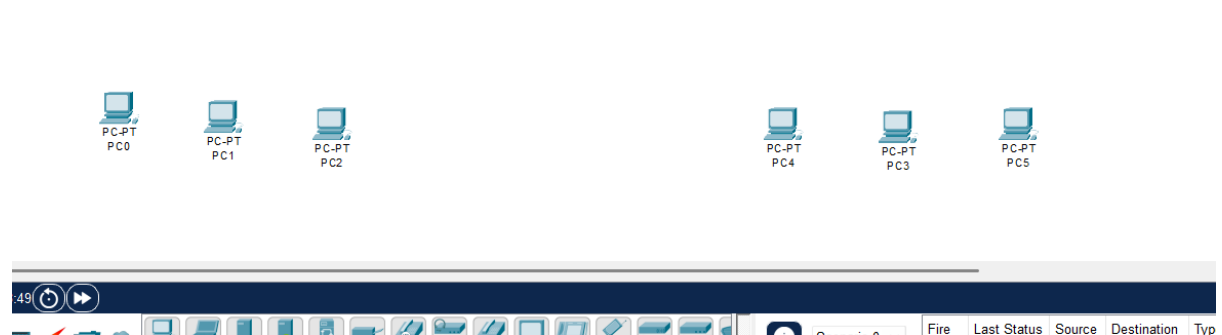


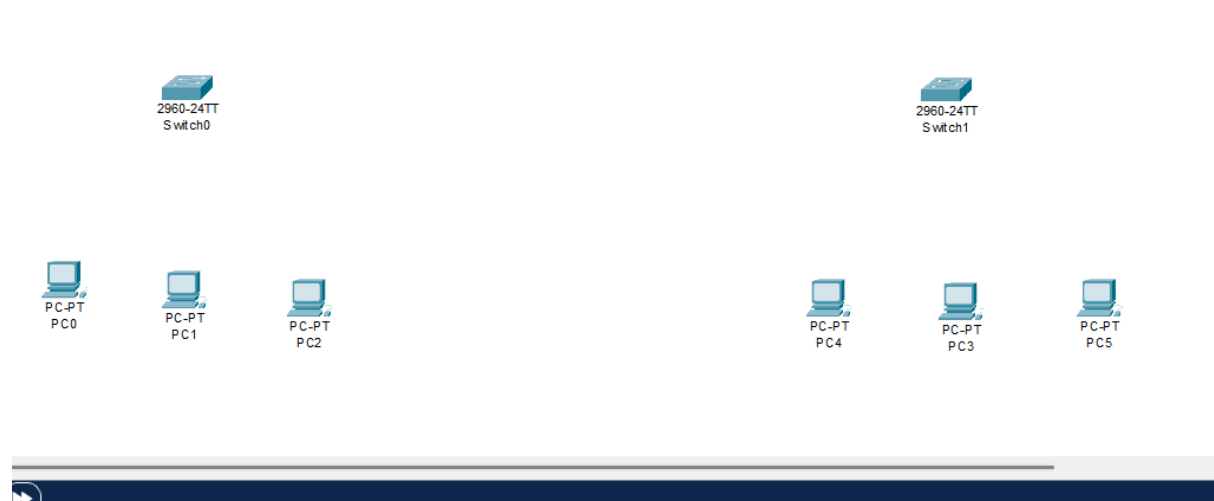
PRACTICAL-3

AIM: Simulate communication between two office branches located in different cities. Build a network that enables devices from both branches to exchange information reliably, and test whether data can travel seamlessly between the locations.

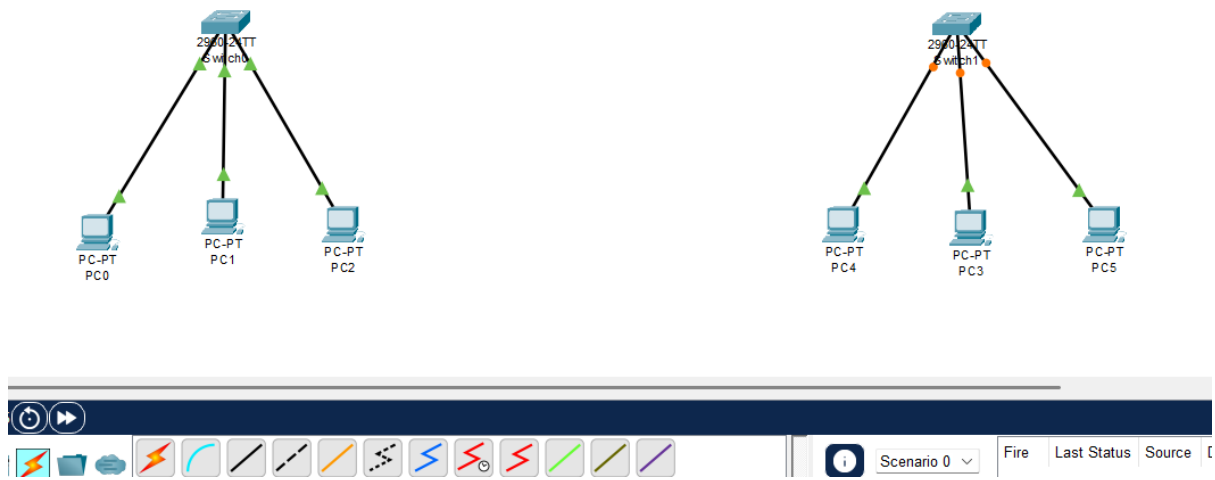
STEP-1: Add Devices for each cities



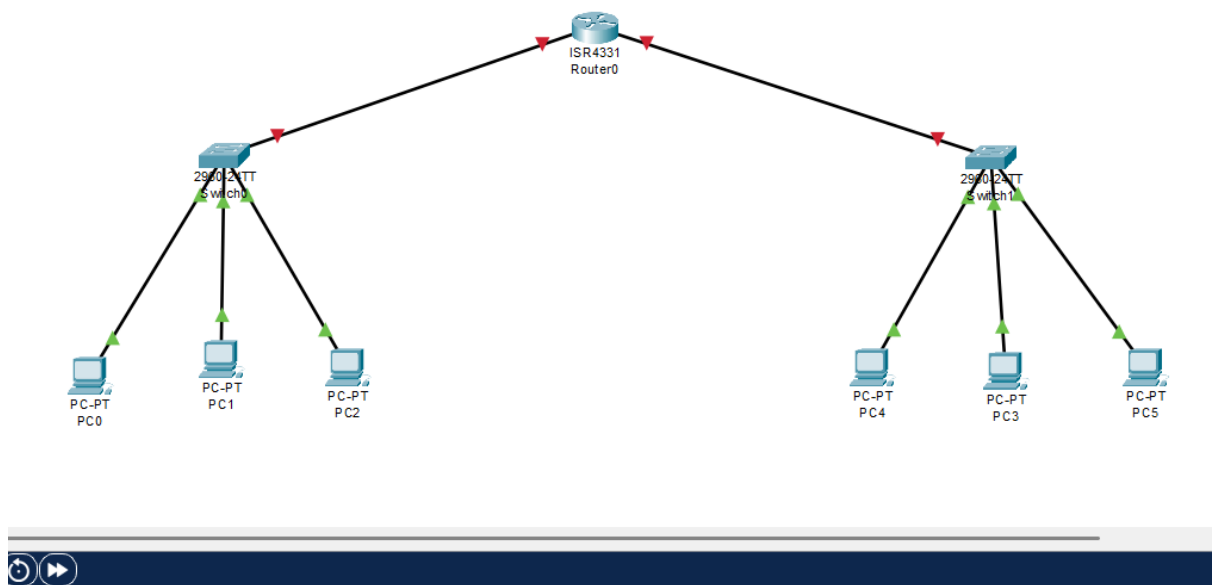
STEP-2: Put switch for each city.

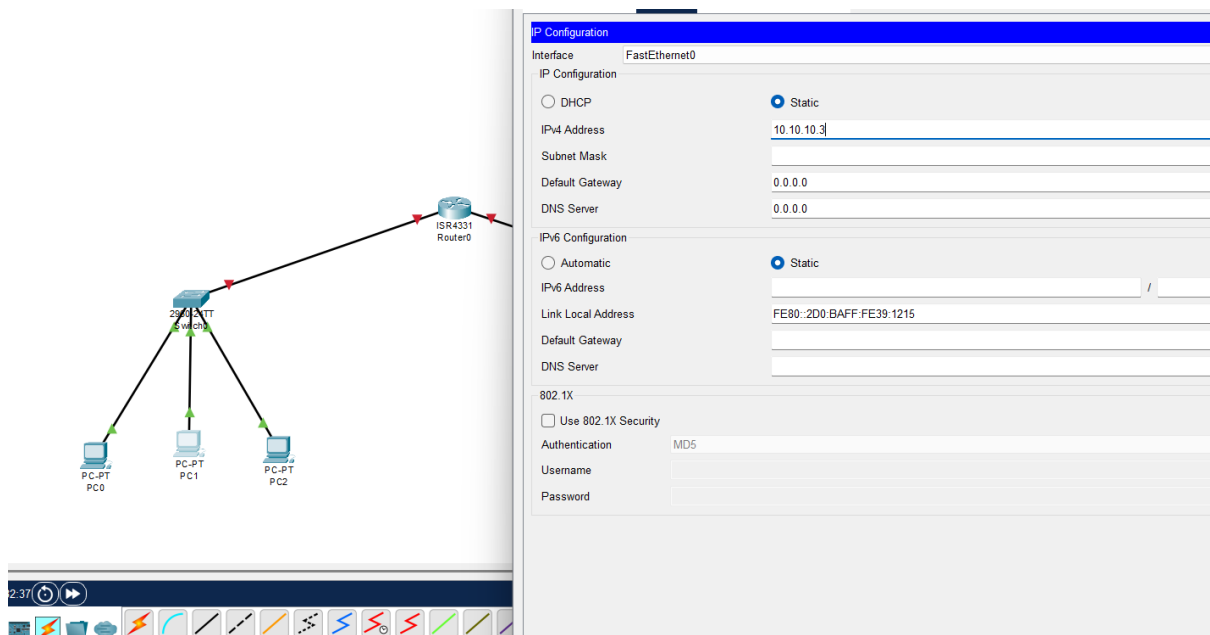


STEP-3: Connect device with switch.



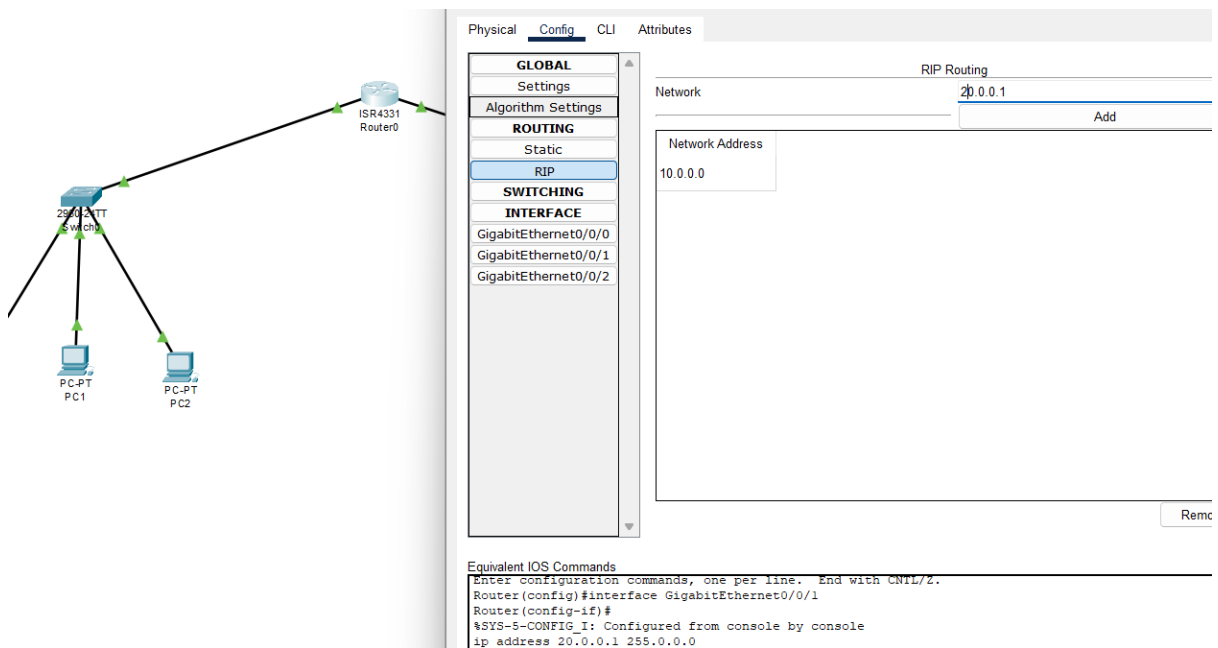
Step-4: Add a router and connect it with cable



STEP-5: Assign Ip to all Devices

The network diagram shows a central 2500 LTT switch connected to three PC-PT devices (PC0, PC1, PC2) and an ISR4331 Router0. The IP Configuration window for FastEthernet0 is displayed on the right, showing the following settings:

- Interface: FastEthernet0
- IP Configuration: Static (selected)
- IPv4 Address: 10.10.10.3
- Subnet Mask: (empty)
- Default Gateway: 0.0.0.0
- DNS Server: 0.0.0.0
- IPv6 Configuration: Static (selected)
- IPv6 Address: (empty)
- Link Local Address: FE80::2D0:BAFF:FE39:1215
- Default Gateway: (empty)
- DNS Server: (empty)
- 802.1X: Use 802.1X Security (unchecked)
- Authentication: MD5
- Username: (empty)
- Password: (empty)

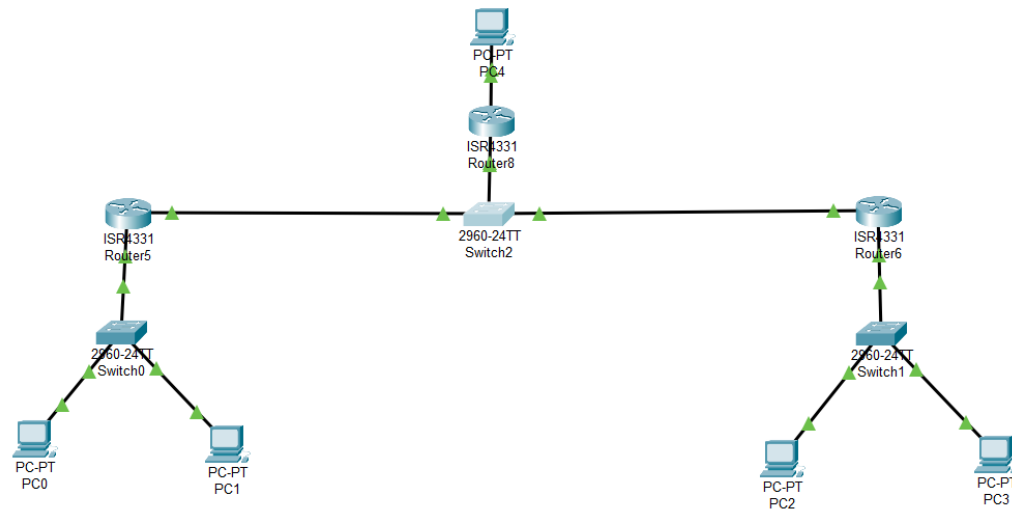
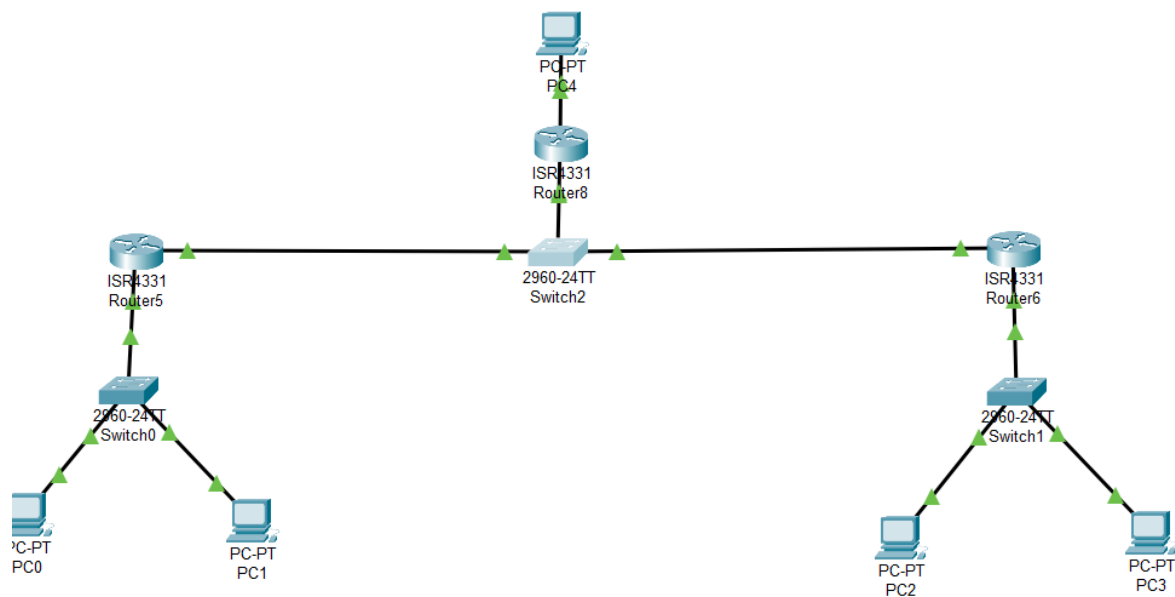
STEP-6: Give RIP value in Router.

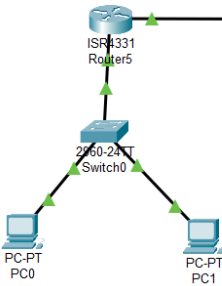
The network diagram shows the same topology as Step 5. The RIP configuration window is displayed on the right, showing the following settings:

- Physical: Config (selected)
- Attributes: (empty)
- GLOBAL: Settings (selected)
- Algorithm Settings: (empty)
- ROUTING: Static (selected)
- SWITCHING: (empty)
- INTERFACE: GigabitEthernet0/0/0, GigabitEthernet0/0/1, GigabitEthernet0/0/2
- RIP Routing: Network 20.0.0.1 (Add button)
- Network Address: 10.0.0.0 (Remc button)

Equivalent IOS Commands:

```
Enter configuration commands, one per line. End with CNTRL/Z.
Router(config)#interface GigabitEthernet0/0/1
Router(config-if)#
%SYS-5-CONFIG I: Configured from console by console
ip address 20.0.0.1 255.0.0.0
```

STEP-7: Add a router and A device**STEP8:**

STEP9: Add IP address to device and Router

The image displays two screenshots from a network configuration tool, likely Packet Tracer, showing the configuration of a router (Router8) and a switch (Switch0).

Top Screenshot: Router8 Configuration

The configuration window for Router8 is open, showing the **Config** tab. The **IP Configuration** section is active, showing the configuration for the **FastEthernet0** interface. The configuration is set to **Static**.

IP Configuration:

- Interface: FastEthernet0
- IP Configuration: ☐ DHCP ☒ Static
- IPv4 Address: 192.168.70.2
- Subnet Mask: 255.255.255.0
- Default Gateway: 192.168.70.1
- DNS Server: 0.0.0.0

IPv6 Configuration:

- IPv6 Configuration: ☐ Automatic ☒ Static
- IPv6 Address: /
- Link Local Address: FE80::200:CFF:FE3D:6CDB
- Default Gateway:
- DNS Server:

802.1X:

- ☐ Use 802.1X Security
- Authentication: MD5
- Username:
- Password:

Bottom Screenshot: Router8 Configuration

The configuration window for Router8 is open, showing the **Config** tab. The **Global** section is active, showing the configuration for the **GigabitEthernet0/0/0** interface. The configuration is set to **Static**.

Global:

- Settings:
- Algorithm Settings:
- ROUTING: ☐ Static ☐ RIP
- SWITCHING:
- VLAN Database:
- INTERFACE:

GigabitEthernet0/0/0:

- Port Status: ☒ On
- Bandwidth: ☐ 1000 Mbps ☒ 100 Mbps ☐ 10 Mbps ☒ Auto
- Duplex: ☐ Half Duplex ☒ Full Duplex ☒ Auto
- MAC Address: 0060.3E34.3501
- IP Configuration:
- IPv4 Address: 10.0.0.3
- Subnet Mask: 255.0.0.0
- Tx Ring Limit: 10

Equivalent IOS Commands:

```
Enter configuration commands, one per line. End with CNTL/Z.  
Router(config)#interface GigabitEthernet0/0/0  
Router(config-if)#
```

Key questions:

1. What changes occur in MAC and IP addresses as a packet crosses routers and switches?
 - As a packet moves across a network, the **IP address stays the same** end-to-end. The **MAC address changes at each router hop**, updated to the next hop's interface. **Switches do not alter MAC or IP addresses**, they just forward using their MAC table. Thus, only routers update MAC addresses, while the IP address remains constant.
2. How does the switch decide where to forward a frame?
 - A switch decides where to forward a frame by checking the **destination MAC address**, looking it up in its **MAC address table**, and then sending the frame out through the **specific port** mapped to that MAC. If the MAC is unknown, the switch **floods the frame to all ports** except the incoming one.
3. How does a router handle a packet's inbound and outbound headers?
 - A router checks the **inbound packet's IP header** to determine the destination network, then looks up the best route in its **routing table**. It removes the old **data link (MAC) header**, keeps the **IP header unchanged**, and adds a new **outbound MAC header** with its own interface as source and the next-hop device as destination.

CONCLUSION:

The simulation successfully demonstrated communication between two office branches in different cities. Data traveled seamlessly with IP addresses remaining constant and MAC addresses updated at each router. Switches efficiently forwarded frames, while routers ensured correct delivery across networks.