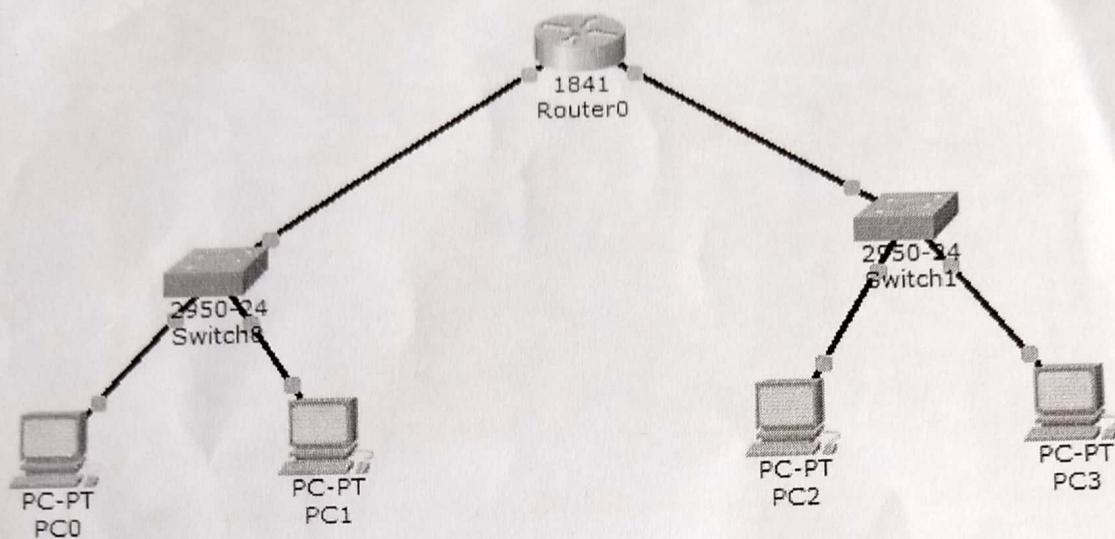


## Lab Experiment 1

One Router 2 Switches and 4 PCs



### PC0 IP Configuration

PC0

### IP Configuration

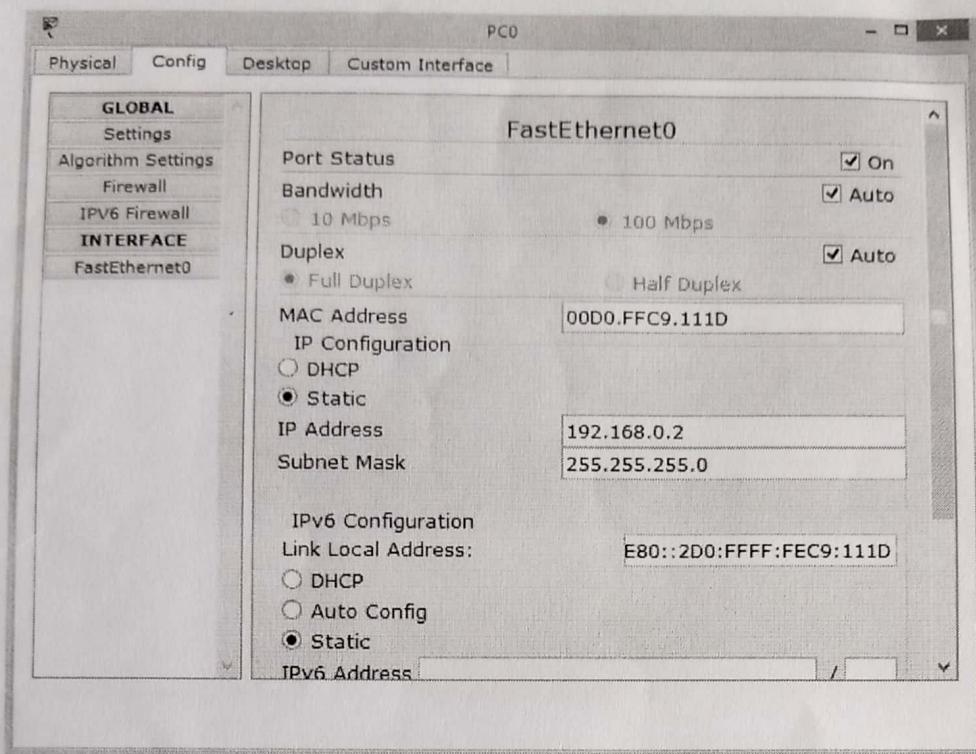
DHCP  Static

IP Address	192.168.0.2
Subnet Mask	255.255.255.0
Default Gateway	192.168.0.1
DNS Server	

### IPv6 Configuration

DHCP  Auto Config  Static

IPv6 Address	/
Link Local Address	FE80::2D0:FFFF:FEC9:111D
IPv6 Gateway	
IPv6 DNS Server	



### PC1 IP Configuration

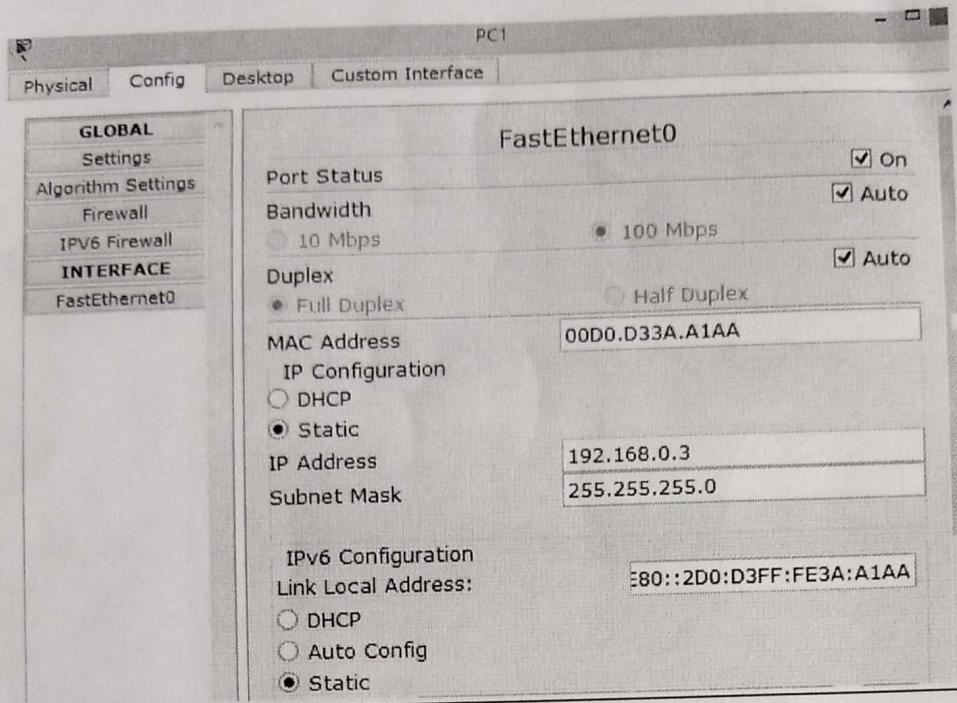
The screenshot shows the IP Configuration window for PC1. The title bar says 'PC1'. The window contains two sections: IP Configuration and IPv6 Configuration.

**IP Configuration:**

- Radio buttons: DHCP (unchecked), Static (checked).
- Fields: IP Address (192.168.0.3), Subnet Mask (255.255.255.0), Default Gateway (192.168.0.1), DNS Server (empty).

**IPv6 Configuration:**

- Radio buttons: DHCP (unchecked), Auto Config (unchecked), Static (checked).
- Fields: IPv6 Address (empty), Link Local Address (FE80::2D0:D3FF:FE3A:A1AA), IPv6 Gateway (empty), IPv6 DNS Server (empty).



### PC2 IP Configuration

PC2

### IP Configuration

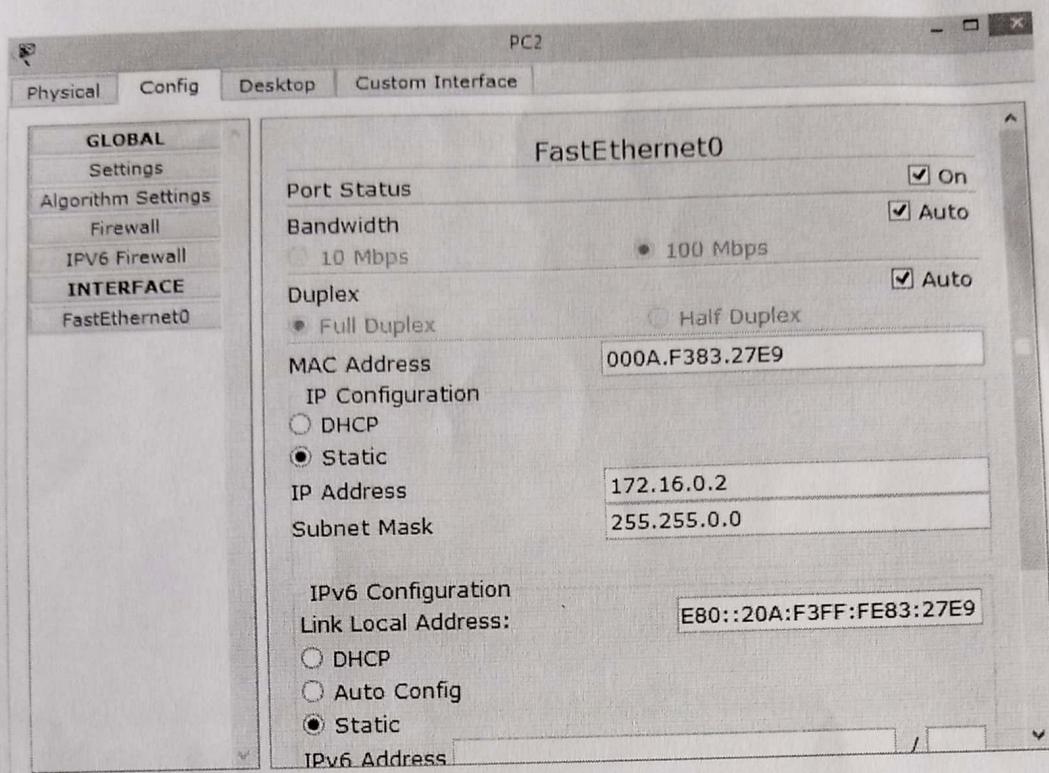
DHCP       Static

IP Address	172.16.0.2
Subnet Mask	255.255.0.0
Default Gateway	172.16.0.1
DNS Server	

### IPv6 Configuration

DHCP     Auto Config     Static

IPv6 Address		/	
Link Local Address	FE80::20A:F3FF:FE83:27E9		
IPv6 Gateway			
IPv6 DNS Server			



### PC3 IP Configuration

PC3

### IP Configuration

IP Configuration

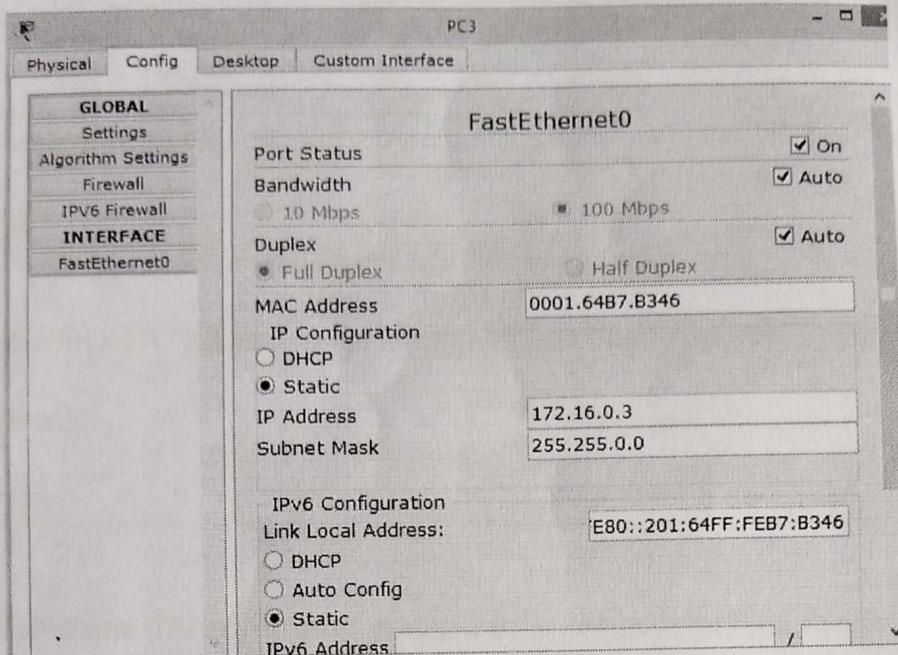
DHCP  Static

IP Address	172.16.0.3
Subnet Mask	255.255.0.0
Default Gateway	172.16.0.1
DNS Server	

IPv6 Configuration

DHCP  Auto Config  Static

IPv6 Address	/
Link Local Address	FE80::201:64FF:FEB7:B346
IPv6 Gateway	
IPv6 DNS Server	



- Now Click on Router Router0, and then click on CLI (Command Line Interface).
- You will see like this, “Continue with configuration dialog? [yes/no]:”, Give “no” and press Enter. Now you will go to user mode.
- Now give “enable” and press *Enter*. Now you get into the Privileged Mode.
- Now type “configure terminal” and press *Enter* to get into global configuration mode.
- Now configure router interface with ip address and subnet mask then give no shutdown to make this interface and line protocol up.

### Complete CLI Command

---

--- System Configuration Dialog ---

Continue with configuration dialog? [yes/no]: no

Press RETURN to get started!

```

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface fastethernet 0/0
Router(config-if)#ip address 192.168.0.1 255.255.255.0
Router(config-if)#no shutdown

```

```

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

```

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
```

```

Router(config-if)#exit
Router(config)#interface fastethernet 0/1
Router(config-if)#ip address 172.16.0.1 255.255.0.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

Router(config-if)#exit
Router(config)#

```

---

**interface fastEthernet 0/0** command is used to enter in interface mode.

**ip address 172.16.0.1 255.255.0.0** command will assign IP address to interface.

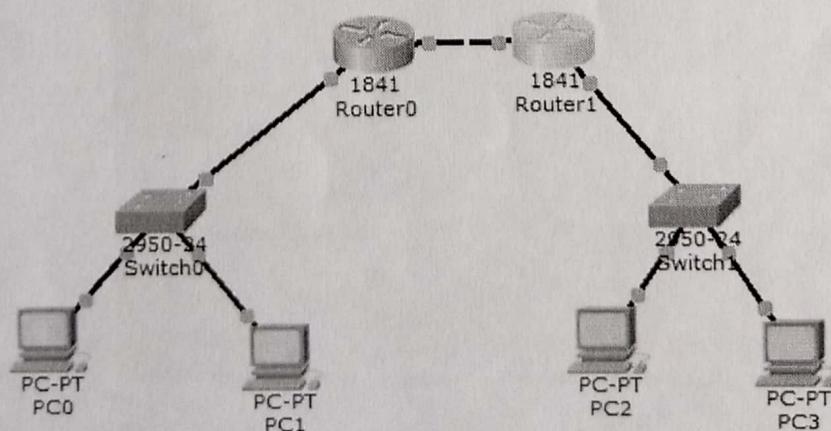
**no shutdown** command will bring the interface up.

**exit** command is used to return in global configuration mode.

---

## Lab Experiment 2

### Two Routers 2 Switches and 4 PCs (Dynamic routing)



## PC0 IP Configuration

PC0

### IP Configuration

DHCP       Static

IP Address: 192.168.0.2  
Subnet Mask: 255.255.255.0  
Default Gateway: 192.168.0.1  
DNS Server:

### IPv6 Configuration

DHCP     Auto Config     Static

IPv6 Address: /  
Link Local Address: FE80::290:2BFF:FE03:9E92  
IPv6 Gateway:  
IPv6 DNS Server:

PC0

Physical    Config    Desktop    Custom Interface

**GLOBAL**

Settings  
Algorithm Settings  
Firewall  
IPV6 Firewall

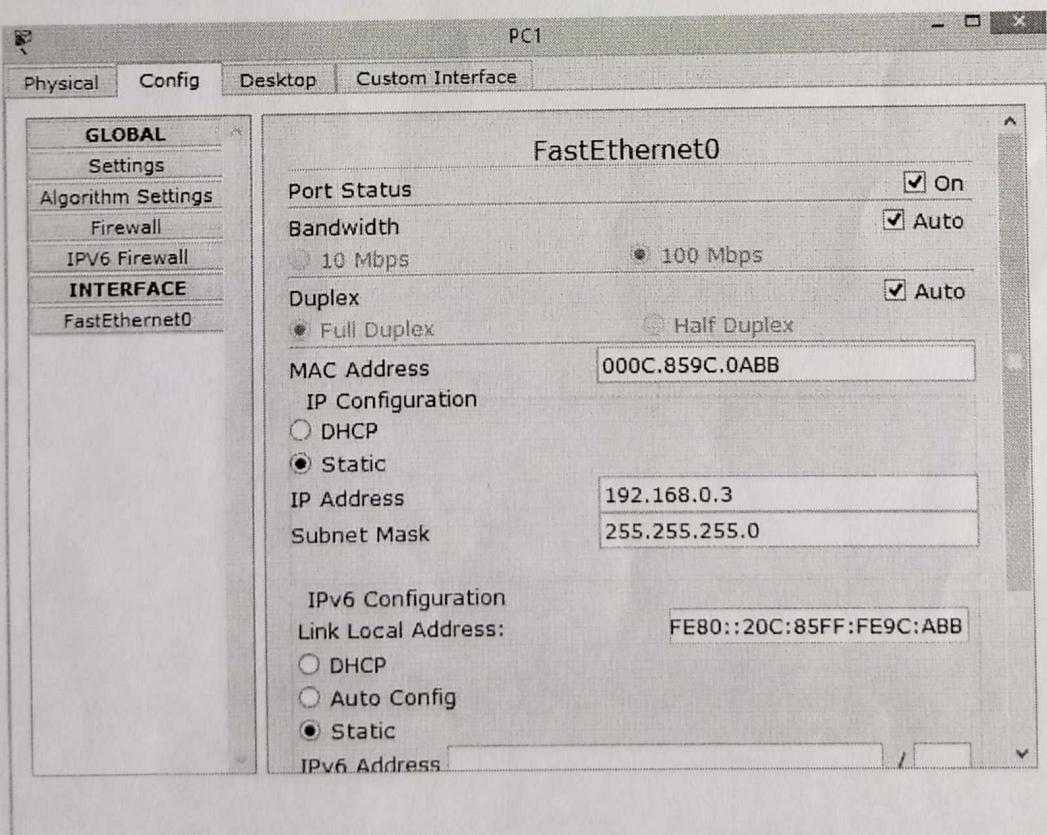
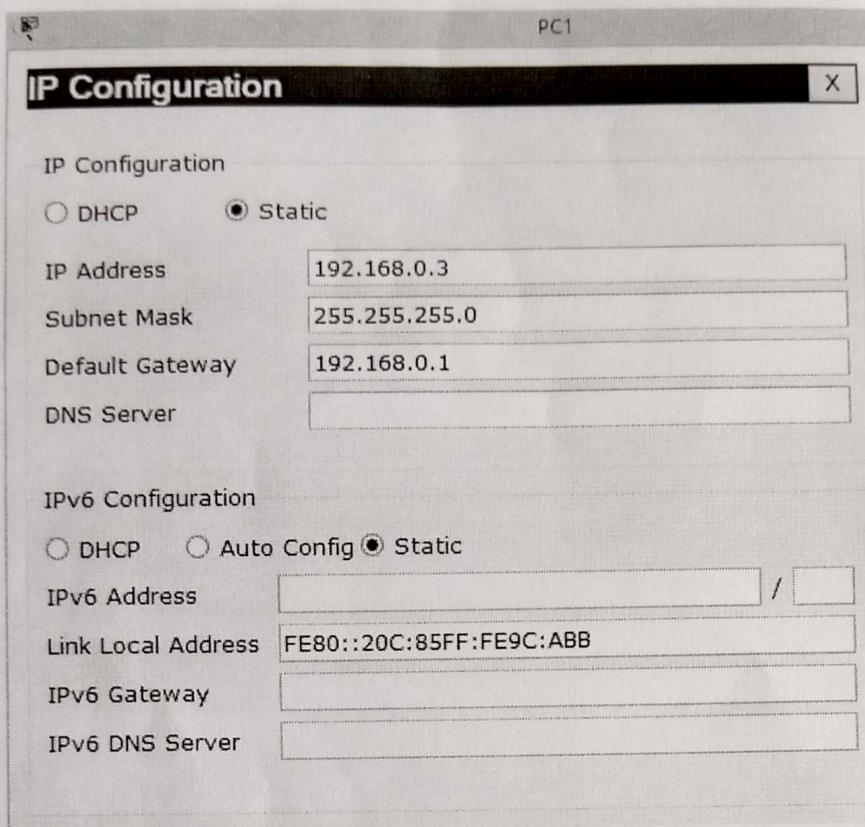
**INTERFACE**

FastEthernet0

**FastEthernet0**

Port Status:  On  
Bandwidth:  Auto  
 10 Mbps     100 Mbps  
Duplex:  Auto  
 Full Duplex     Half Duplex  
MAC Address: 0090.2BE3.9E92  
IP Configuration:  
 DHCP  
 Static  
IP Address: 192.168.0.2  
Subnet Mask: 255.255.255.0  
  
IPv6 Configuration  
Link Local Address: E80::290:2BFF:FE03:9E92  
 DHCP  
 Auto Config  
 Static  
IPv6 Address: /

## PC1 IP Configuration



## PC2 IP Configuration

PC2

### IP Configuration

DHCP  Static

IP Address: 192.168.1.2  
Subnet Mask: 255.255.255.0  
Default Gateway: 192.168.1.1  
DNS Server:

### IPv6 Configuration

DHCP  Auto Config  Static

IPv6 Address: /  
Link Local Address: FE80::20B:BEFF:FE8B:5C5A  
IPv6 Gateway:  
IPv6 DNS Server:

PC2

Physical Config Desktop Custom Interface

**GLOBAL**  
Settings  
Algorithm Settings  
Firewall  
IPV6 Firewall

**INTERFACE**  
FastEthernet0

**FastEthernet0**

Port Status:  On  
Bandwidth:  Auto  
 10 Mbps  100 Mbps  
Duplex:  Auto  
 Full Duplex  Half Duplex  
MAC Address: 000B.BE8B.5C5A  
IP Configuration:  
 DHCP  Static  
IP Address: 192.168.1.2  
Subnet Mask: 255.255.255.0  
IPv6 Configuration:  
Link Local Address: E80::20B:BEFF:FE8B:5C5A  
 DHCP  
 Auto Config  
 Static  
IPv6 Address: /

---

**Complete CLI command for Router0**

Router>enable

Router#configure terminal

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#interface fastethernet 0/0

Router(config-if)#ip address 192.168.0.1 255.255.255.0

Router(config-if)#no shutdown

Router(config-if)#exit

Router(config)#interface fastethernet 0/1

Router(config-if)#ip address 172.16.0.1 255.255.0.0

Router(config-if)#no shutdown

Router(config-if)#exit

Router(config)#router rip

Router(config-router)#network 192.168.0.0

Router(config-router)#network 172.16.0.0

Router(config-router)#exit

Router(config)#[  

---

---

**Complete CLI command for Router1**

---

Router>enable

Router#configure terminal

Enter configuration commands, one per line. End with CNTL/Z.

```
Router(config)#interface fastethernet 0/0
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#interface fastethernet 0/1
Router(config-if)#ip address 172.16.0.2 255.255.0.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#router rip
Router(config-router)#network 172.16.0.0
Router(config-router)#network 192.168.1.0
Router(config-router)#exit
Router(config)#

```

---

#### Examples

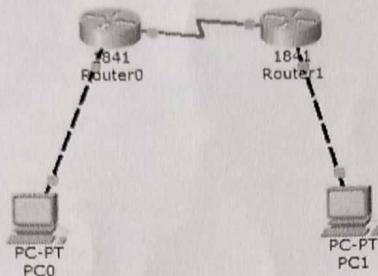
The following example defines RIP as the routing protocol to be used on all interfaces connected to networks 10.99.0.0 and 192.168.7.0:

```
router rip
  network 10.99.0.0
  network 192.168.7.0

```

---

### *Lab Experiment 3: Static Routing (2 routers 2 computers)*



Device	Connected from	Connected to	IP Address
PC0	FastEthernet0	Router0's FastEthernet0/0	10.0.0.2/8
Router0	FastEthernet0/0	PC0's FastEthernet0	10.0.0.1/8
Router0	Serial 0/0/0	Router1's serial0/0/0	192.168.0.253/30
Router1	Serial 0/0/0/	Router0's serial0/0/0	192.168.0.254/30
Router1	FastEthernet0/0	PC1's FastEthernet0	20.0.0.1/8
PC1	FastEthernet0	Router1's FastEthernet0/0	20.0.0.2/8

Two interfaces **FastEthernet0/0** and **Serial0/0/0** of **Router0** are used in this topology. By default interfaces on router are remain administratively down during the start up. We need to configure IP address and other parameters on interfaces before we could actually use them for routing.

#### PC0 IP Configuration

PC0

**IP Configuration**

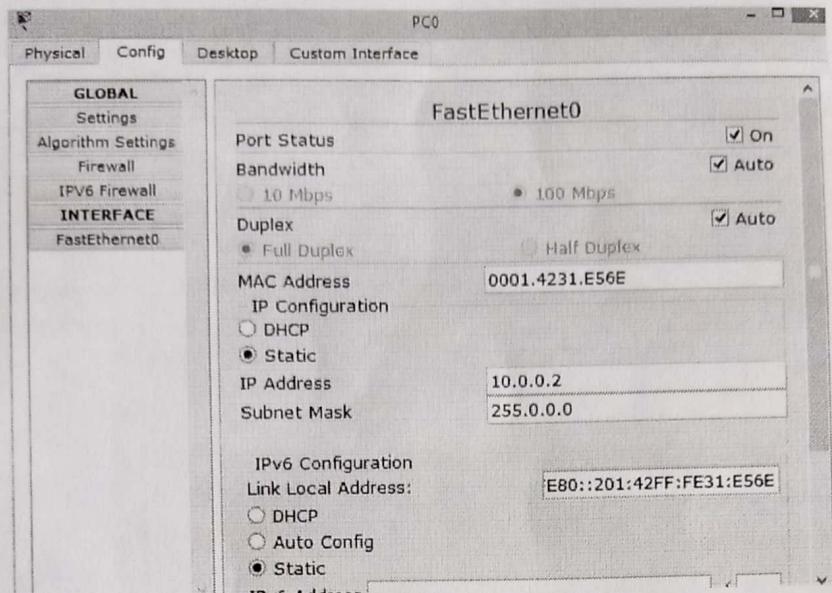
DHCP     Static

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::201:42FF:FE31:E56E
IPv6 Gateway	
IPv6 DNS Server	



### PC1 IP Configuration

The screenshot shows the IP Configuration dialog box for PC1. It contains two main sections: IP Configuration and IPv6 Configuration.

**IP Configuration**

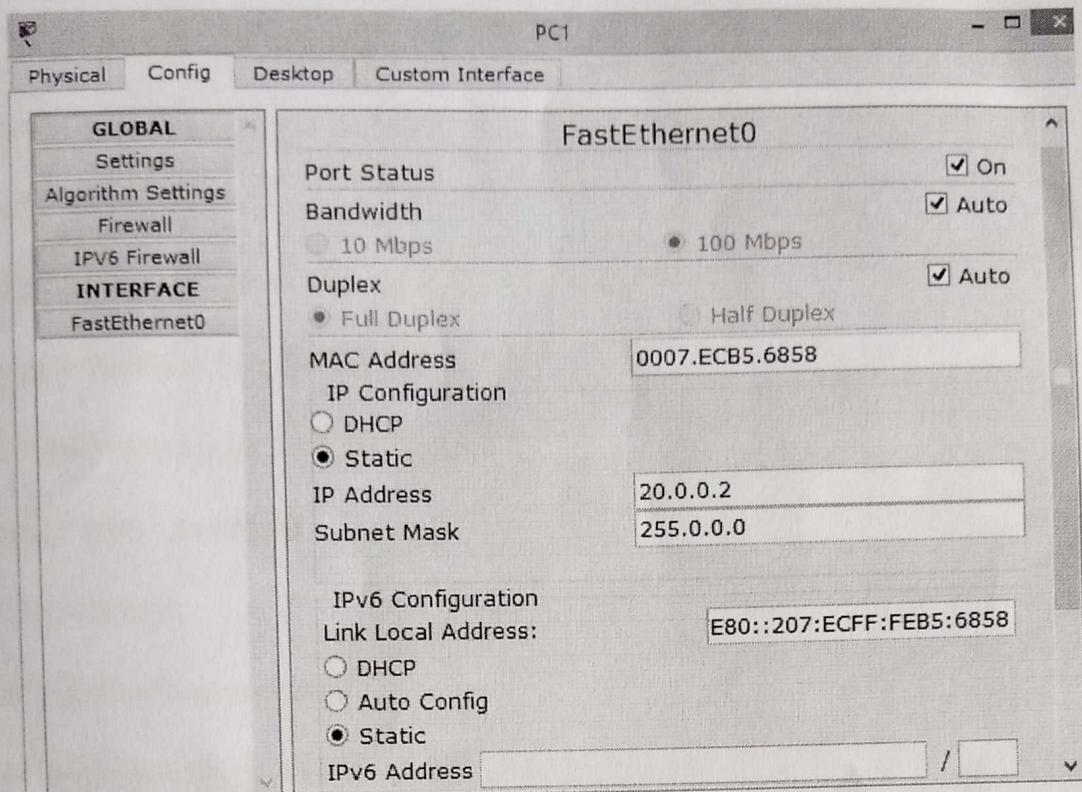
DHCP     Static

IP Address: 20.0.0.2  
Subnet Mask: 255.0.0.0  
Default Gateway: 20.0.0.1  
DNS Server: (empty)

**IPv6 Configuration**

DHCP     Auto Config     Static

IPv6 Address: /  
Link Local Address: FE80::207:ECFF:FEB5:6858  
IPv6 Gateway: (empty)  
IPv6 DNS Server: (empty)



Complete CLI command for router0

Router>enable

Router#configure terminal

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#interface fastethernet 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 0/0/0

Router(config-if)#ip address 192.168.0.253 255.255.255.252

Router(config-if)#clock rate 64000

Router(config-if)#bandwidth 64

Router(config-if)#no shutdown

Router(config-if)#exit

Router(config)#

Router(config)#ip route 20.0.0.0 255.0.0.0 192.168.0.254

Router(config)#

---

Complete CLI command for router 1

---

Router>enable

Router#configure terminal

Enter configuration commands, one per line. End with CNTL/Z.

```
Router(config)#interface FastEthernet0/0
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 0/0/0
Router(config-if)#ip address 192.168.0.254 255.255.255.252
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#
Router(config)#ip route 10.0.0.0 255.0.0.0 192.168.0.253
```

---

**interface fastEthernet 0/0** command is used to enter in interface mode.

**ip address 10.0.0.2 255.0.0.0** command will assign IP address to interface.

**no shutdown** command will bring the interface up.

**exit** command is used to return in global configuration mode.

**Router#configure terminal** Command is used to enter in global configuration mode.

**Router(config)#interface serial 0/0/0** Command is used to enter in interface mode.

**Router(config-if)#ip address 192.168.0.253 255.255.255.252** Command assigns IP address to interface. For serial link we usually use IP address from /30 subnet.

**Router(config-if)#clock rate 64000**

**Router(config-if)#bandwidth 64** In real life environment these parameters control the data flow between serial links and need to be set at service providers end. In lab environment we need not to worry about these values. We can use these values.

**Router(config-if)#no shutdown** Command brings interface up.

**Router(config-if)#exit** Command is used to return in global configuration mode.

We will use same commands to assign IP addresses on interfaces of Router1. Since we have provided clock rate and bandwidth on serial interface of Router0 we need not to assign them on serial interface of Router1.

### Configure Static Route

Now we know that how IP route command is used to configure the static route. Let's implement it in our example topology. Run following command from global configuration mode in routers.

#### Router0

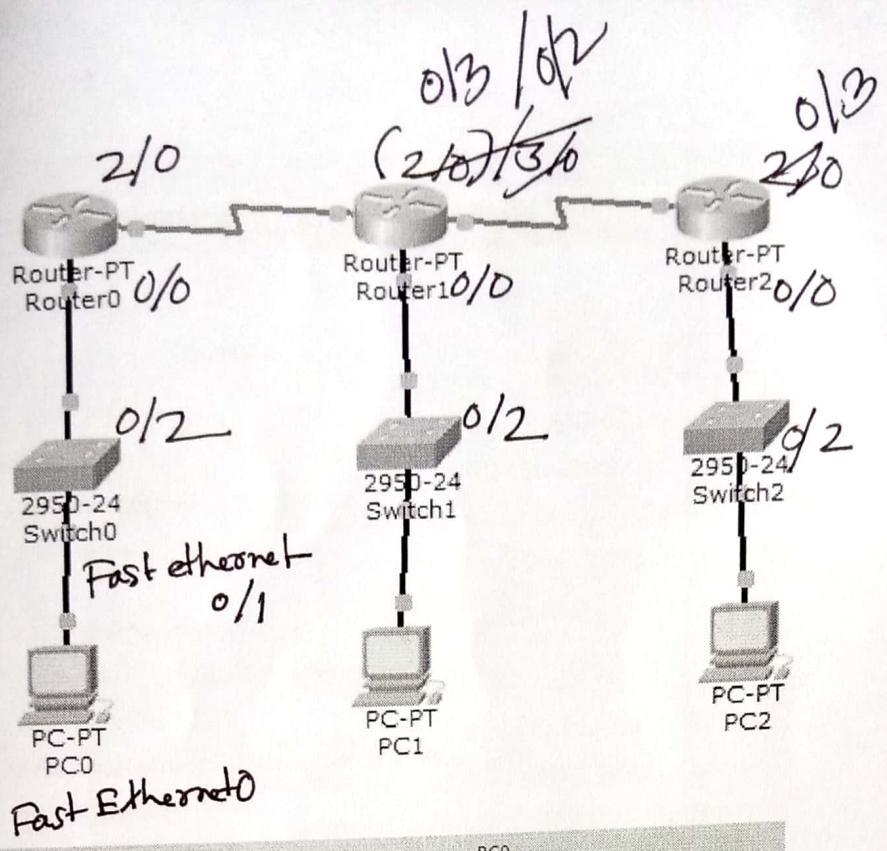
Router(config)#ip route 20.0.0.0 255.0.0.0 192.168.0.254

#### Router1

Router(config)#ip route 10.0.0.0 255.0.0.0 192.168.0.253

---

**Lab Experiment 4: Dynamic Routing (3 routers 3 computers) (Serial Port)**



PC0

### 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::260:3EFF:FE07:B4D2
IPv6 Gateway	
IPv6 DNS Server	

PC1

### IP Configuration

IP Configuration

DHCP  Static

IP Address: 20.0.0.2  
Subnet Mask: 255.0.0.0  
Default Gateway: 20.0.0.1  
DNS Server:

IPv6 Configuration

DHCP  Auto Config  Static

IPv6 Address: /  
Link Local Address: FE80::2D0:D3FF:FE2A:157E  
IPv6 Gateway:  
IPv6 DNS Server:

PC2

### IP Configuration

IP Configuration

DHCP  Static

IP Address: 30.0.0.2  
Subnet Mask: 255.0.0.0  
Default Gateway: 30.0.0.1  
DNS Server:

IPv6 Configuration

DHCP  Auto Config  Static

IPv6 Address: /  
Link Local Address: FE80::201:43FF:FE33: AAC5  
IPv6 Gateway:  
IPv6 DNS Server:

## Router 0

--- System Configuration Dialog ---

Continue with configuration dialog? [yes/no]: n

Press RETURN to get started!

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

```
Router(config-if)#  
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up  
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
```

```
Router(config-if)#exit  
Router(config)#interface serial 2/0  
Router(config-if)#ip address 40.0.0.1 255.0.0.0  
Router(config-if)#clock rate 64000  
Router(config-if)#bandwidth 64  
Router(config-if)#no shutdown  
  
%LINK-5-CHANGED: Interface Serial2/0, changed state to down  
Router(config-if)#exit  
Router(config)#+
```

---

-- System Configuration Dialog ---

Continue with configuration dialog? [yes/no]: n

Press RETURN to get started!

Router>enable

Router#configure terminal

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#interface fastethernet 0/0

Router(config-if)#ip address 20.0.0.1 255.0.0.0

Router(config-if)#no shutdown

Router(config-if)#+

%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

Router(config-if)#exit

Router(config)#interface serial 2/0

Router(config-if)#ip address 40.0.0.2

% Incomplete command.

Router(config-if)#ip address 40.0.0.2 255.0.0.0

Router(config-if)#clock rate 64000

This command applies only to DCE interfaces

Router(config-if)#no shutdown

Router(config-if)#+

%LINK-5-CHANGED: Interface Serial2/0, changed state to up

Router(config-if)#exit

Router(config)#interface serial 3/0

Router(config-if)#ip address 50.0.0.1 255.0.0.0

Router(config-if)#clock rate 64000

Router(config-if)#bandwidth 64

Router(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial3/0, changed state to down

Router(config-if)#exit

Router(config)#+

---

---

-- System Configuration Dialog ---

Continue with configuration dialog? [yes/no]: n

Press RETURN to get started!

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface fastethernet 0/0
Router(config-if)#ip address 30.0.0.1 255.0.0.0
Router(config-if)#no shutdown
```

```
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
```

Router(config-if)#exit

```
Router(config)#interface serial 3/0
Router(config-if)#ip address 50.0.0.2 255.0.0.0
Router(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial3/0, changed state to up
```

```
Router(config-if)#exit
Router(config)#


---


```

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router rip
Router(config-router)#network 10.0.0.0
Router(config-router)#network 40.0.0.0
Router(config-router)#exit
Router(config)#


---


```

```
Router(config)#router rip
Router(config-router)#network 20.0.0.0
Router(config-router)#network 40.0.0.0
```

