

DATE : 20-NOVEMBER-2024

## LAB-5

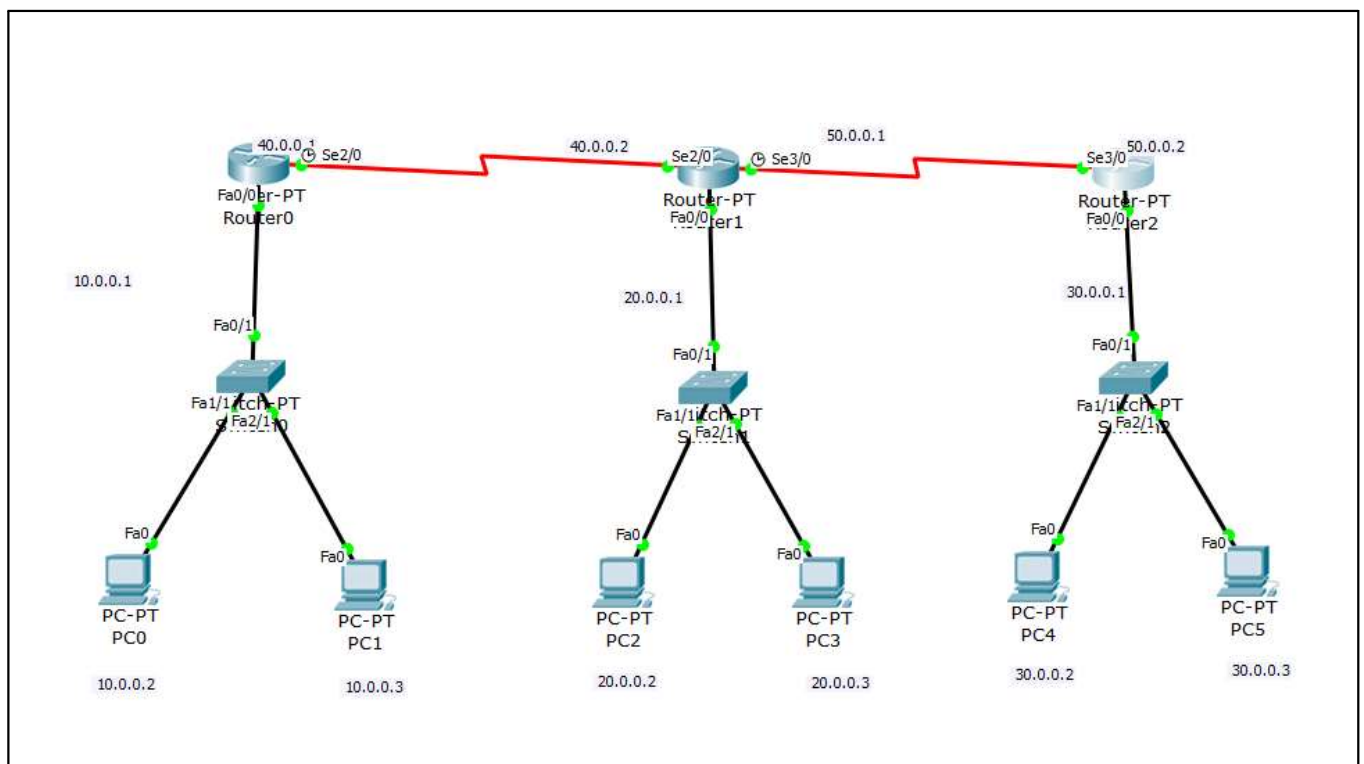
### Question:

Configure RIP routing Protocol in Routers

### Aim:

To Configure RIP routing Protocol in Routers by using routing table

### Topology:



### Topology Description:

#### 1. Devices Involved:

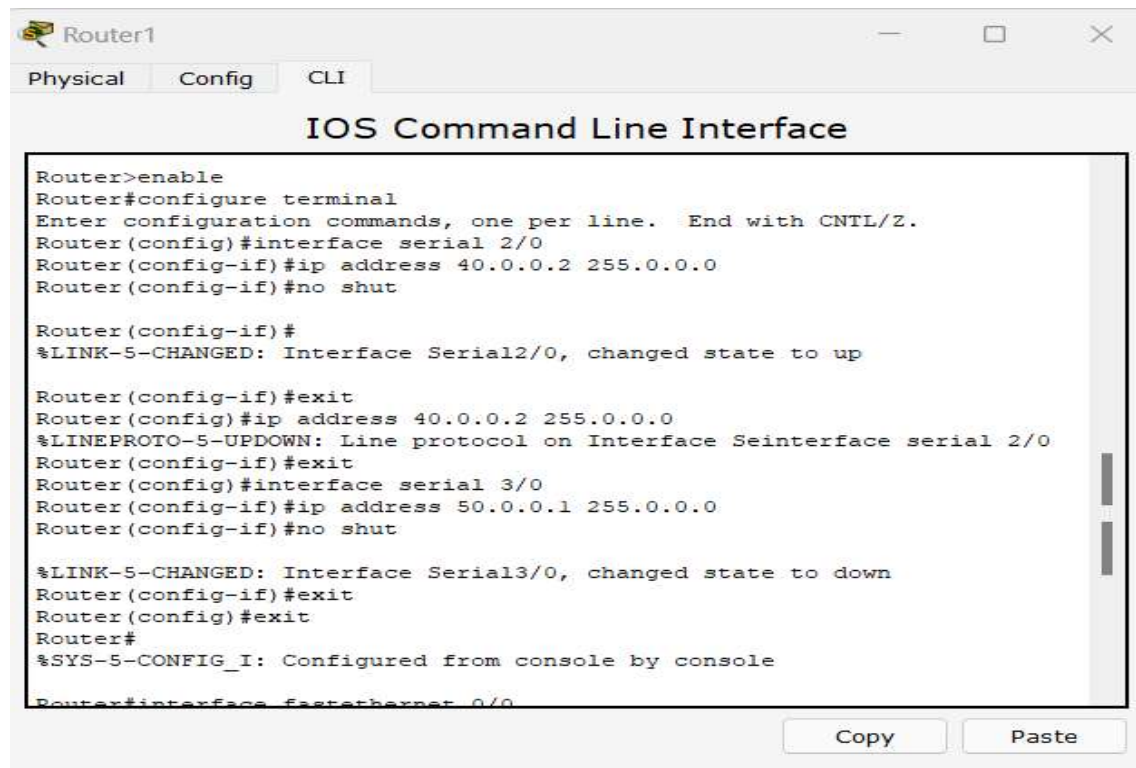
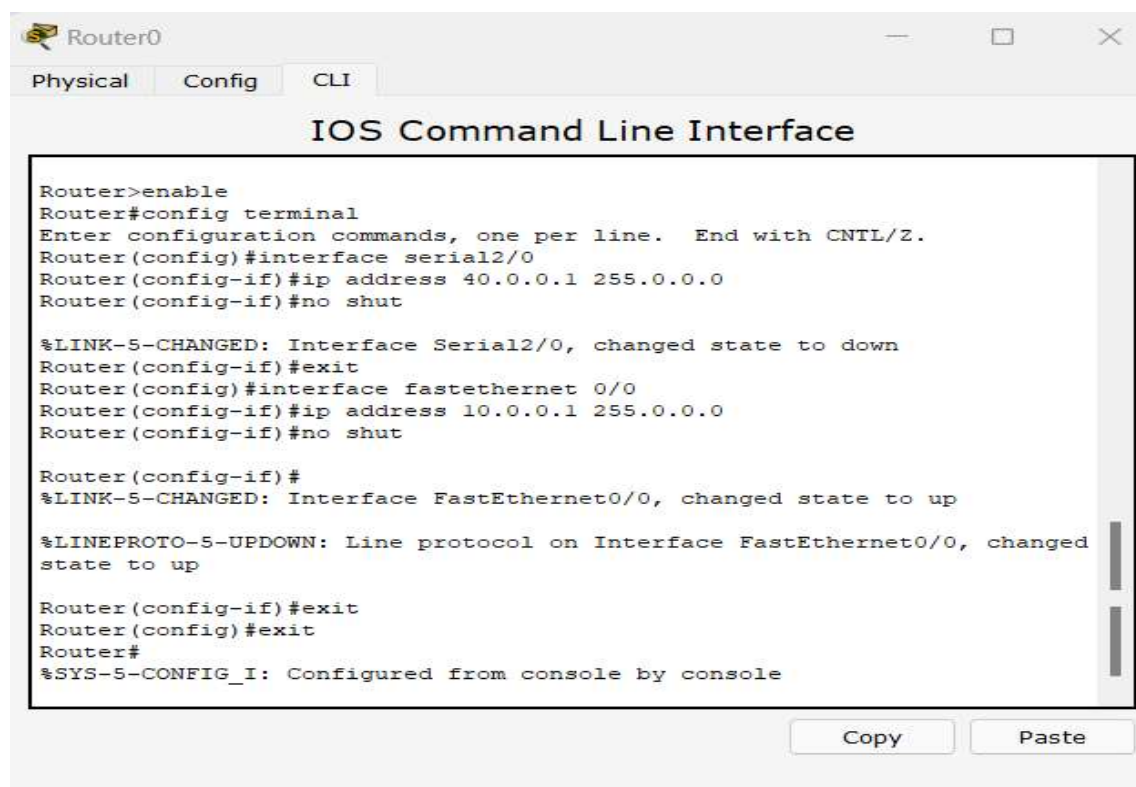
- **3 Routers:**
  - Router0
  - Router1
  - Router2
- **3 Switches:**
  - Switch connected to Router0

- Switch connected to Router1
  - Switch connected to Router2
- **6 PCs:**
  - PC0, PC1 connected to Router 0 via a switch
  - PC2, PC3 connected to Router 1 via a switch
  - PC4, PC5 connected to Router 2 via a switch
- 2. Connections:**
  - Router0 is connected to Router 1 via Serial (Se2/0) interface.
  - Router1 is connected to Router 2 via Serial (Se3/0) interface.
  - Each router connects to a switch, which then connects to two PCs.
- 3. IP Address Schema:**
  - **Router0 LAN:** 10.0.0.0/24
    - Router0: 10.0.0.1
    - PC0: 10.0.0.2
    - PC1: 10.0.0.3
  - **Router1 LAN:** 20.0.0.0/24
    - Router1: 20.0.0.1
    - PC2: 20.0.0.2
    - PC3: 20.0.0.3
  - **Router2 LAN:** 30.0.0.0/24
    - Router2: 30.0.0.1
    - PC4: 30.0.0.2
    - PC5: 30.0.0.3
  - Serial links:
    - Between Router0 and Router1: 40.0.0.0/30
    - Between Router1 and Router2: 50.0.0.0/30

## **Procedure to Configure the Network:**

### Step 1: Configure Router Interfaces

1. Access each router using CLI (Command Line Interface).
2. Assign IP addresses to FastEthernet and Serial interfaces:





Router1

Physical Config CLI

### IOS Command Line Interface

```

Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#interface fastethernet 0/0
      ^
% Invalid input detected at '^' marker.

Router#config 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 shut

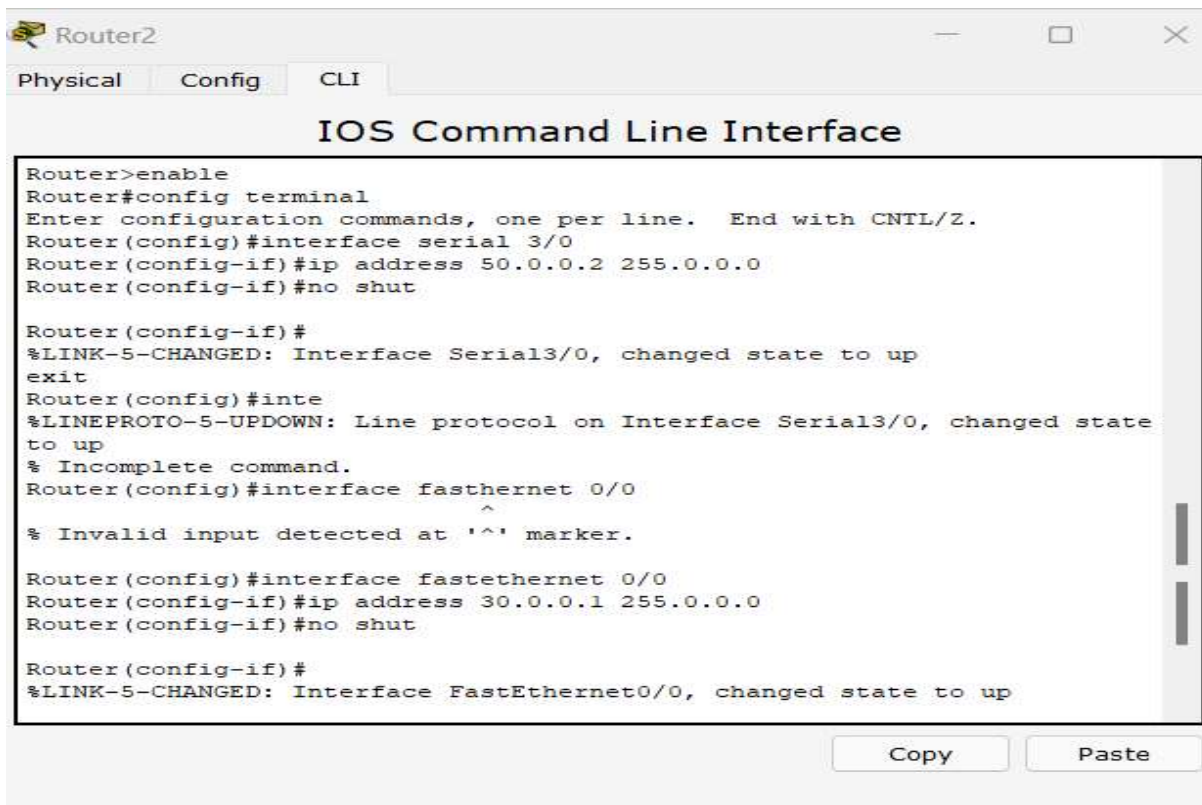
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed
state to up
exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#

```

Copy Paste



Router2

Physical Config CLI

### IOS Command Line Interface

```

Router>enable
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface serial 3/0
Router(config-if)#ip address 50.0.0.2 255.0.0.0
Router(config-if)#no shut

Router(config-if)#
%LINK-5-CHANGED: Interface Serial3/0, changed state to up
exit
Router(config)#inte
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state
to up
% Incomplete command.
Router(config)#interface fasthernet 0/0
      ^
% Invalid input detected at '^' marker.

Router(config)#interface fastethernet 0/0
Router(config-if)#ip address 30.0.0.1 255.0.0.0
Router(config-if)#no shut

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

```

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## Step 2: Configure Routing:

### Router 0:

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

### Router 1:

```
Router>enable
Router#config terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router rip
Router(config-router)#network 40.0.0.0
Router(config-router)#network 20.0.0.0
Router(config-router)#network 50.0.0.0
Router(config-router)#network 10.0.0.0
Router(config-router)#exit
Router(config)#
```

### Router 2:

```
Router>enable
Router#config terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router rip
Router(config-router)#network 50.0.0.0
Router(config-router)#network 30.0.0.0
Router(config-router)#
```

## Step 3: Routing



Router0

Physical Config CLI

### IOS Command Line Interface

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state
to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state
to up

Router>show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS
inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

C    10.0.0.0/8 is directly connected, FastEthernet0/0
R    20.0.0.0/8 [120/1] via 40.0.0.2, 00:00:02, Serial2/0
R    30.0.0.0/8 [120/2] via 40.0.0.2, 00:00:02, Serial2/0
C    40.0.0.0/8 is directly connected, Serial2/0
R    50.0.0.0/8 [120/1] via 40.0.0.2, 00:00:02, Serial2/0
Router>
```

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Router1

Physical Config CLI

### IOS Command Line Interface

```
to up


%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state
to up

Router>
Router>show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS
inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

R    10.0.0.0/8 [120/1] via 40.0.0.1, 00:00:12, Serial2/0
C    20.0.0.0/8 is directly connected, FastEthernet0/0
R    30.0.0.0/8 [120/1] via 50.0.0.2, 00:00:16, Serial3/0
C    40.0.0.0/8 is directly connected, Serial2/0
C    50.0.0.0/8 is directly connected, Serial3/0
Router>
```

Copy Paste



The screenshot shows a window titled "Router2" with three tabs: "Physical", "Config", and "CLI". The "CLI" tab is active, displaying the "IOS Command Line Interface". The command "Router>show ip route" has been entered, and the output is displayed. The output includes a legend for route codes, a message about the gateway of last resort, and a list of routes.

```

Router>show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS
inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

R    10.0.0.0/8 [120/2] via 50.0.0.1, 00:00:25, Serial3/0
R    20.0.0.0/8 [120/1] via 50.0.0.1, 00:00:25, Serial3/0
C    30.0.0.0/8 is directly connected, FastEthernet0/0
R    40.0.0.0/8 [120/1] via 50.0.0.1, 00:00:25, Serial3/0
C    50.0.0.0/8 is directly connected, Serial3/0
Router>

```

At the bottom of the window, there are two buttons: "Copy" and "Paste".

#### Step 4: Test Connectivity

1. Use the **ping** command to test communication between PCs in different subnets.
  - From PC0, ping PC4 (30.0.0.2).

## Command Prompt

```
Pinging 20.0.0.3 with 32 bytes of data:

Request timed out.
Reply from 20.0.0.3: bytes=32 time=12ms TTL=126
Reply from 20.0.0.3: bytes=32 time=6ms TTL=126
Reply from 20.0.0.3: bytes=32 time=3ms TTL=126

Ping statistics for 20.0.0.3:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 3ms, Maximum = 12ms, Average = 7ms

PC>ping 30.0.0.2

Pinging 30.0.0.2 with 32 bytes of data:

Request timed out.
Reply from 30.0.0.2: bytes=32 time=2ms TTL=125
Reply from 30.0.0.2: bytes=32 time=2ms TTL=125
Reply from 30.0.0.2: bytes=32 time=11ms TTL=125

Ping statistics for 30.0.0.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 11ms, Average = 5ms

PC>ping 20.0.0.2

Pinging 20.0.0.2 with 32 bytes of data:

Request timed out.
Reply from 20.0.0.2: bytes=32 time=9ms TTL=126
Reply from 20.0.0.2: bytes=32 time=6ms TTL=126
Reply from 20.0.0.2: bytes=32 time=7ms TTL=126

Ping statistics for 20.0.0.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 6ms, Maximum = 9ms, Average = 7ms

PC>ping 30.0.0.3

Pinging 30.0.0.3 with 32 bytes of data:

Request timed out.
Reply from 30.0.0.3: bytes=32 time=15ms TTL=125
Reply from 30.0.0.3: bytes=32 time=2ms TTL=125
Reply from 30.0.0.3: bytes=32 time=2ms TTL=125

Ping statistics for 30.0.0.3:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 15ms, Average = 6ms
```



## **Observations**

### **1. Network Segments:**

- Each router manages its LAN segment with different subnets (10.0.0.0/24, 20.0.0.0/24, 30.0.0.0/24).
- Serial links use point-to-point subnets (/30).

### **2. Routing:**

- Routing protocols (e.g., static routing or dynamic routing like RIP, OSPF, EIGRP) must be configured for communication between different LAN segments.
- PCs in one subnet need a gateway configured to communicate with PCs in another subnet.

### **3. Configuration Dependencies:**

- IP addresses must be correctly assigned to routers, switches, and PCs.
- Serial links must be configured with appropriate IP addresses and clock rates (for DCE interfaces).
- Default gateways must be set on PCs.