

Practical 5

Configure IP routing using RIP

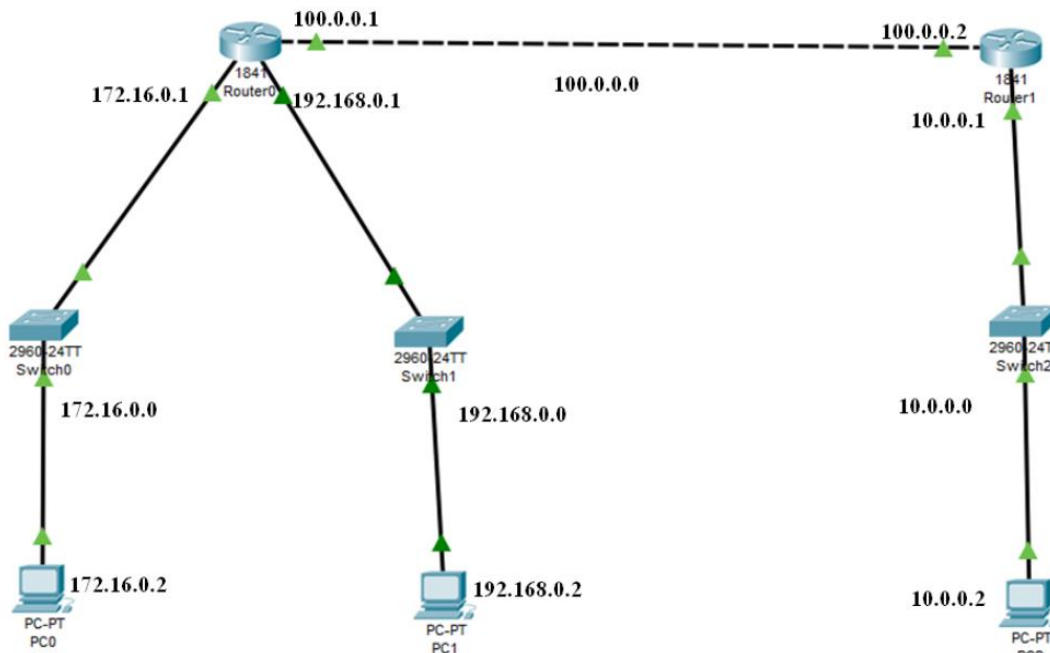
Aim: Configure IP routing using Routing Information Protocol (RIP)

Theory:

RIP (Routing Information Protocol) is a standardized Distance Vector protocol, designed for use on smaller networks. RIP was one of the first true Distance Vector routing protocols, and is supported on a wide variety of systems. RIP adheres to the following Distance Vector characteristics:

- RIP sends out periodic routing updates (every 30 seconds)
 - RIP sends out the full routing table every periodic update
 - RIP uses a form of distance as its metric (in this case, hopcount)
 - RIP uses the Bellman-Ford Distance Vector algorithm to determine the best “path” to a particular destination
- Other characteristics of RIP include:
- RIP supports IP and IPX routing.
 - RIP utilizes UDP port 520
 - RIP routes have an administrative distance of 120.
 - RIP has a maximum hopcount of 15 hops. Any network that is 16 hops away or more is considered unreachable to RIP, thus the maximum diameter of the network is 15 hops. A metric of 16 hops in RIP is considered a poison route or infinity metric.

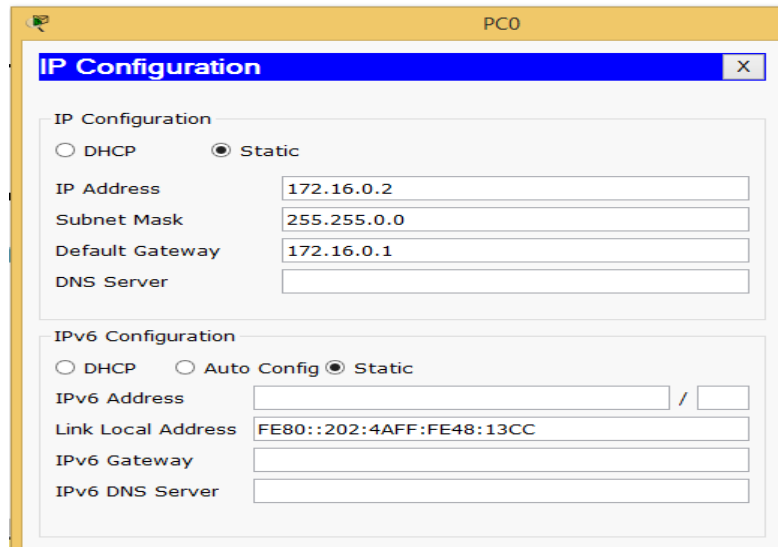
We study the RIP protocol using the following network



By Default Routers have 2-interfaces in most of the cases, but in our case we need 3-interfaces for Router 0, hence we need to add one interface in Router 0

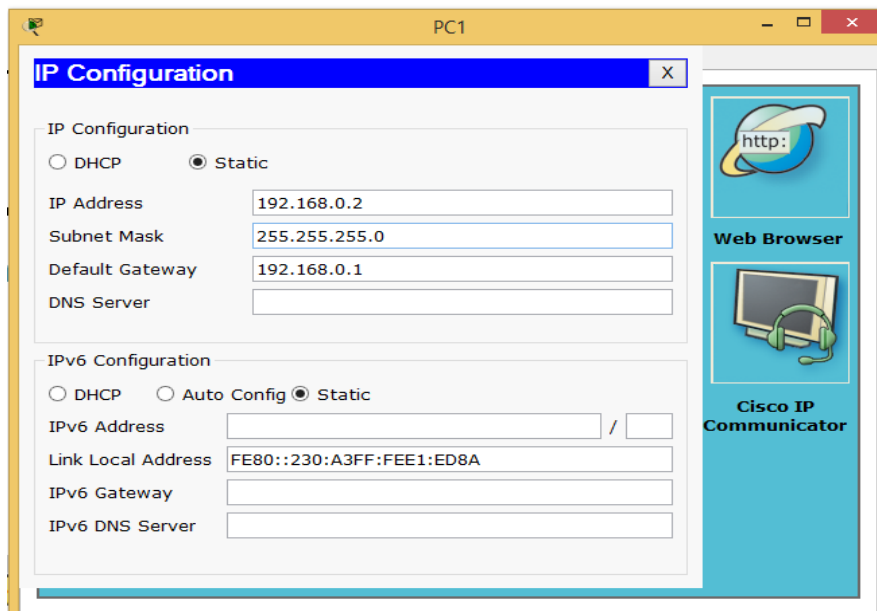
Now we configure the PC's and Routers as follows

Step 1: Configuring PC0

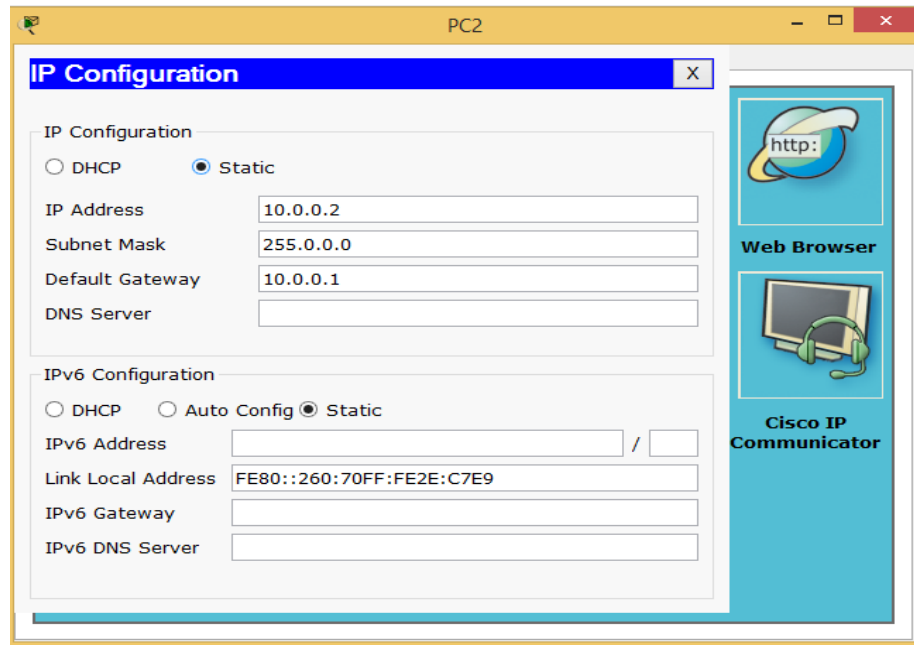


The screenshot shows the 'IP Configuration' window for PC0. The window has a title bar with 'PC0' and a close button. The main content area is divided into two sections: 'IP Configuration' and 'IPv6 Configuration'. In the 'IP Configuration' section, the 'Static' radio button is selected. The fields are filled with: IP Address: 172.16.0.2, Subnet Mask: 255.255.0.0, Default Gateway: 172.16.0.1, and DNS Server: (empty). In the 'IPv6 Configuration' section, the 'Static' radio button is selected. The fields are filled with: IPv6 Address: (empty), Link Local Address: FE80::202:4AFF:FE48:13CC, IPv6 Gateway: (empty), and IPv6 DNS Server: (empty).

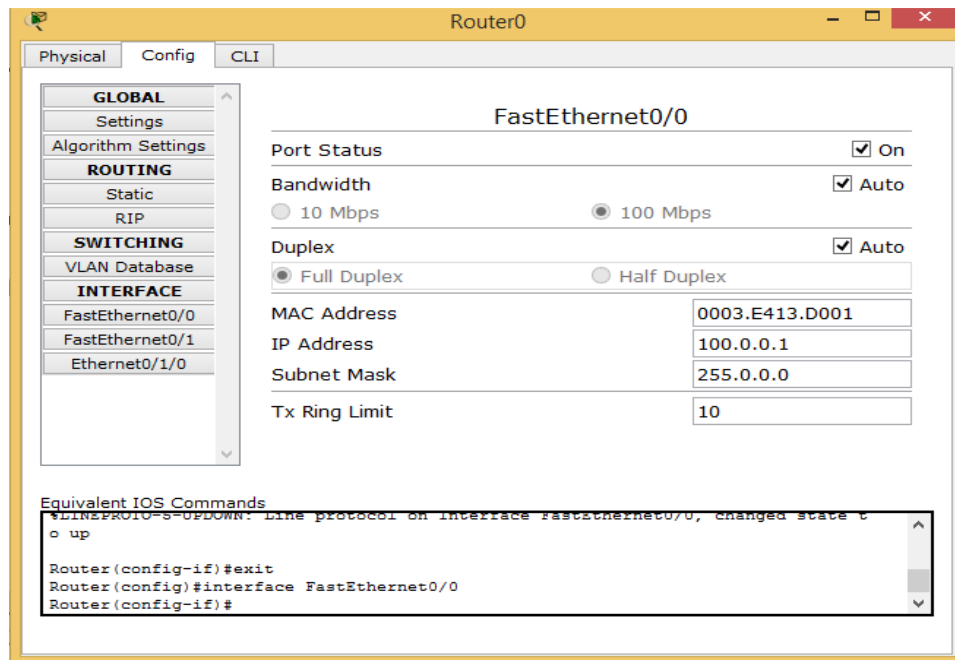
Step 2: Configuring PC1



The screenshot shows the 'IP Configuration' window for PC1. The window has a title bar with 'PC1' and standard window controls. The main content area is divided into two sections: 'IP Configuration' and 'IPv6 Configuration'. In the 'IP Configuration' section, the 'Static' radio button is selected. The fields are filled with: IP Address: 192.168.0.2, Subnet Mask: 255.255.255.0, Default Gateway: 192.168.0.1, and DNS Server: (empty). In the 'IPv6 Configuration' section, the 'Static' radio button is selected. The fields are filled with: IPv6 Address: (empty), Link Local Address: FE80::230:A3FF:FEE1:ED8A, IPv6 Gateway: (empty), and IPv6 DNS Server: (empty). On the right side of the window, there is a sidebar with two icons: 'Web Browser' (with an 'http:' icon) and 'Cisco IP Communicator' (with a headset icon).

Step 3: Configuring PC0

The screenshot shows the 'IP Configuration' window for PC2. It has two tabs: 'IP Configuration' and 'IPv6 Configuration'. In the 'IP Configuration' tab, the 'Static' radio button is selected. The fields are filled with: IP Address: 10.0.0.2, Subnet Mask: 255.0.0.0, Default Gateway: 10.0.0.1, and DNS Server: (empty). In the 'IPv6 Configuration' tab, the 'Static' radio button is selected. The fields are filled with: IPv6 Address: (empty), Link Local Address: FE80::260:70FF:FE2E:C7E9, IPv6 Gateway: (empty), and IPv6 DNS Server: (empty). On the right side of the window, there are two icons: 'Web Browser' and 'Cisco IP Communicator'.

Step 4: (configure Router 0)

The screenshot shows the 'Router0' configuration window. It has three tabs: 'Physical', 'Config', and 'CLI'. The 'Config' tab is selected. On the left, there is a tree view with the following categories: GLOBAL, ROUTING, SWITCHING, and INTERFACE. Under 'INTERFACE', 'FastEthernet0/0' is selected. The main area shows the configuration for 'FastEthernet0/0'. The fields are: Port Status: On (checked), Bandwidth: 100 Mbps (selected), Duplex: Full Duplex (selected), MAC Address: 0003.E413.D001, IP Address: 100.0.0.1, Subnet Mask: 255.0.0.0, and Tx Ring Limit: 10. At the bottom, there is a text box labeled 'Equivalent IOS Commands' containing the following commands:

```
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 100.0.0.1 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exit
```

Router0

Physical Config CLI

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

SWITCHING

VLAN Database

INTERFACE

FastEthernet0/0

FastEthernet0/1

Ethernet0/1/0

FastEthernet0/1

Port Status ☒ On

Bandwidth ☒ Auto

☐ 10 Mbps ☒ 100 Mbps

Duplex ☒ Auto

☒ Full Duplex ☐ Half Duplex

MAC Address 0003.E413.D002

IP Address 172.16.0.1

Subnet Mask 255.255.0.0

Tx Ring Limit 10

Equivalent IOS Commands

```
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/1
Router(config-if)#
```

Router0

Physical Config CLI

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

SWITCHING

VLAN Database

INTERFACE

FastEthernet0/0

FastEthernet0/1

Ethernet0/1/0

Ethernet0/1/0

Port Status ☒ On

Bandwidth ☒ Auto

☐ 10 Mbps

Duplex ☒ Auto

☒ Full Duplex ☐ Half Duplex

MAC Address 00E0.F97B.C633

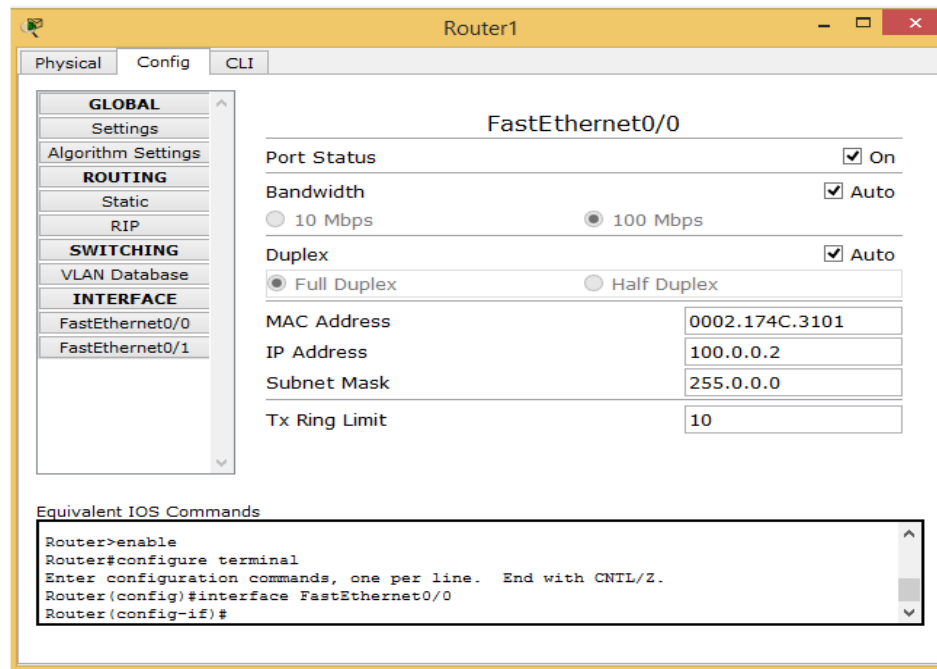
IP Address 192.168.0.1

Subnet Mask 255.255.255.0

Tx Ring Limit 10

Equivalent IOS Commands

```
Router(config-if)#exit
Router(config)#interface FastEthernet0/1
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Ethernet0/1/0
Router(config-if)#
```

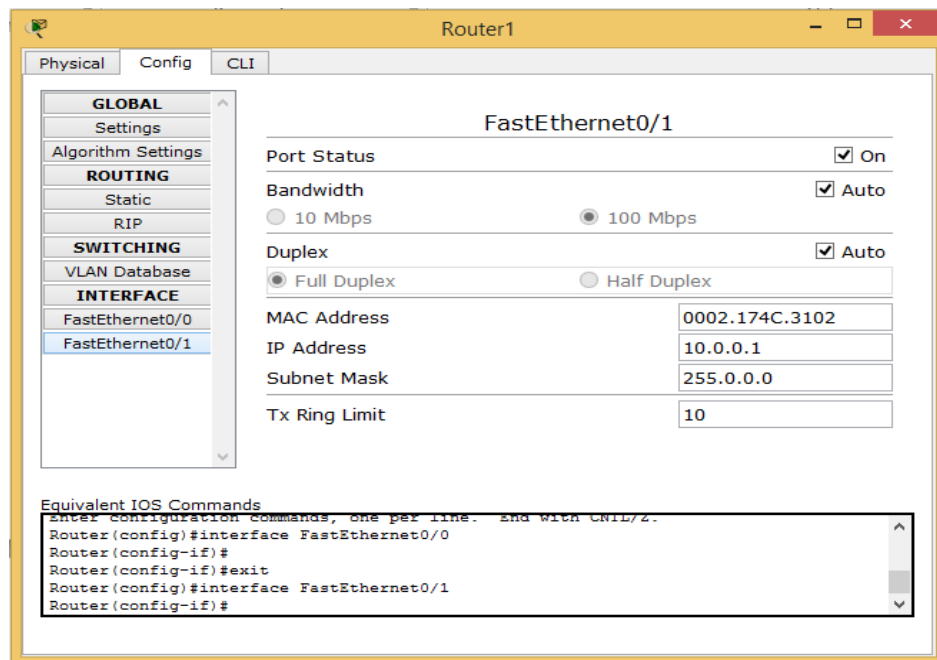
Step 5: (configure Router 1)

The screenshot shows the configuration window for Router1, specifically for the FastEthernet0/0 interface. The left sidebar contains a tree view with categories: GLOBAL, Settings, Algorithm Settings, ROUTING, Static, RIP, SWITCHING, VLAN Database, and INTERFACE. Under INTERFACE, FastEthernet0/0 is selected. The main area displays the configuration for FastEthernet0/0 with the following settings:

- Port Status: ☒ On
- Bandwidth: ☒ Auto (radio buttons for 10 Mbps and 100 Mbps, with 100 Mbps selected)
- Duplex: ☒ Auto (radio buttons for Full Duplex and Half Duplex, with Full Duplex selected)
- MAC Address: 0002.174C.3101
- IP Address: 100.0.0.2
- Subnet Mask: 255.0.0.0
- Tx Ring Limit: 10

Below the configuration fields, there is a section titled "Equivalent IOS Commands" with a text area containing the following commands:

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#
```



The screenshot shows the configuration window for Router1, specifically for the FastEthernet0/1 interface. The left sidebar is the same as in the previous screenshot, but FastEthernet0/1 is now selected under the INTERFACE category. The main area displays the configuration for FastEthernet0/1 with the following settings:

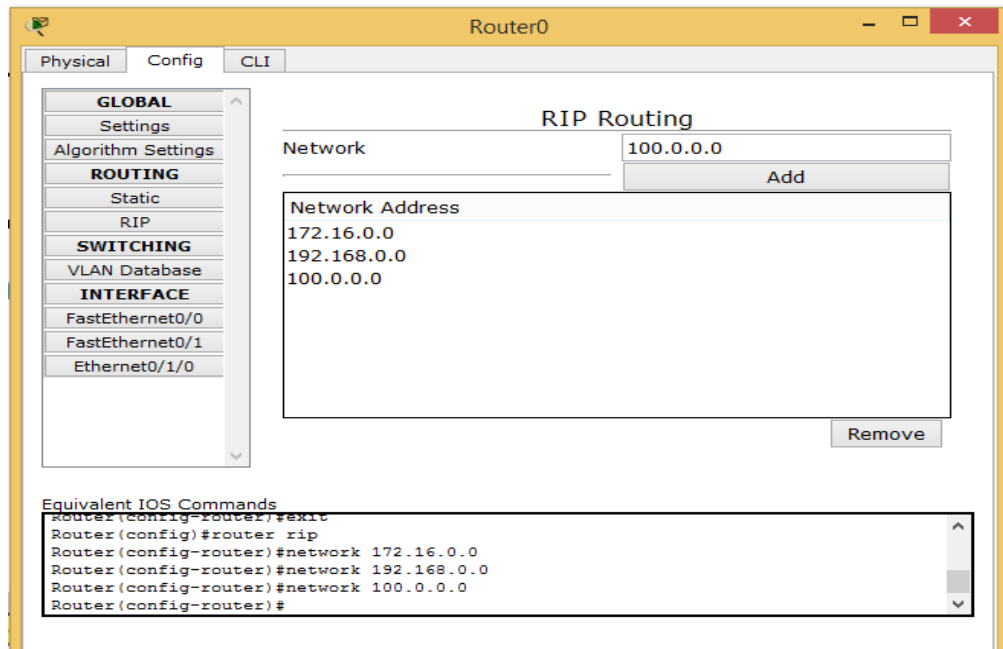
- Port Status: ☒ On
- Bandwidth: ☒ Auto (radio buttons for 10 Mbps and 100 Mbps, with 100 Mbps selected)
- Duplex: ☒ Auto (radio buttons for Full Duplex and Half Duplex, with Full Duplex selected)
- MAC Address: 0002.174C.3102
- IP Address: 10.0.0.1
- Subnet Mask: 255.0.0.0
- Tx Ring Limit: 10

Below the configuration fields, there is a section titled "Equivalent IOS Commands" with a text area containing the following commands:

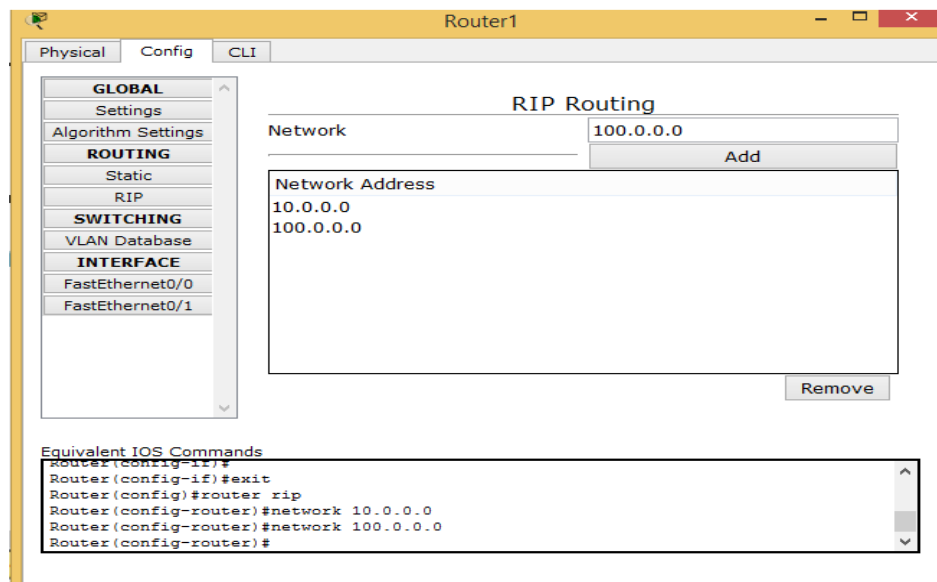
```
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/1
Router(config-if)#
```

Now we configure the routing table for both the routers

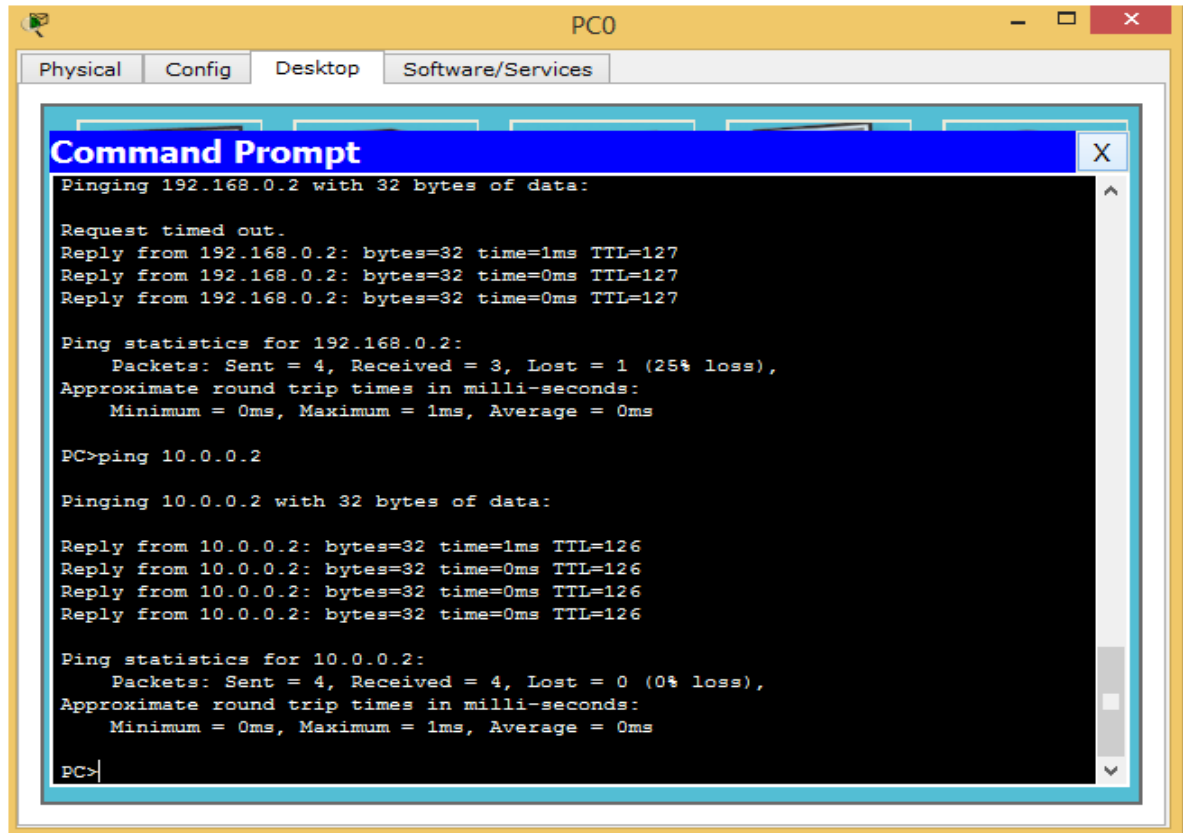
Routing table for Router 0



Routing table for Router 1



Now we use the ping command to check the working



The screenshot shows a window titled "PC0" with tabs for "Physical", "Config", "Desktop", and "Software/Services". The "Desktop" tab is active, displaying a "Command Prompt" window. The Command Prompt shows the results of two ping commands. The first command is "ping 192.168.0.2", which shows a "Request timed out." followed by three successful replies from 192.168.0.2 with 32 bytes of data, 1ms time, and TTL=127. The ping statistics for 192.168.0.2 show 4 packets sent, 3 received, and 1 lost (25% loss). The second command is "ping 10.0.0.2", which shows four successful replies from 10.0.0.2 with 32 bytes of data, 1ms time, and TTL=126. The ping statistics for 10.0.0.2 show 4 packets sent, 4 received, and 0 lost (0% loss). The Command Prompt prompt is "PC>".

```
PC0
Physical Config Desktop Software/Services
Command Prompt
Pinging 192.168.0.2 with 32 bytes of data:

Request timed out.
Reply from 192.168.0.2: bytes=32 time=1ms TTL=127
Reply from 192.168.0.2: bytes=32 time=0ms TTL=127
Reply from 192.168.0.2: bytes=32 time=0ms TTL=127

Ping statistics for 192.168.0.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

PC>ping 10.0.0.2

Pinging 10.0.0.2 with 32 bytes of data:

Reply from 10.0.0.2: bytes=32 time=1ms TTL=126
Reply from 10.0.0.2: bytes=32 time=0ms TTL=126
Reply from 10.0.0.2: bytes=32 time=0ms TTL=126
Reply from 10.0.0.2: bytes=32 time=0ms TTL=126

Ping statistics for 10.0.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

PC>
```

Hence the RIP protocol has been studied

For Video
demonstration of the
given Practical, scan
the QR code

