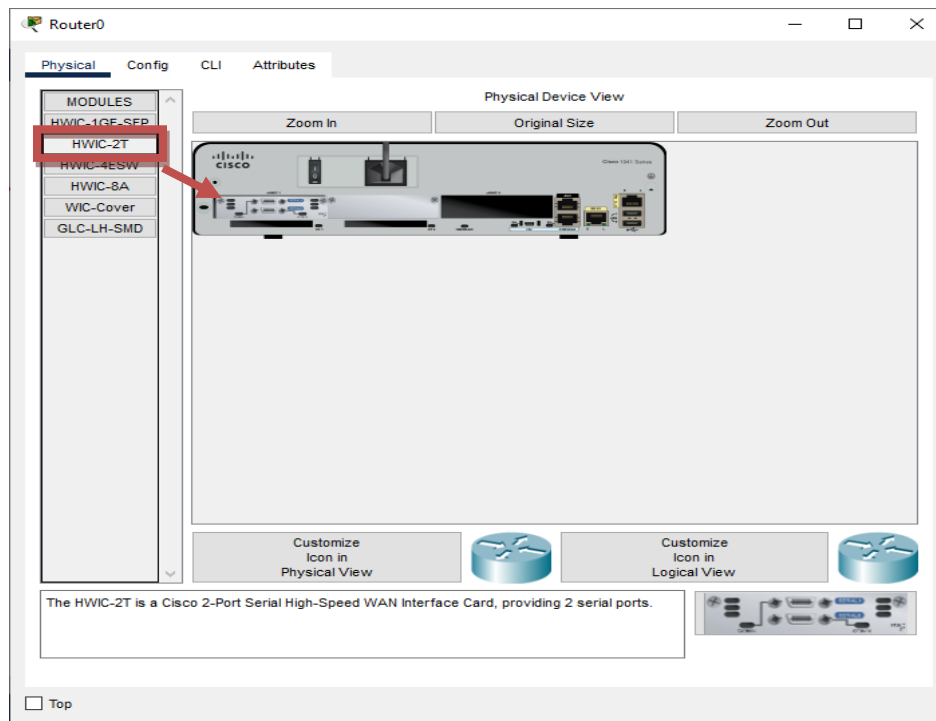
We use the following topology for the present case



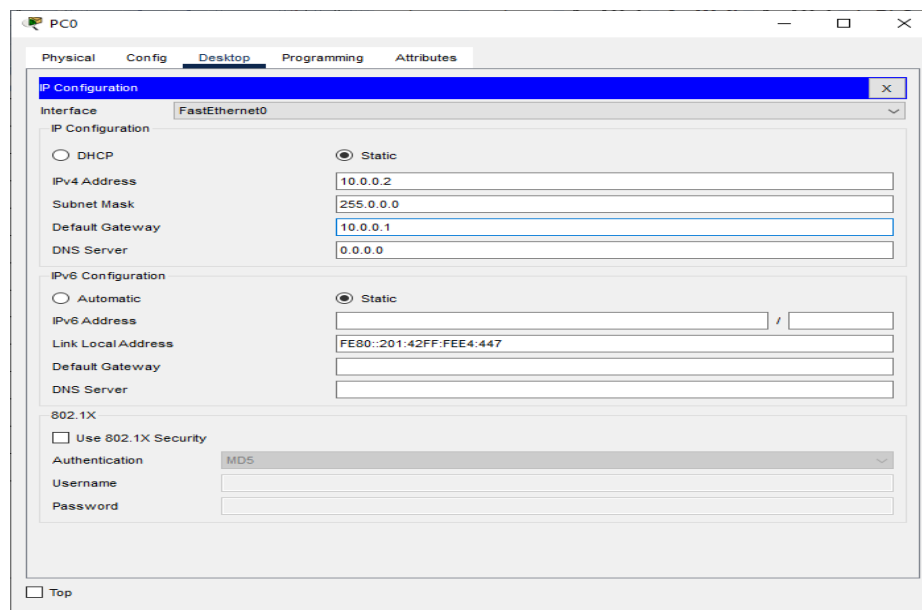
We configure the above network using the following IP addresses

Host	Interface	IP address	Network Address	Default Gateway
Router 0	G0/0	10.0.0.1	10.0.0.0	
	S0/1/0	192.168.0.1	192.168.0.0	
Router 1	G0/0	20.0.0.1	20.0.0.0	
	S0/1/0	192.168.0.2	192.168.0.0	
	S0/1/1	192.168.1.1	192.168.1.0	
Router 2	G0/0	30.0.0.1	30.0.0.0	
	S0/1/1	192.168.1.2	192.168.1.0	
PC0	FastEthernet0	10.0.0.2	10.0.0.0	10.0.0.1
PC1	FastEthernet0	10.0.0.3	10.0.0.0	10.0.0.1
PC2	FastEthernet0	10.0.0.4	10.0.0.0	10.0.0.1
PC3	FastEthernet0	20.0.0.2	20.0.0.0	20.0.0.1
PC4	FastEthernet0	20.0.0.3	20.0.0.0	20.0.0.1
PC5	FastEthernet0	20.0.0.4	20.0.0.0	20.0.0.1
PC6	FastEthernet0	30.0.0.2	30.0.0.0	30.0.0.1
PC7	FastEthernet0	30.0.0.3	30.0.0.0	30.0.0.1
PC8	FastEthernet0	30.0.0.4	30.0.0.0	30.0.0.1

## 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 for both IPv4 and IPv6 configurations. The IPv4 configuration includes an IP Address of 10.0.0.3, Subnet Mask of 255.0.0.0, Default Gateway of 10.0.0.1, and DNS Server of 0.0.0.0. The IPv6 configuration includes a Static IP Address, Link Local Address of FE80::205:5EFF:FE88:E00C, and a Default Gateway. The 802.1X section is also visible, with 'Use 802.1X Security' unchecked, Authentication set to MDS, and empty fields for Username and Password.

PC1

Physical Config Desktop Programming Attributes

IP Configuration

Interface FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IPv4 Address 10.0.0.3

Subnet Mask 255.0.0.0

Default Gateway 10.0.0.1

DNS Server 0.0.0.0

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address

Link Local Address FE80::205:5EFF:FE88:E00C

Default Gateway

DNS Server

802.1X

☐ 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 for both IPv4 and IPv6 configurations. The IPv4 configuration includes an IP Address of 10.0.0.4, Subnet Mask of 255.0.0.0, Default Gateway of 10.0.0.1, and DNS Server of 0.0.0.0. A warning message 'This address is already used in the network.' is displayed next to the IPv4 address field. The IPv6 configuration includes a Static IP Address, Link Local Address of FE80::2D0:BAFF:FE8E:684C, and a Default Gateway. The 802.1X section is also visible, with 'Use 802.1X Security' unchecked, Authentication set to MDS, and empty fields for Username and Password.

PC2

Physical Config Desktop Programming Attributes

IP Configuration

Interface FastEthernet0

IP Configuration

☐ DHCP ☒ Static This address is already used in the network.

IPv4 Address 10.0.0.4

Subnet Mask 255.0.0.0

Default Gateway 10.0.0.1

DNS Server 0.0.0.0

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address

Link Local Address FE80::2D0:BAFF:FE8E:684C

Default Gateway

DNS Server

802.1X

☐ Use 802.1X Security

Authentication MDS

Username

Password

Top

## Configuring PC3:

The screenshot shows the configuration window for PC3. The 'Desktop' tab is selected. Under 'IP Configuration', the 'Static' radio button is chosen. The IPv4 Address is set to 20.0.0.2, Subnet Mask to 255.0.0.0, Default Gateway to 20.0.0.1, and DNS Server to 0.0.0.0. The IPv6 Configuration section has 'Static' selected, with a Link Local Address of FE80::202:17FF:FE81:A06. The 802.1X section has 'Use 802.1X Security' unchecked, and Authentication set to MD5. A 'Top' button is at the bottom left.

IP Configuration	
Interface: FastEthernet0	
IP Configuration	
<input type="radio"/> DHCP	<input checked="" type="radio"/> Static
IPv4 Address	20.0.0.2
Subnet Mask	255.0.0.0
Default Gateway	20.0.0.1
DNS Server	0.0.0.0
IPv6 Configuration	
<input type="radio"/> Automatic	<input checked="" type="radio"/> Static
IPv6 Address	/
Link Local Address	FE80::202:17FF:FE81:A06
Default Gateway	
DNS Server	
802.1X	
<input type="checkbox"/> Use 802.1X Security	
Authentication	MD5
Username	
Password	

☐ Top

## Configuring PC4:

The screenshot shows the configuration window for PC4. The 'Desktop' tab is selected. Under 'IP Configuration', the 'Static' radio button is chosen. The IPv4 Address is set to 20.0.0.3, Subnet Mask to 255.0.0.0, Default Gateway to 20.0.0.1, and DNS Server to 0.0.0.0. The IPv6 Configuration section has 'Static' selected, with a Link Local Address of FE80::20A:41FF:FE13:AB7E. The 802.1X section has 'Use 802.1X Security' unchecked, and Authentication set to MD5. A 'Top' button is at the bottom left.

IP Configuration	
Interface: FastEthernet0	
IP Configuration	
<input type="radio"/> DHCP	<input checked="" type="radio"/> Static
IPv4 Address	20.0.0.3
Subnet Mask	255.0.0.0
Default Gateway	20.0.0.1
DNS Server	0.0.0.0
IPv6 Configuration	
<input type="radio"/> Automatic	<input checked="" type="radio"/> Static
IPv6 Address	/
Link Local Address	FE80::20A:41FF:FE13:AB7E
Default Gateway	
DNS Server	
802.1X	
<input type="checkbox"/> Use 802.1X Security	
Authentication	MD5
Username	
Password	

☐ Top

## 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 20.0.0.4, Subnet Mask to 255.0.0.0, Default Gateway to 20.0.0.1, and DNS Server to 0.0.0.0. The IPv6 Configuration section has 'Static' selected, with a Link Local Address of FE80::2E0:F9FF:FE0D:3AA. The 802.1X section has 'Use 802.1X Security' unchecked, and Authentication set to MD5. 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	20.0.0.4
Subnet Mask	255.0.0.0
Default Gateway	20.0.0.1
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::2E0:F9FF:FE0D:3AA
Default Gateway	
DNS Server	
<b>802.1X</b>	
<input type="checkbox"/> Use 802.1X Security	
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 30.0.0.2, Subnet Mask to 255.0.0.0, Default Gateway to 30.0.0.1, and DNS Server to 0.0.0.0. The IPv6 Configuration section has 'Static' selected, with a Link Local Address of FE80::2E0:F9FF:FE9A:D3AA. The 802.1X section has 'Use 802.1X Security' unchecked, and Authentication set to MD5. 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	30.0.0.2
Subnet Mask	255.0.0.0
Default Gateway	30.0.0.1
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::2E0:F9FF:FE9A:D3AA
Default Gateway	
DNS Server	
<b>802.1X</b>	
<input type="checkbox"/> Use 802.1X Security	
Authentication	MD5
Username	
Password	

## Configuring PC7:

The screenshot shows the configuration window for PC7. The 'Desktop' tab is selected. Under 'IP Configuration', the 'Static' radio button is chosen. The IPv4 Address is set to 30.0.0.3, Subnet Mask to 255.0.0.0, Default Gateway to 30.0.0.1, and DNS Server to 0.0.0.0. The IPv6 Configuration section has 'Static' selected, with a Link Local Address of FE80::201:C9FF:FEDC:D846. The 802.1X section is collapsed.

Field	Value
Interface	FastEthernet0
IP Configuration	Static
IPv4 Address	30.0.0.3
Subnet Mask	255.0.0.0
Default Gateway	30.0.0.1
DNS Server	0.0.0.0
IPv6 Configuration	Static
IPv6 Address	
Link Local Address	FE80::201:C9FF:FEDC:D846
Default Gateway	
DNS Server	
802.1X	Use 802.1X Security: <input type="checkbox"/>
Authentication	MDS
Username	
Password	

## Configuring PC8:

The screenshot shows the configuration window for PC8. The 'Desktop' tab is selected. Under 'IP Configuration', the 'Static' radio button is chosen. The IPv4 Address is set to 30.0.0.4, Subnet Mask to 255.0.0.0, Default Gateway to 30.0.0.1, and DNS Server to 0.0.0.0. The IPv6 Configuration section has 'Static' selected, with a Link Local Address of FE80::260:3EFF:FE25:E1BE. The 802.1X section is collapsed.

Field	Value
Interface	FastEthernet0
IP Configuration	Static
IPv4 Address	30.0.0.4
Subnet Mask	255.0.0.0
Default Gateway	30.0.0.1
DNS Server	0.0.0.0
IPv6 Configuration	Static
IPv6 Address	
Link Local Address	FE80::260:3EFF:FE25:E1BE
Default Gateway	
DNS Server	
802.1X	Use 802.1X Security: <input type="checkbox"/>
Authentication	MDS
Username	
Password	

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

```
Router>en
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface gigabitEthernet 0/0
Router(config-if)#ip address 10.0.0.1 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#interface serial 0/1/0
Router(config-if)#ip address 192.168.0.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#
Router#
```

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

```
Router>enable
Router#configure terminal
Router(config)#interface gigabitEthernet 0/0
Router(config-if)#ip address 20.0.0.1 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exit

Router(config)#interface serial 0/1/0
Router(config-if)#ip address 192.168.0.2 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#exit

Router(config)#interface serial 0/1/1
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#no shutdown
```



## Configuring Router 2 (using the CLI mode)

```
Router>enable
Router#configure terminal
Router(config)#interface gigabitEthernet 0/0
Router(config-if)#ip address 30.0.0.1 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exit

Router(config)#interface serial 0/1/1
Router(config-if)#ip address 192.168.1.2 255.255.255.0
Router(config-if)#no shutdown
```

## Setting the RIPv1 on Router 0

```
Router>enable
Router#configure terminal
Router(config)#router rip
Router(config-router)#network 10.0.0.0
Router(config-router)#network 192.168.0.0
Router(config-router)#exit
```

## Setting the RIPv1 on Router 1

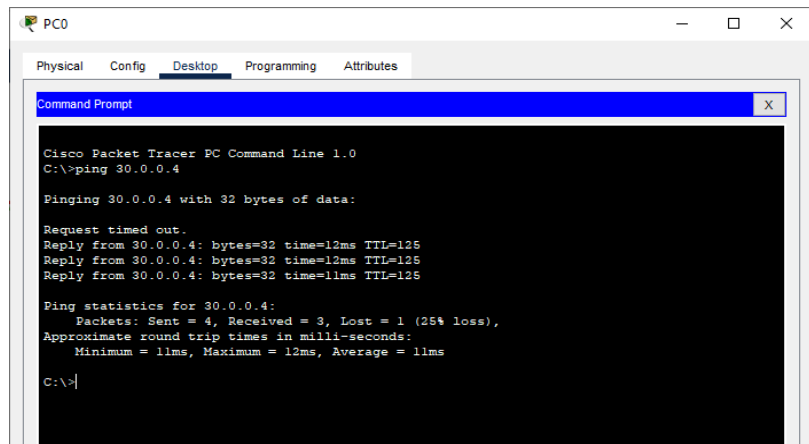
```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router rip
Router(config-router)#network 192.168.0.0
Router(config-router)#network 20.0.0.0
Router(config-router)#network 192.168.1.0
Router(config-router)#exit
Router(config)#
Router#
```

## Setting the RIPv1 on Router 2

```
Router>enable
Router#configure terminal
Router(config)#router rip
Router(config-router)#network 192.168.1.0
Router(config-router)#network 30.0.0.0
Router(config-router)#exit
Router(config)#
```

## Checking the connectivity by using the ping command

Pinging PC8 (ip address 30.0.0.4) from PC0



```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 30.0.0.4

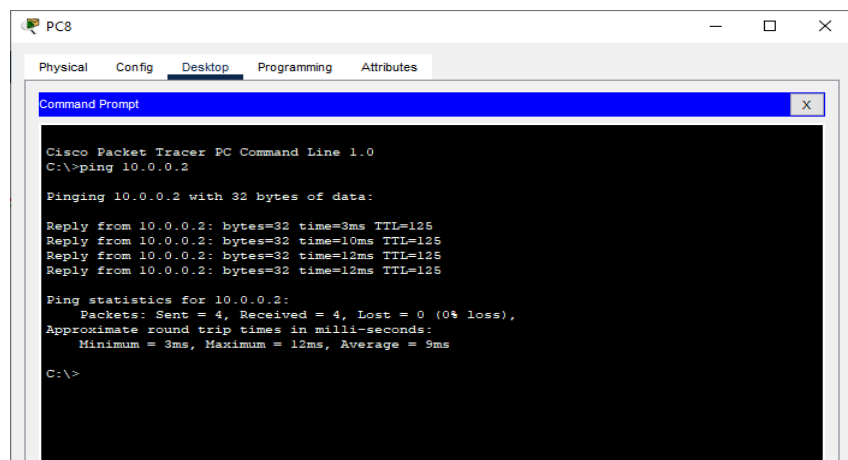
Pinging 30.0.0.4 with 32 bytes of data:

Request timed out.
Reply from 30.0.0.4: bytes=32 time=12ms TTL=125
Reply from 30.0.0.4: bytes=32 time=12ms TTL=125
Reply from 30.0.0.4: bytes=32 time=11ms TTL=125

Ping statistics for 30.0.0.4:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 11ms, Maximum = 12ms, Average = 11ms

C:\>
```

Pinging PC0 (ip address 10.0.0.2) from PC8



```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 10.0.0.2

Pinging 10.0.0.2 with 32 bytes of data:

Reply from 10.0.0.2: bytes=32 time=3ms TTL=125
Reply from 10.0.0.2: bytes=32 time=10ms TTL=125
Reply from 10.0.0.2: bytes=32 time=12ms TTL=125
Reply from 10.0.0.2: bytes=32 time=12ms TTL=125

Ping statistics for 10.0.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 3ms, Maximum = 12ms, Average = 9ms

C:\>
```

### Result:

Hence the RIPv1 has been studied and verified through the given network

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

<https://youtu.be/DLMpobkrDGw>