# Ex. No: 5 Inter-VLAN Routing Using Router-on-a-Stick

# Date: 13-09-2025

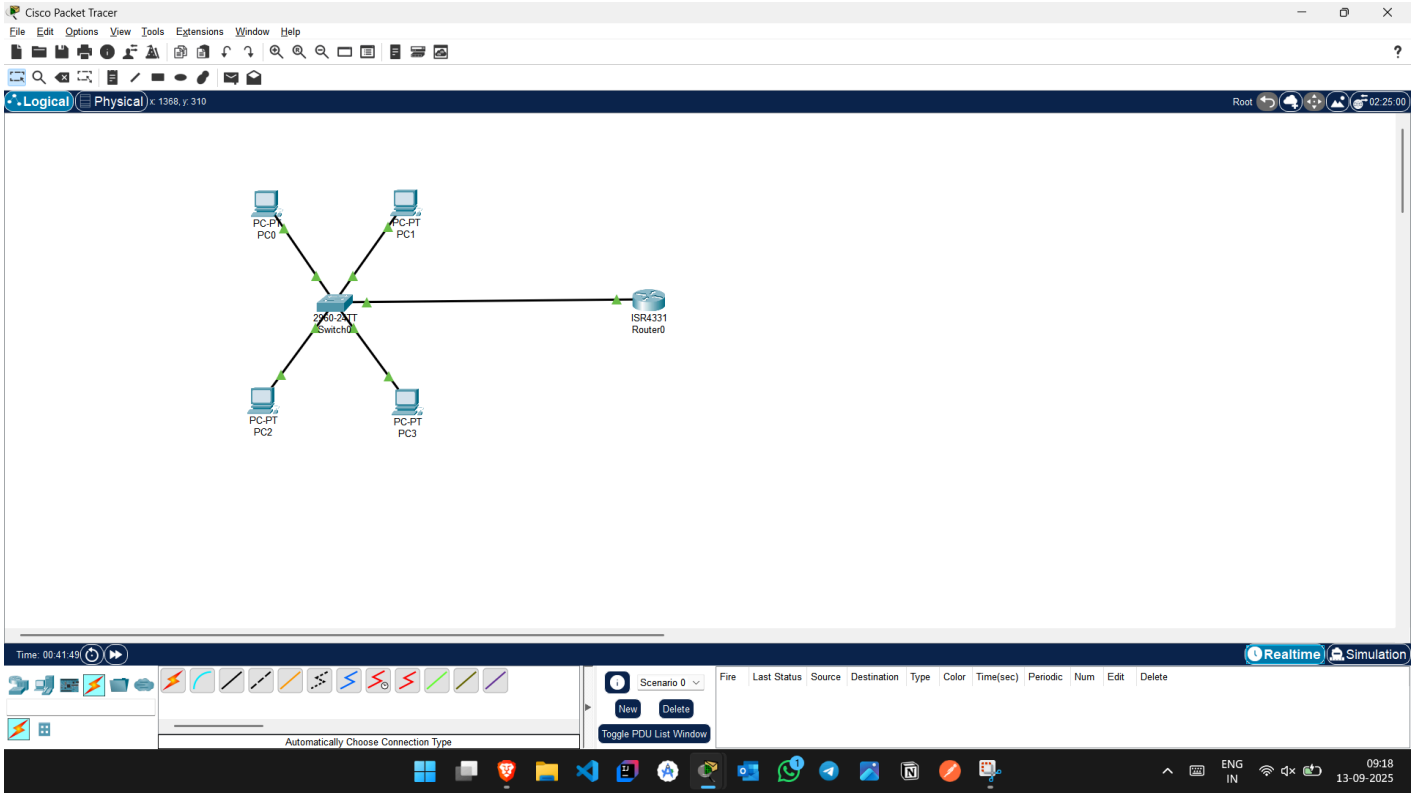
# Objective

To configure Inter-VLAN routing using a single router interface with subinterfaces (Router-on-a-Stick) so that hosts in different VLANs can communicate with each other.

# Apparatus/Tools Required

- Cisco Packet Tracer
- 1 Router (e.g., 2911)
- 1 Managed Switch (e.g., 2960)
- 4 PCs
- Straight-through Ethernet cables

# Network Topology Diagram




# Description:

• PC0 and PC1 belong to VLAN 10 (192.168.10.0/24)
• PC2 and PC3 belong to VLAN 20 (192.168.20.0/24)
• Switch connected to Router via a trunk port (FastEthernet0/1 on switch → GigabitEthernet0/0 on router)
• Router subinterfaces handle VLAN routing
(Insert screenshot of your Packet Tracer setup here)

# IP Addressing Table

Device VLAN IP Address Subnet Mask Port/Interface
PC0 10 192.168.10.1 255.255.255.0 FastEthernet0/1
PC1 10 192.168.10.2 255.255.255.0 FastEthernet0/2
PC2 20 192.168.20.1 255.255.255.0 FastEthernet0/3
PC3 20 192.168.20.2 255.255.255.0 FastEthernet0/4
Router G0/0.10 10 192.168.10.254 255.255.255.0 Subinterface VLAN 10
Router G0/0.20 20 192.168.20.254 255.255.255.0 Subinterface VLAN 20

# Procedure

1. Setup devices in Packet Tracer: Place 4 PCs, 1 switch, and 1 router.

2. Cabling:
   - o PCs to switch ports (PC0–F0/1, PC1–F0/2, PC2–F0/3, PC3–F0/4)
   - o Switch F0/5 to Router G0/0
3. Assign IP addresses to each PC as per the IP table.
4. Switch Configuration:
   - o Create VLAN 10 and VLAN 20
   - o Assign ports F0/1–F0/2 to VLAN 10, ports F0/3–F0/4 to VLAN 20
   - o Configure trunk on port F0/5 to the router
5. Router Configuration (Router-on-a-Stick):
   - o Enable subinterfaces G0/0.10 and G0/0.20
   - o Assign encapsulation dot1q for each VLAN ID
   - o Assign IP addresses to each subinterface (default gateway for respective VLANs)
6. Testing:
   - o Ping from PC0 to PC2 (should succeed after routing is configured)
   - o Ping between PCs in the same VLAN (should succeed)

# Commands Used

Switch Configuration:
python
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Switch> enable
Switch# configure terminal
Switch(config)# vlan 10
Switch(config-vlan)# name STAFF
Switch(config-vlan)# exit
Switch(config)# vlan 20
Switch(config-vlan)# name STUDENTS
Switch(config-vlan)# exit
Switch(config)# interface range fastethernet0/1 - 2
Switch(config-if-range)# switchport mode access
Switch(config-if-range)# switchport access vlan 10
Switch(config-if-range)# exit
Switch(config)# interface range fastethernet0/3 - 4
Switch(config-if-range)# switchport mode access
Switch(config-if-range)# switchport access vlan 20
Switch(config-if-range)# exit
Switch(config)# interface fastethernet0/5
Switch(config-if)# switchport mode trunk
Switch(config-if)# exit
```
Router Configuration:
arduino
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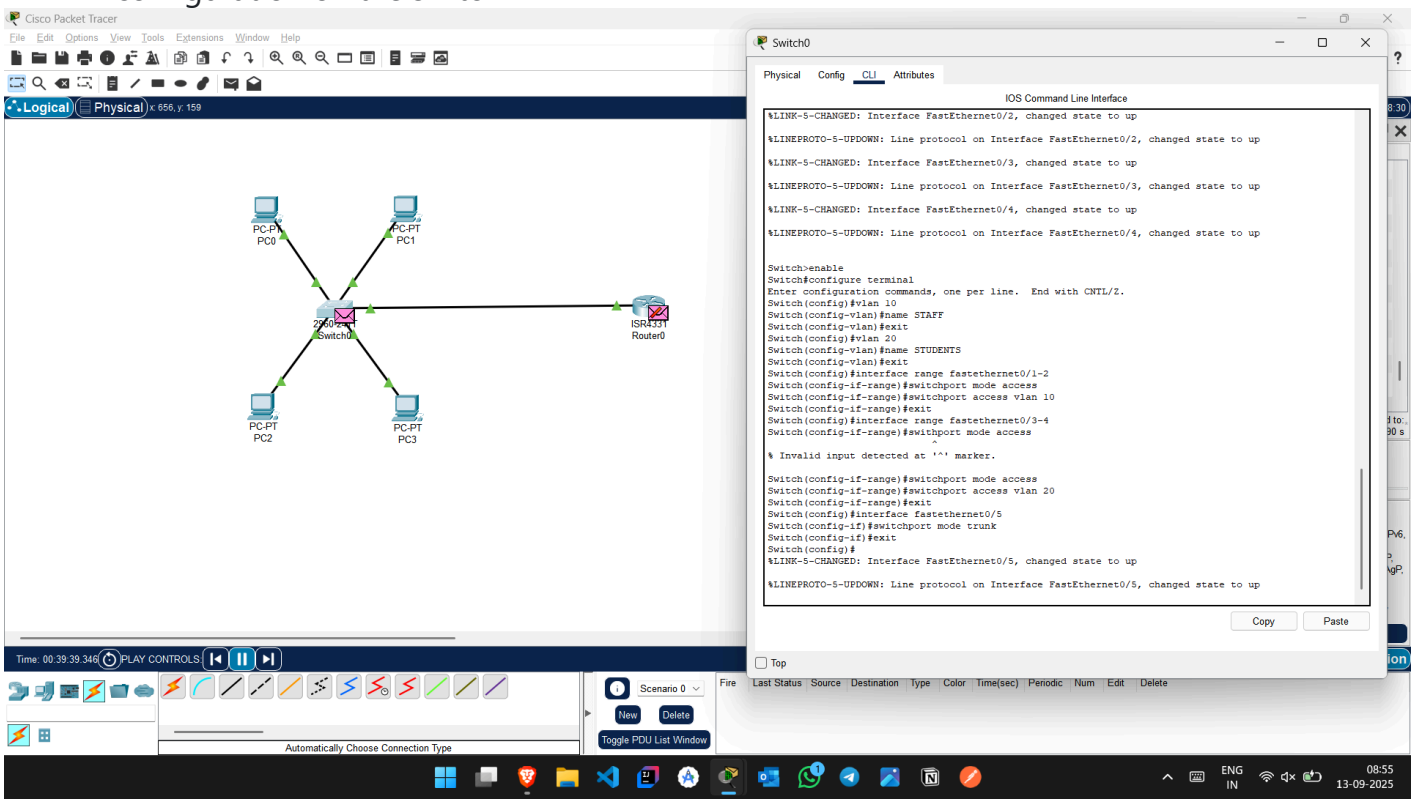
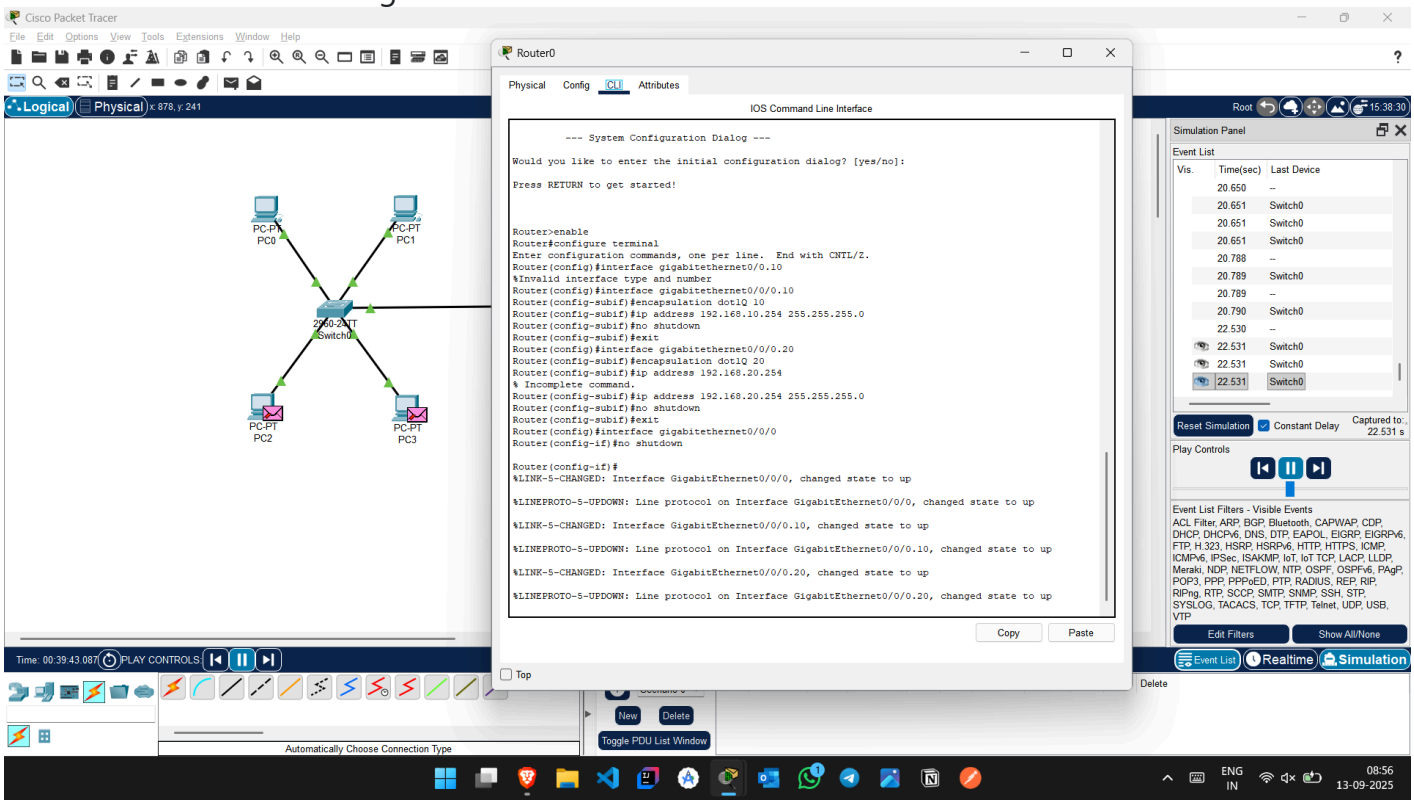
```
Router> enable
Router# configure terminal
Router(config)# interface gigabitethernet0/0.10
Router(config-subif)# encapsulation dot1Q 10
Router(config-subif)# ip address 192.168.10.254 255.255.255.0
Router(config-subif)# no shutdown
Router(config)# interface gigabitethernet0/0.20
Router(config-subif)# encapsulation dot1Q 20
Router(config-subif)# ip address 192.168.20.254 255.255.255.0
Router(config-subif)# no shutdown
Router(config)# interface gigabitethernet0/0
Router(config-if)# no shutdown
```

# Output (Screenshots)

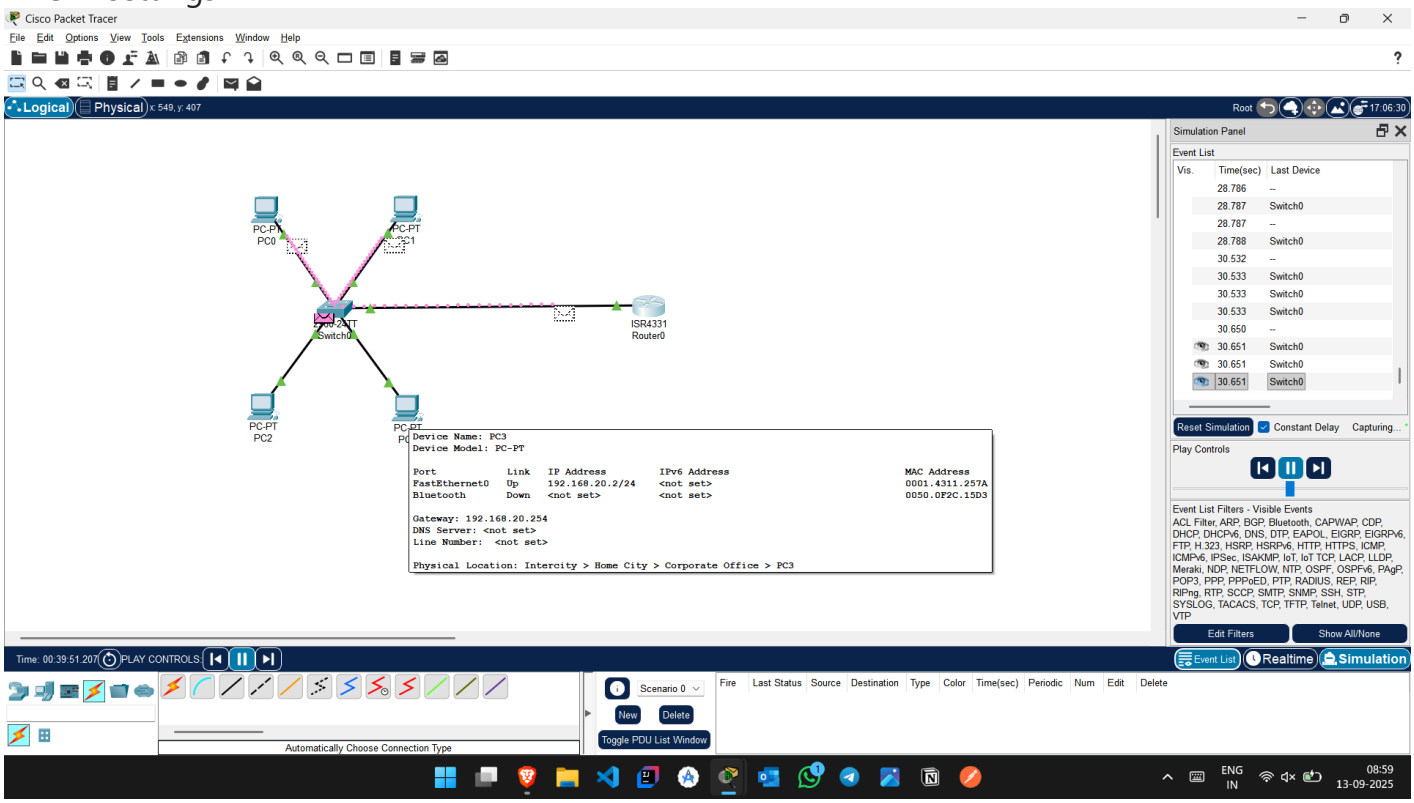
- VLAN configuration on the switch



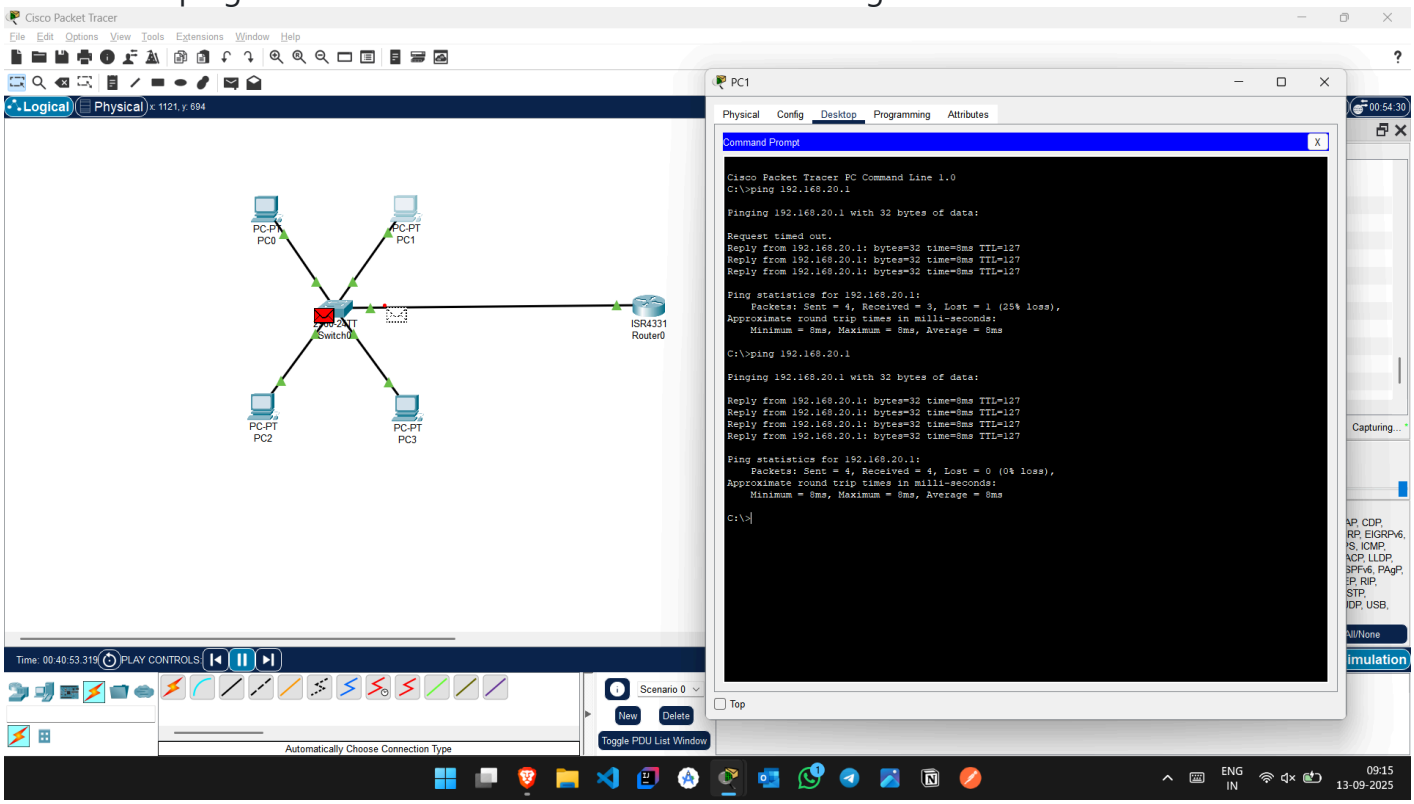

- Router subinterface configuration



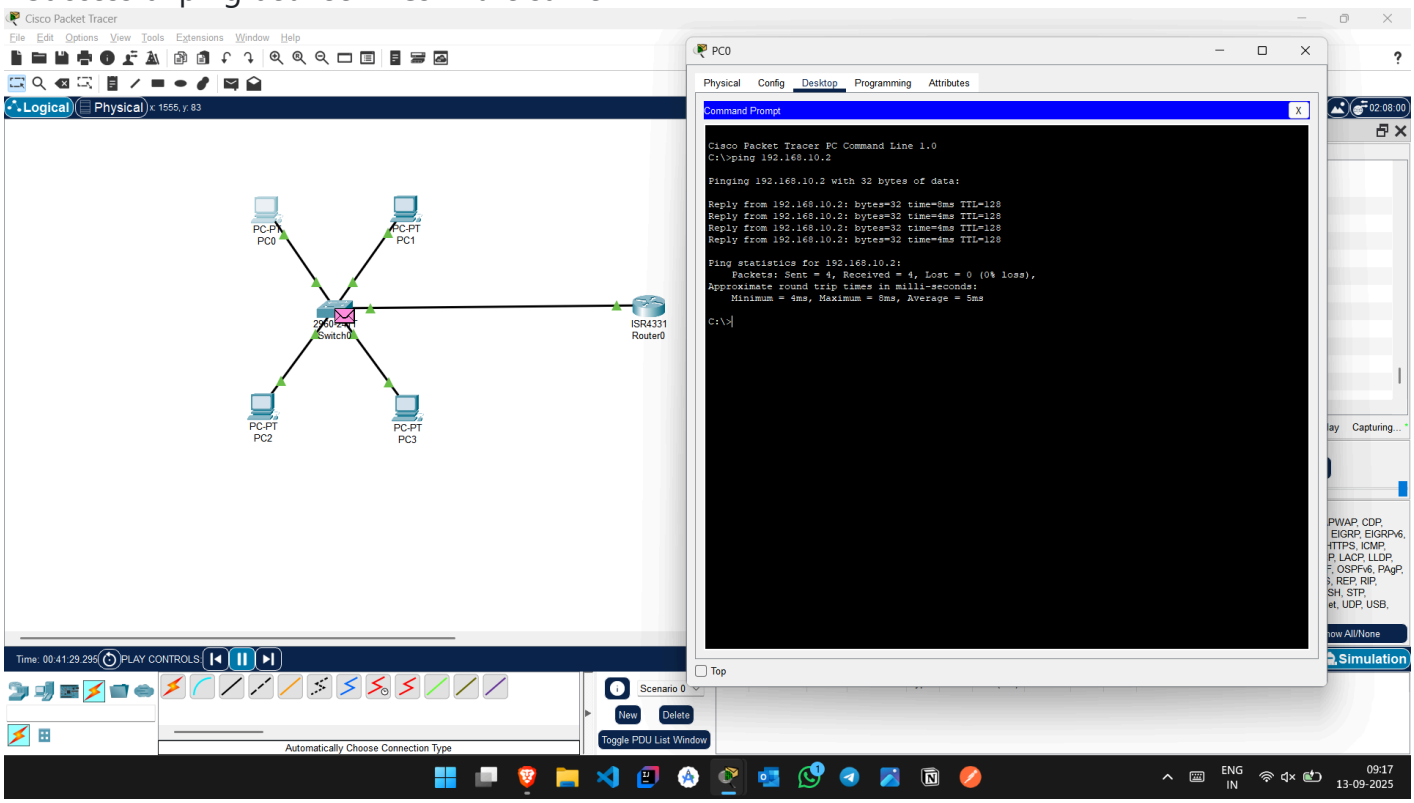
- PC IP settings




- Successful ping between PCs in different VLANs after routing



- Successful ping between PCs in the same VLAN




# Result

Inter-VLAN routing was successfully configured using the Router-on-a-Stick method. PCs in different VLANs could communicate through the router.