Course: Cloud and Network Security - C3 – 2025

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Week 2 Assignment 1:

Class Exercise: Packet Tracer - Build a Switch and Router Network

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Introduction

The purpose of this lab was to design, configure, and test a basic network consisting of a router, switch, and two end devices using Cisco Packet Tracer. The activity focused on establishing end-to-end connectivity by configuring IP addressing, enabling interfaces, and verifying connections using various commands such as ping, show ip route, and show ip interface brief. Additionally, the lab involved exploring device information through CLI commands, including routing tables and interface statistics, to gain a deeper understanding of how networks operate. This exercise provided hands-on experience with fundamental networking concepts such as subnetting, routing, and troubleshooting, while simulating real-world network management scenarios.

Lab - Build a Switch and Router Network

Objectives

Part 1: Set Up the Topology and Initialize Devices

Part 2: Configure Devices and Verify Connectivity

Part 3: Display Device Information

The primary objective is to configure IPv4 and IPv6 addressing, secure device access, and verify connectivity across the network. This exercise reinforces knowledge of Cisco IOS commands and network fundamentals, including interface configuration, VLAN management, and basic routing.

Part 1: Set Up Topology and Initialize Devices

Step 1: Cable the network as shown in the topology

The topology with all devices turned on.

Step 2: Initialize and reload the router and switch

Router > Reset the router

Switch > Reset the Switch

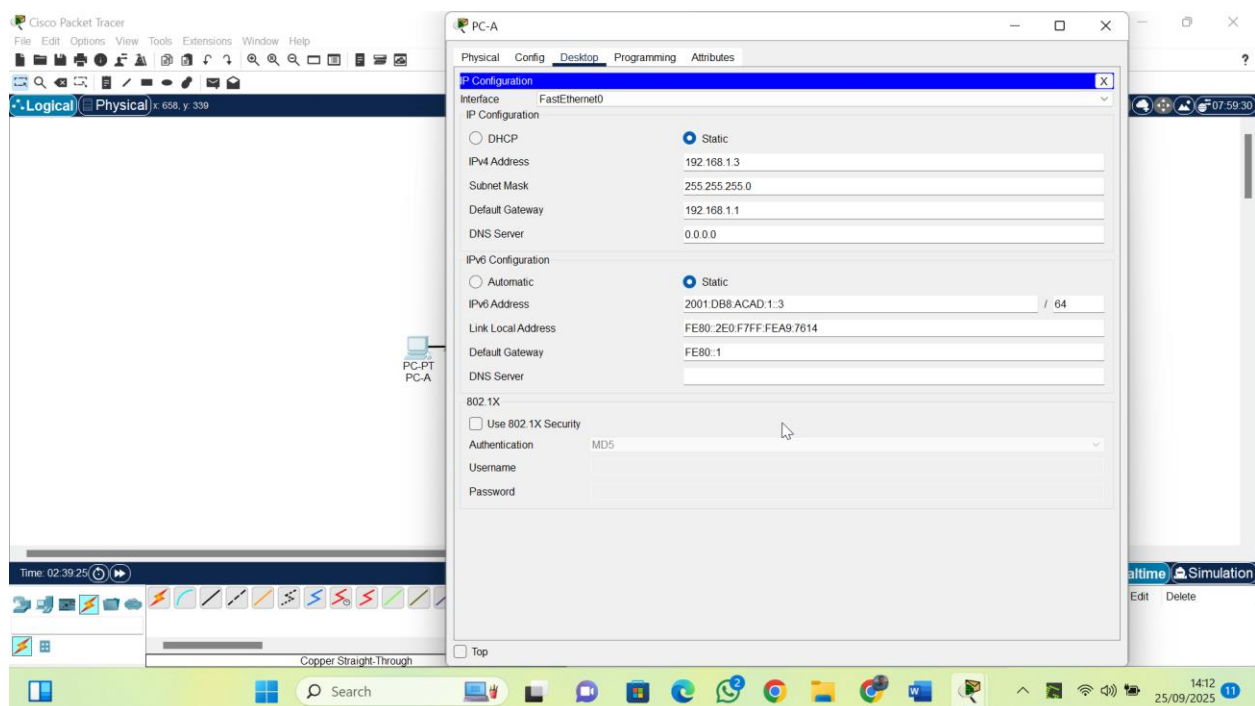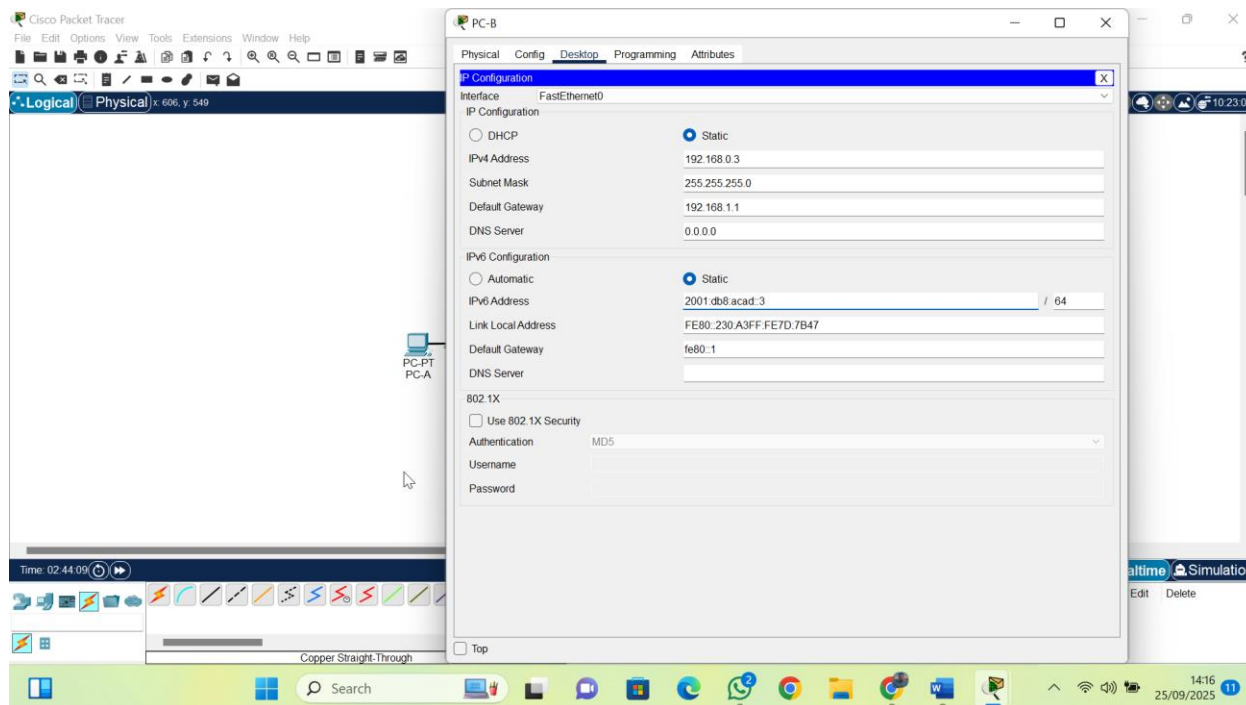# Part 2: Configure Devices and Verify Connectivity

Step 1: Assign static IP information to the PC interfaces.

PC-A

PC-B

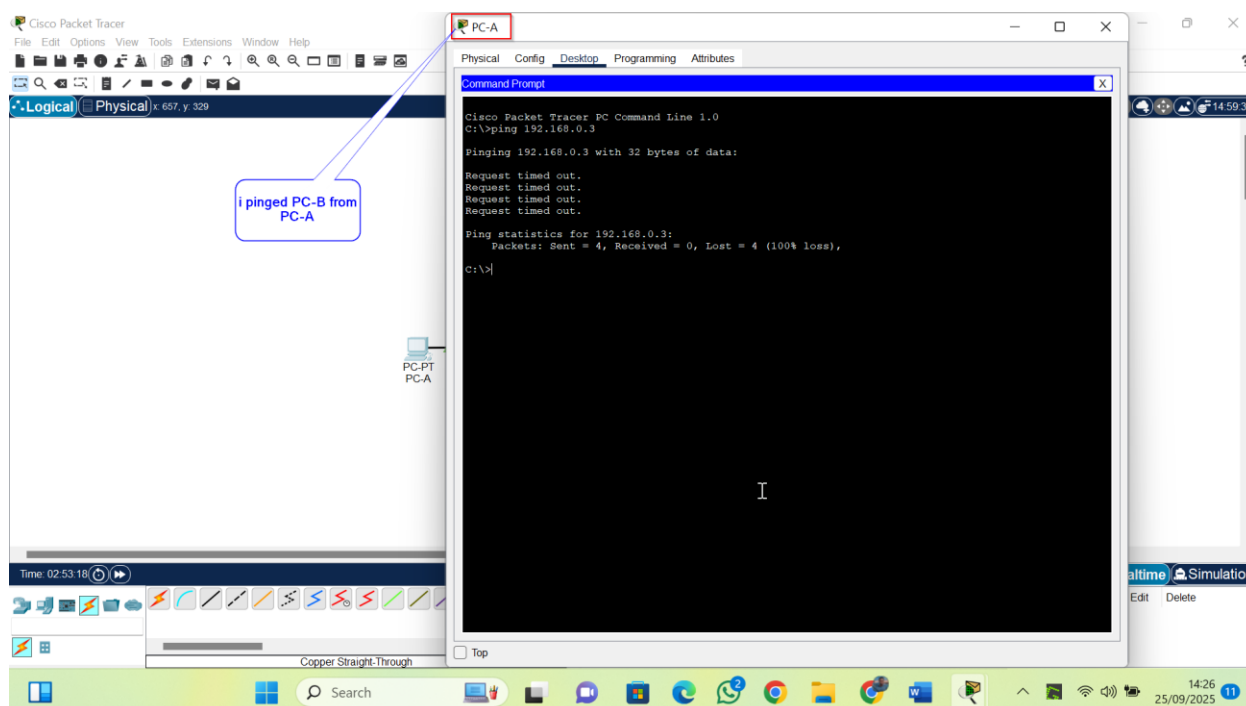**Why were the pings not successful?**

The ping fails because router interfaces have not been configured yet, so Layer 3 traffic cannot move between subnets.

Step 2: Configure the Router.

CLI showing hostname and password configuration.
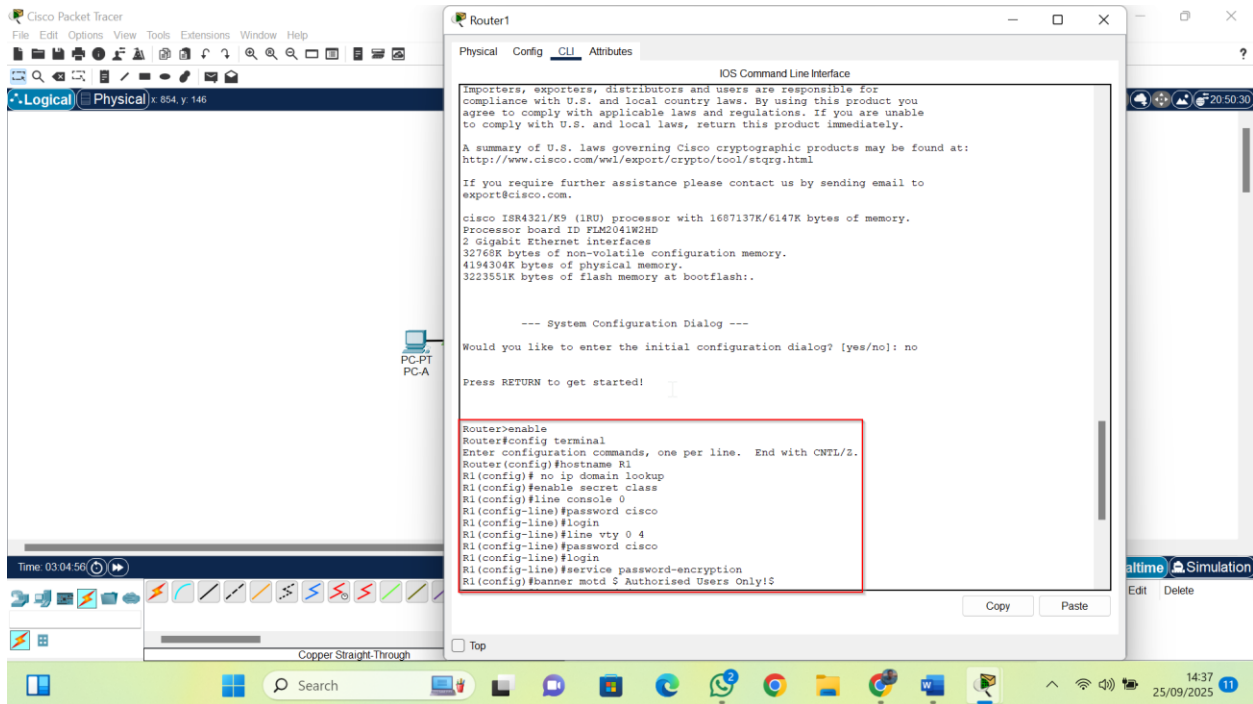
Configure Router Interfaces

    a.   **Interface G0/0/0**

b. Interface G0/0/1

Interfaces configured and enabled
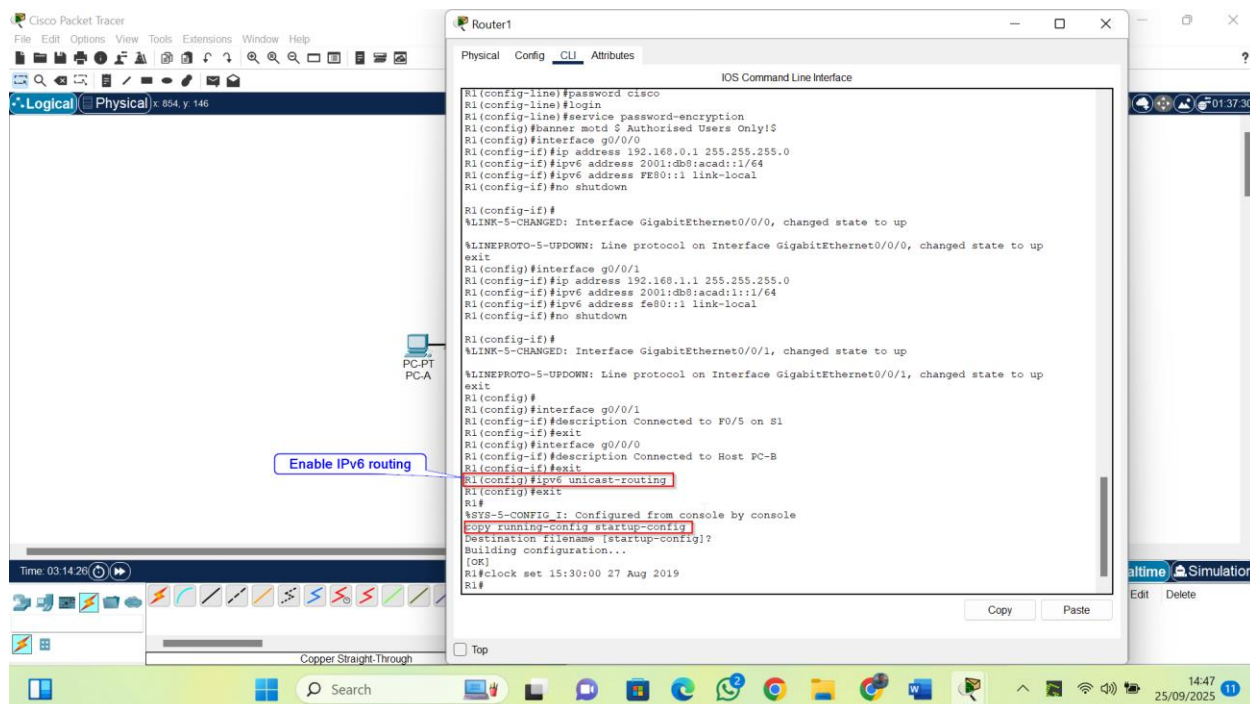
Successful Configuration

All the indications are green now from the previous.
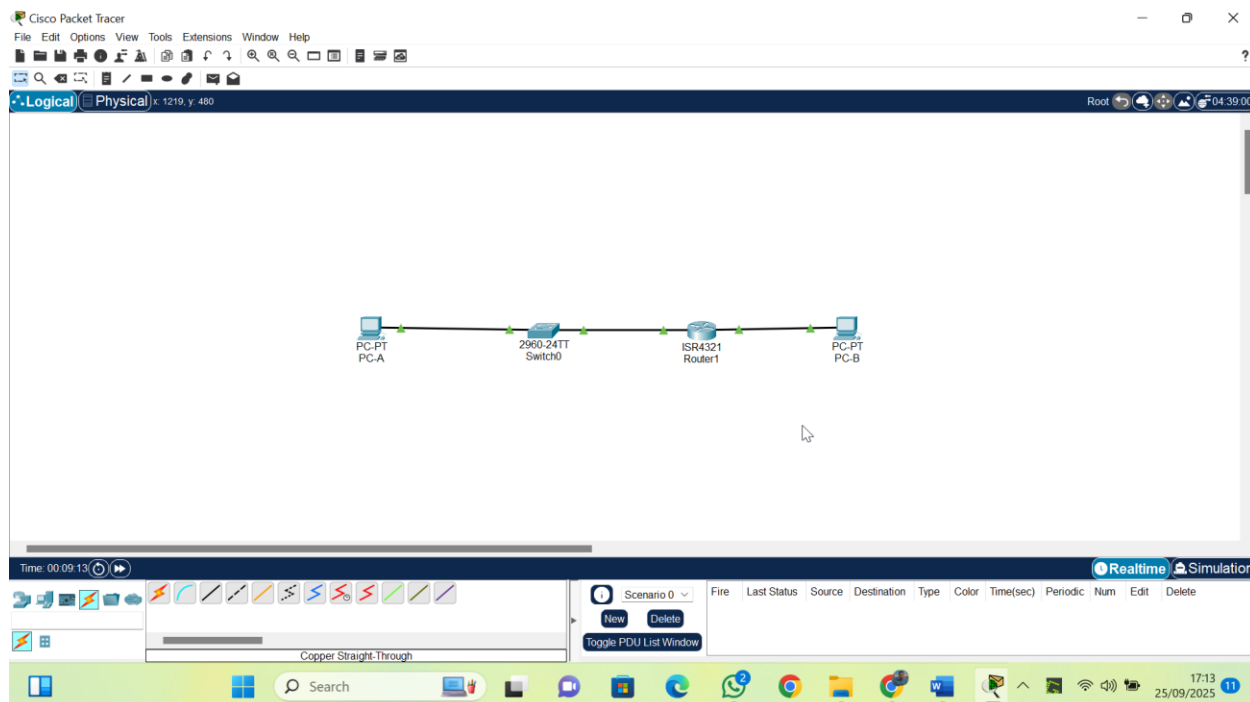
Verify Router Configuration

- Ping PC-B from PC-A again.
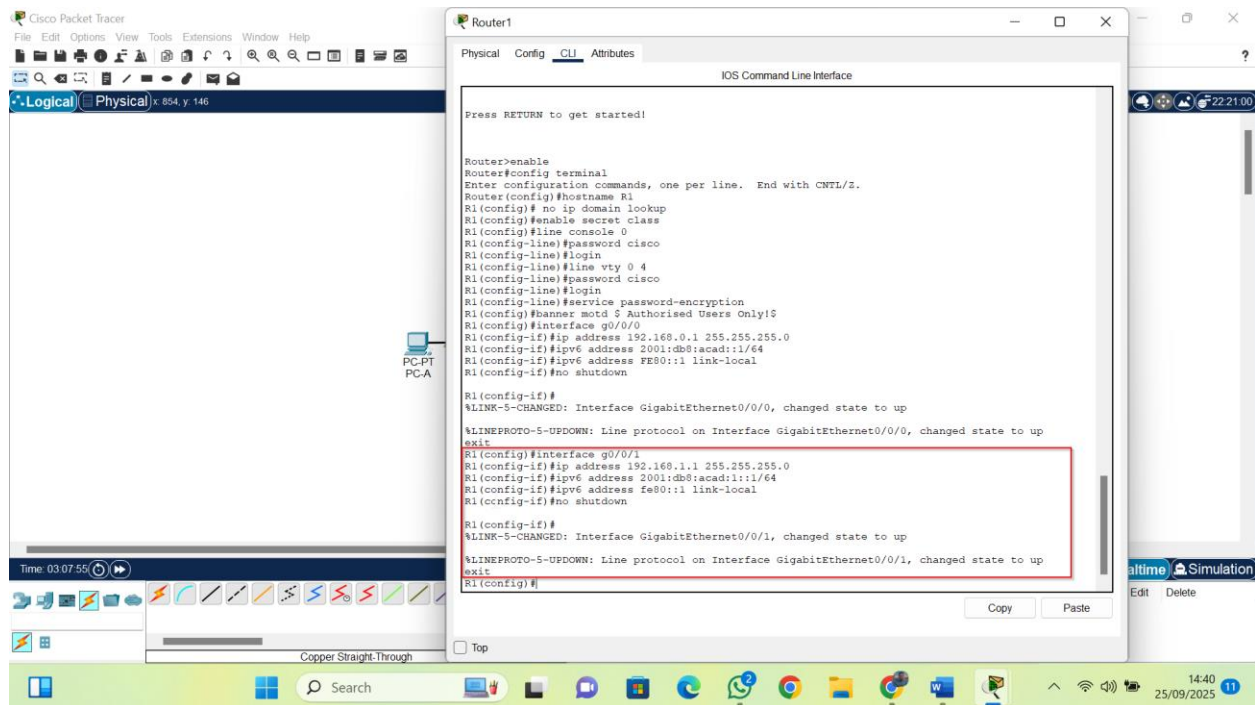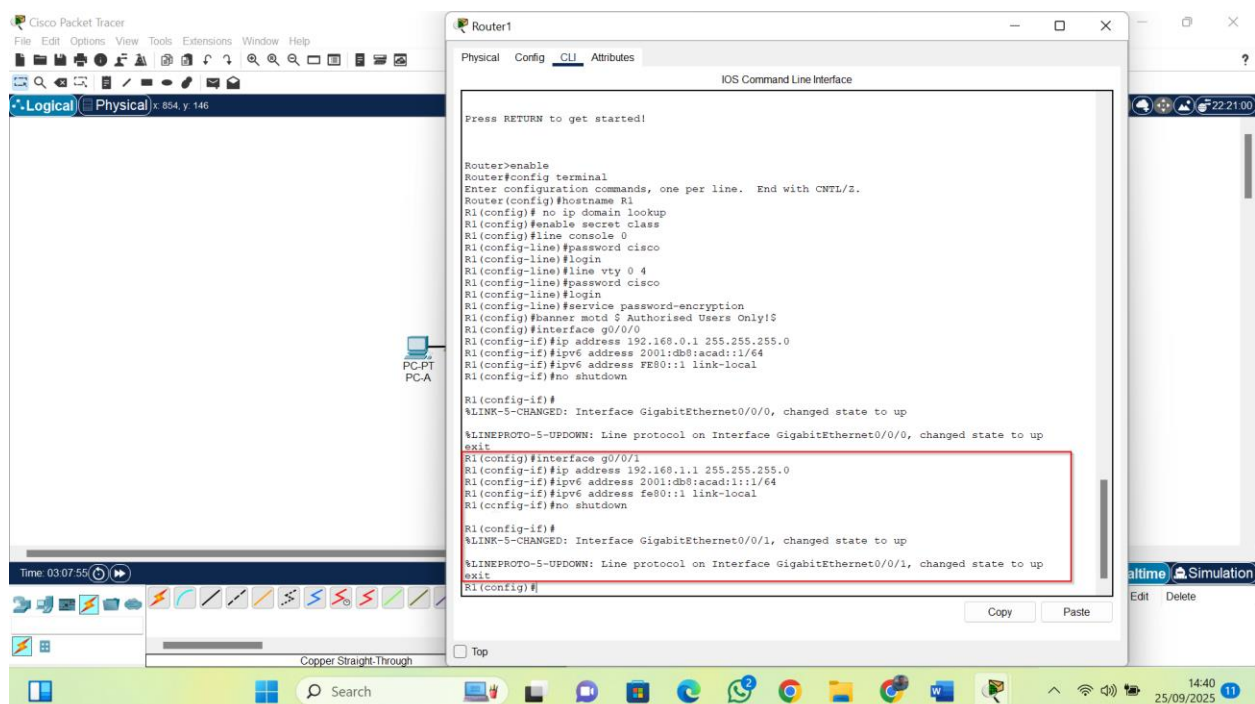- Now the ping should be successful because the router is routing between the subnets.
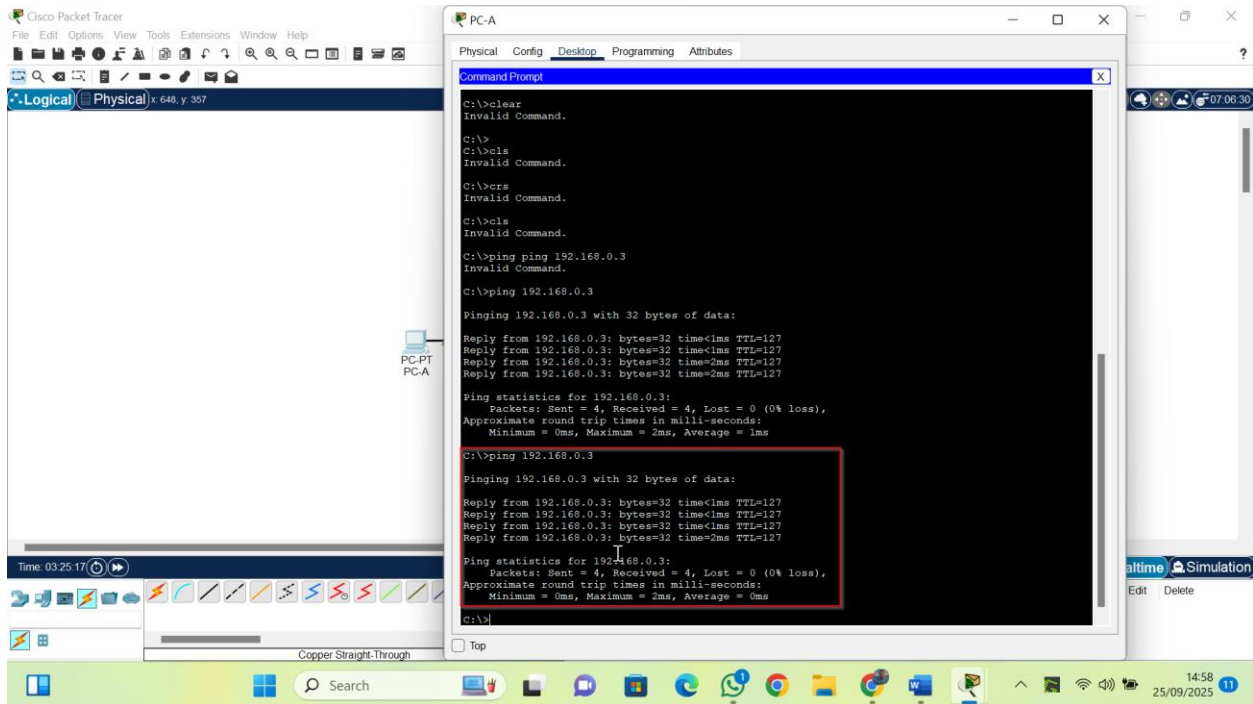
Were the pings successful? Explain

The ping succeeds as the router has been configured to route traffic between the two networks, and the switch interfaces automatically activate by default.

Step 3: Configure the Switch

    i.   **Configure VLAN Interface**
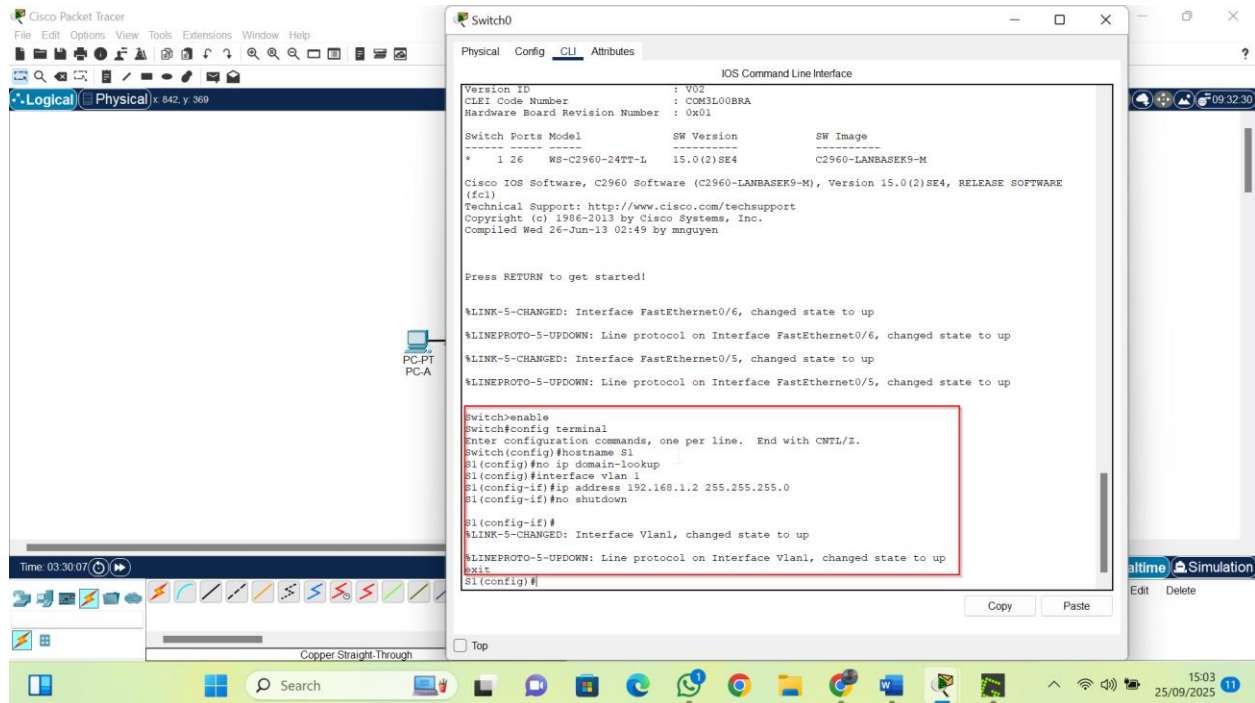
ii. Configure the default gateway for the switch S1
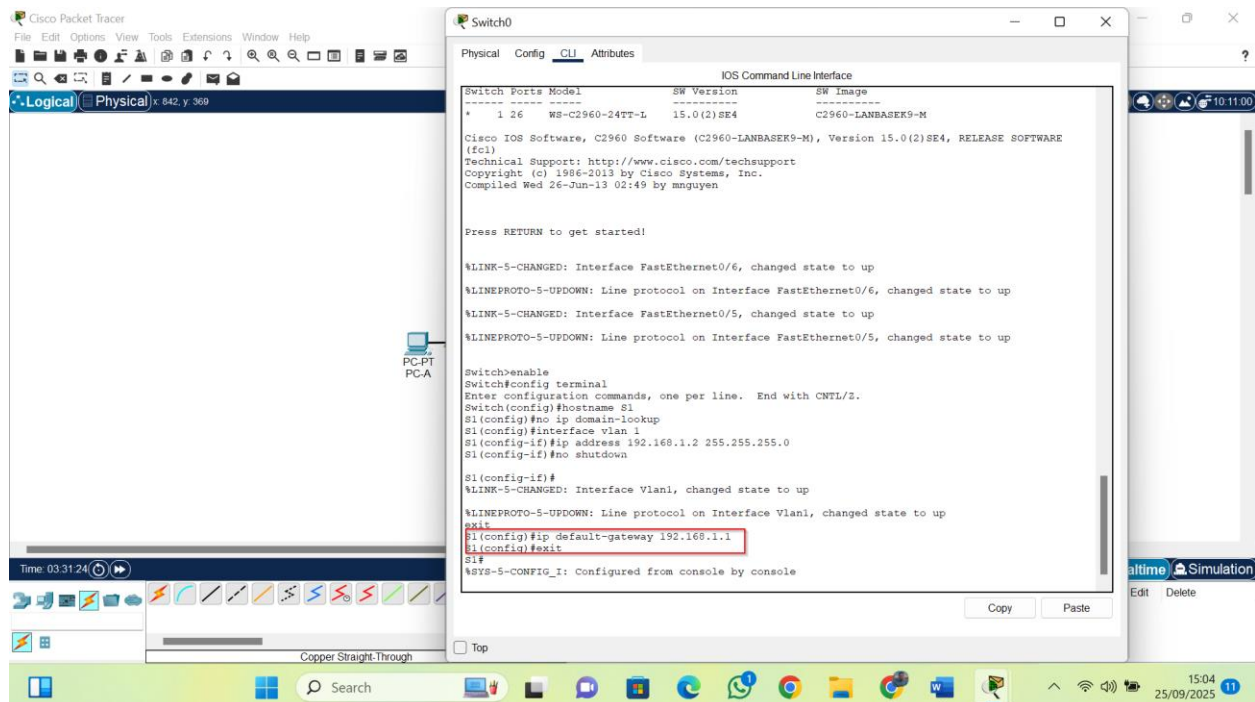
iii. Save the running configuration to the startup configuration file
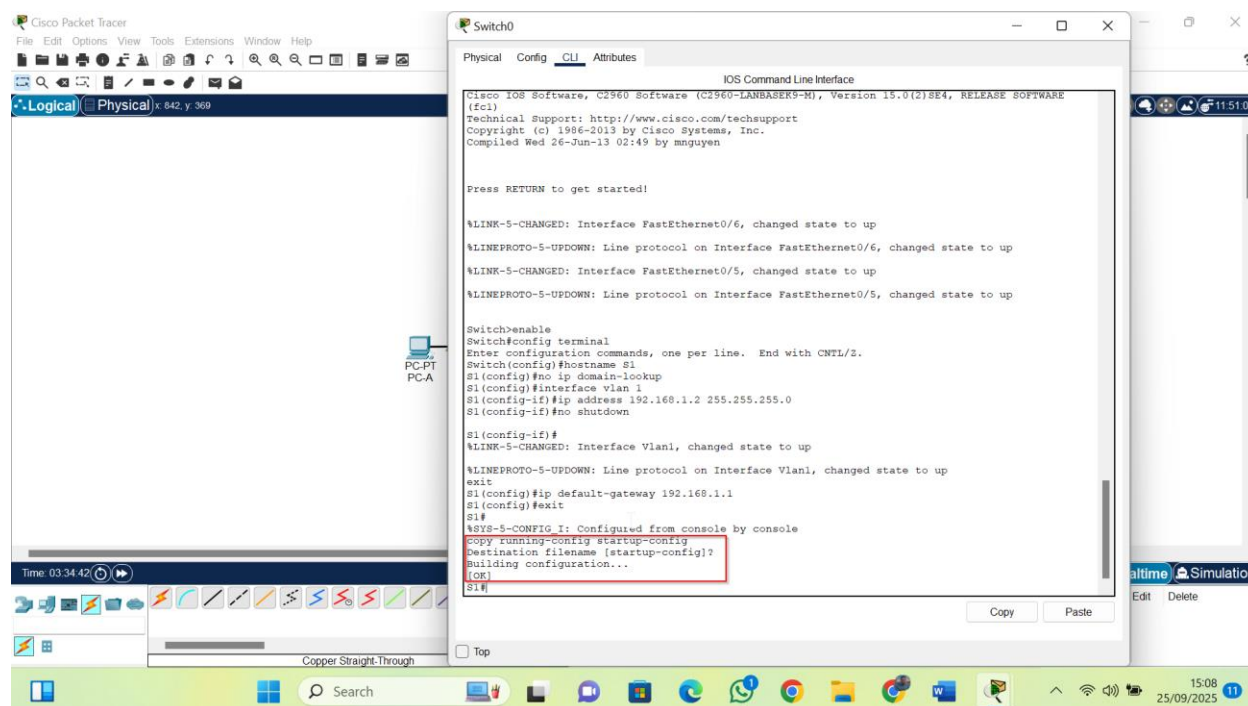
Step 4: Verify connectivity end-to-end connectivity

a. From PC-A → Ping PC-B

Successful ping

b. From Switch → Ping PC-B

Successful ping
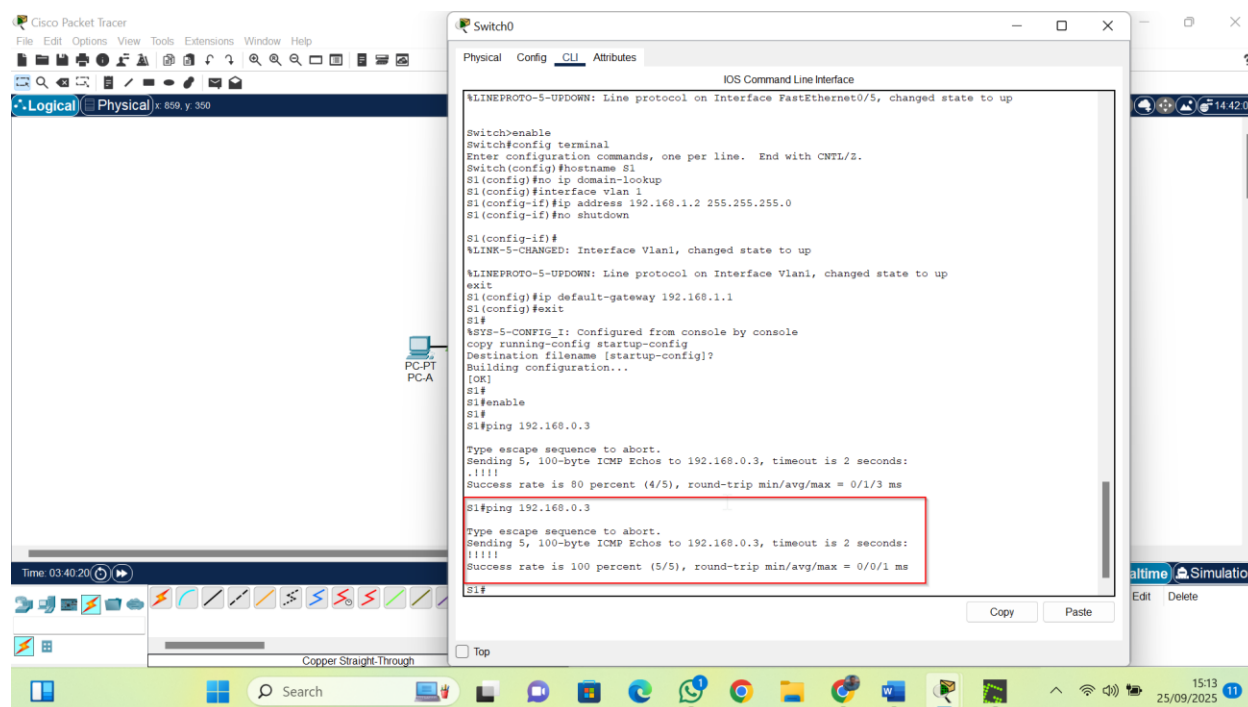
Part 3: Display Device Information

Step 1: Display the routing table on the router

Part a: Use the show ip route
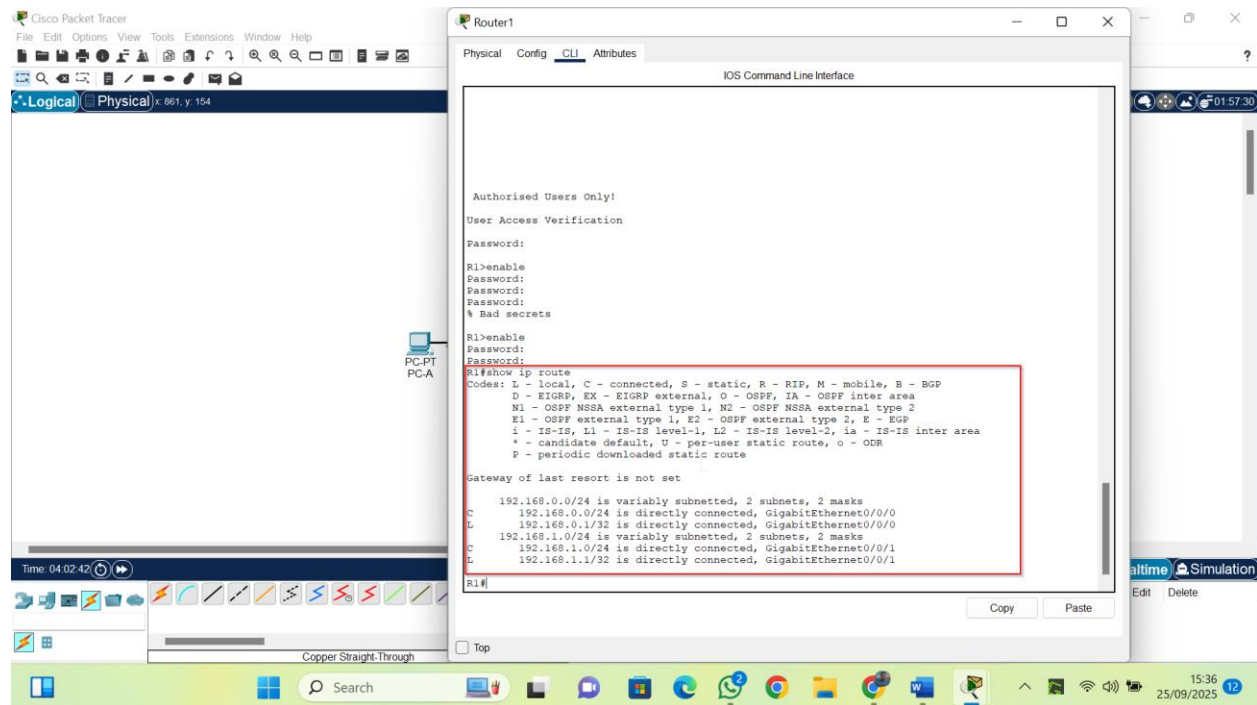
Questions

i.   **What code is used in the routing table to indicate a directly connected network?**
The letter C represents a directly connected network.
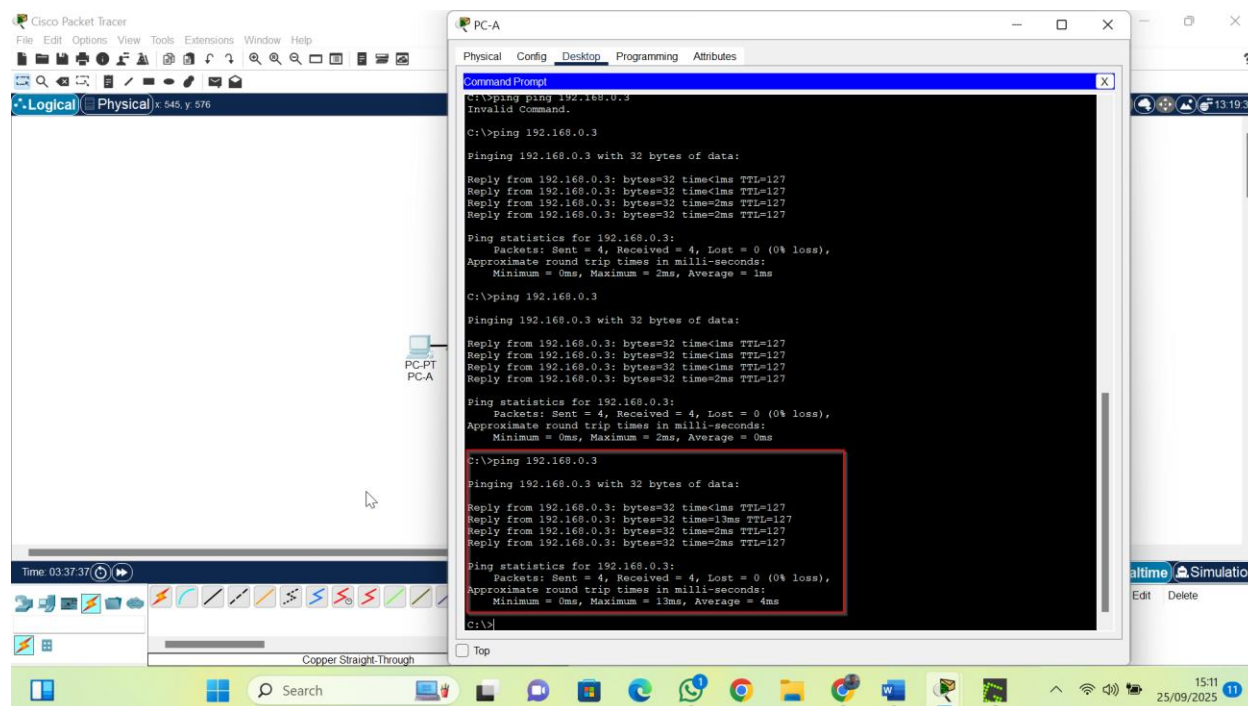The letter L represents the local interface IP address.

ii.   **How many route entries are coded with a C code in the routing table?**
2
192.168.0.0/24 → G0/0/0
192.168.1.0/24 → G0/0/1

iii. **What interface types are associated to the C coded routes?**

G0/0/0 (connected to PC-B subnet)

 G0/0/1 (connected to PC-A subnet)

Part b: Use the show ipv6 route command on router R1
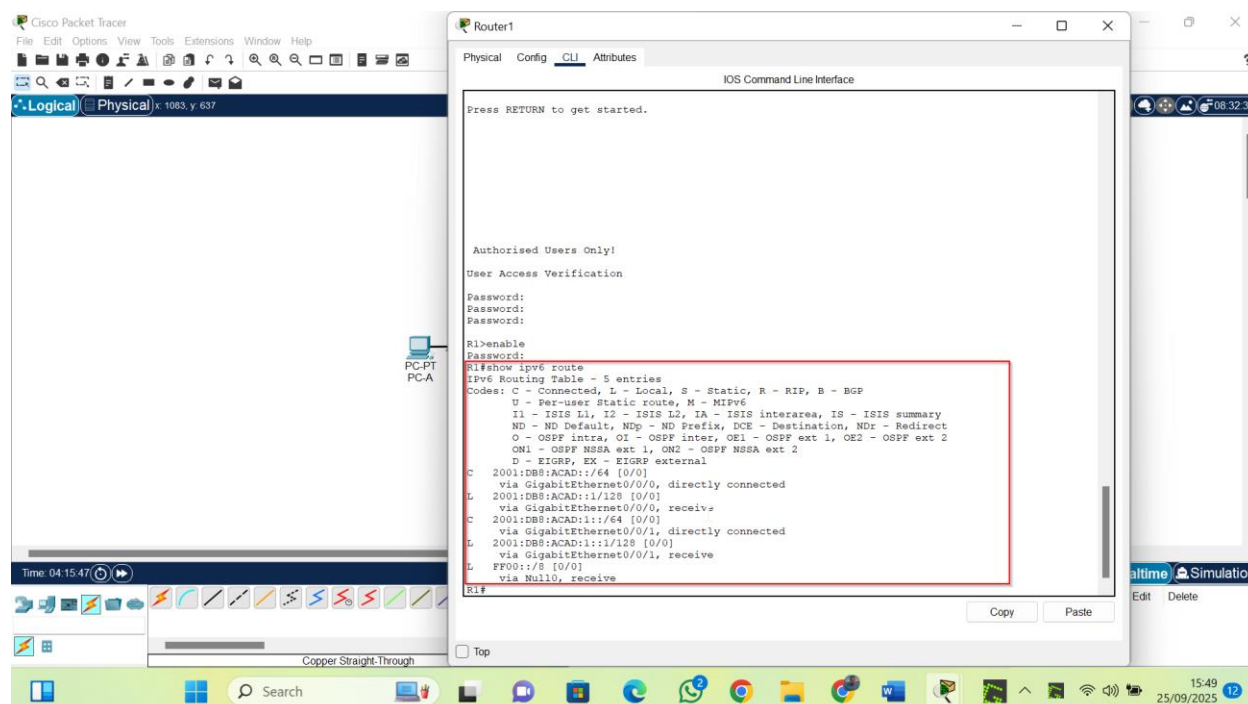
Step 2: Display interface information on the router R1

Part a: Use the show IP interface g0/0/1

Questions

    i.   **What is the operational status of the G0/0/1 interface?**

        GigabitEthernet0/0/1 is up, line protocol is up (connected)

    ii.   **What is the Media Access Control (MAC) address of the G0/1 interface?**

        Hardware is Lance, address is 0040.0b2b.9e02 (bia 0040.0b2b.9e02)
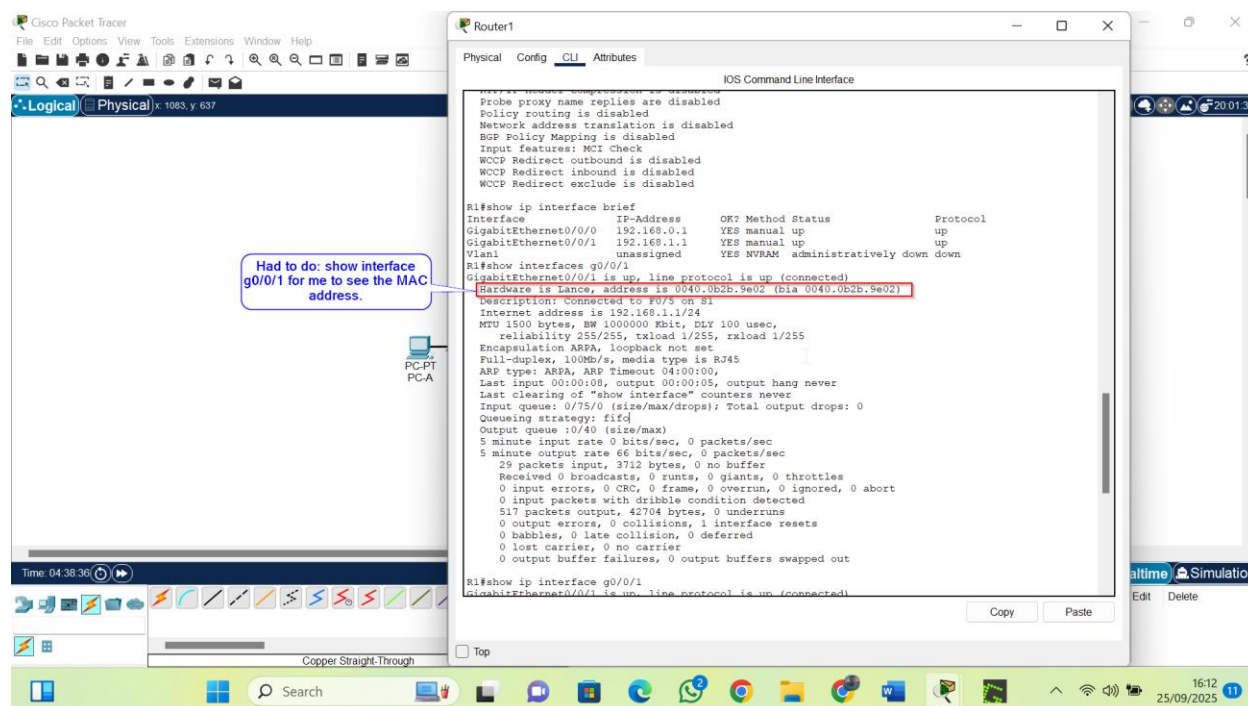
iii.   How is the Internet address displayed in this command?

Internet address is 192.168.1.1/24
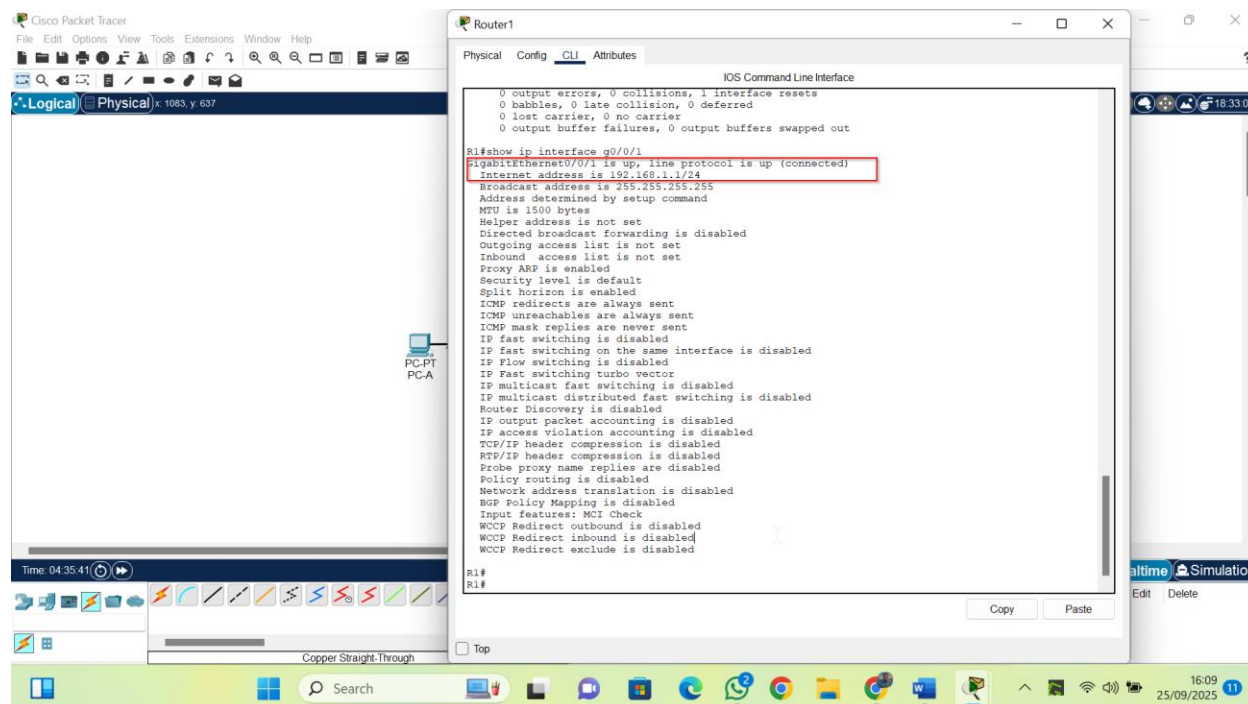
Part b: Enter the show ipv6 interface

Step 3: Display a summary list of the interfaces on the router and switch

Part a: Show IP interface brief command on the router R1

Part b: Enter the show ipv6 interface brief command on R1.

Part c: Show IP interface brief command on the switch S1

Reflection Questions
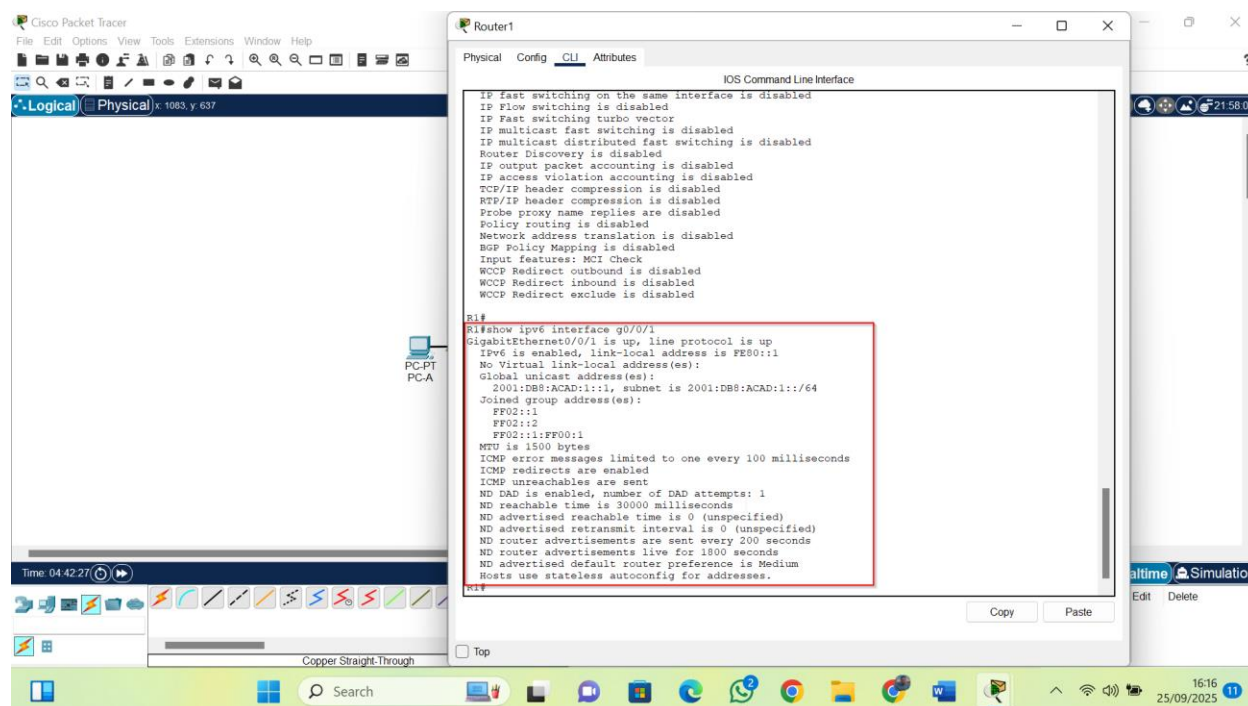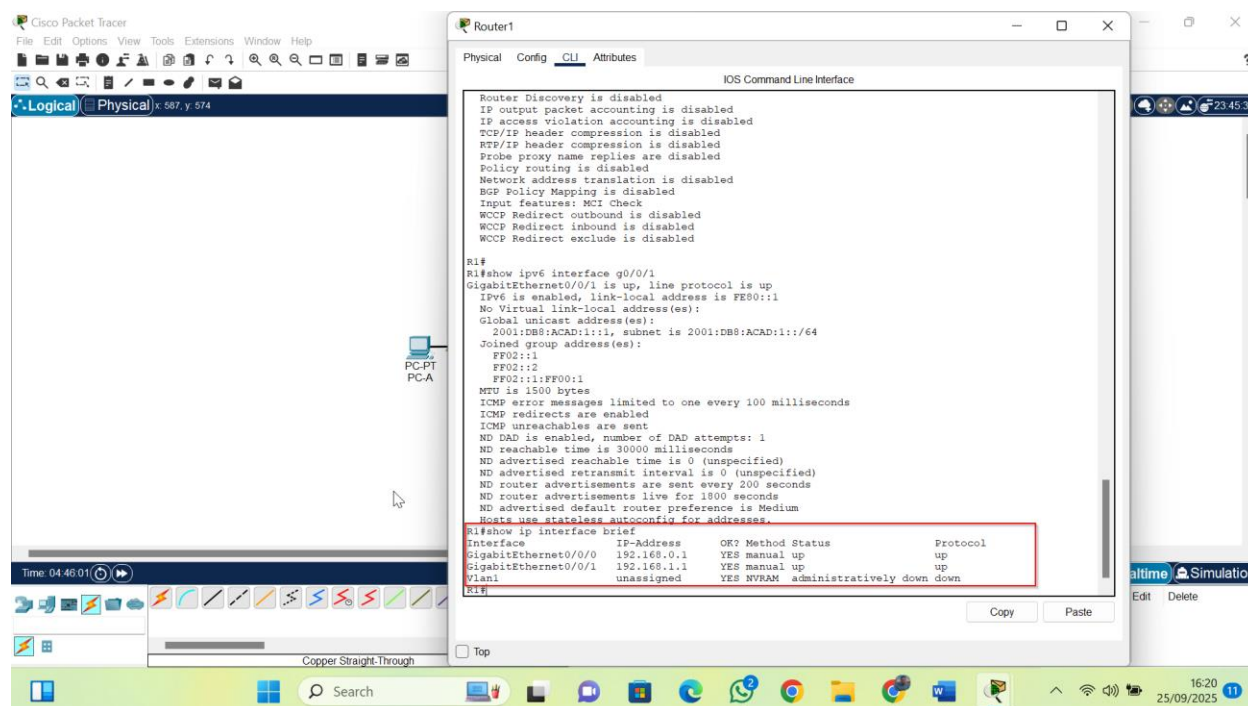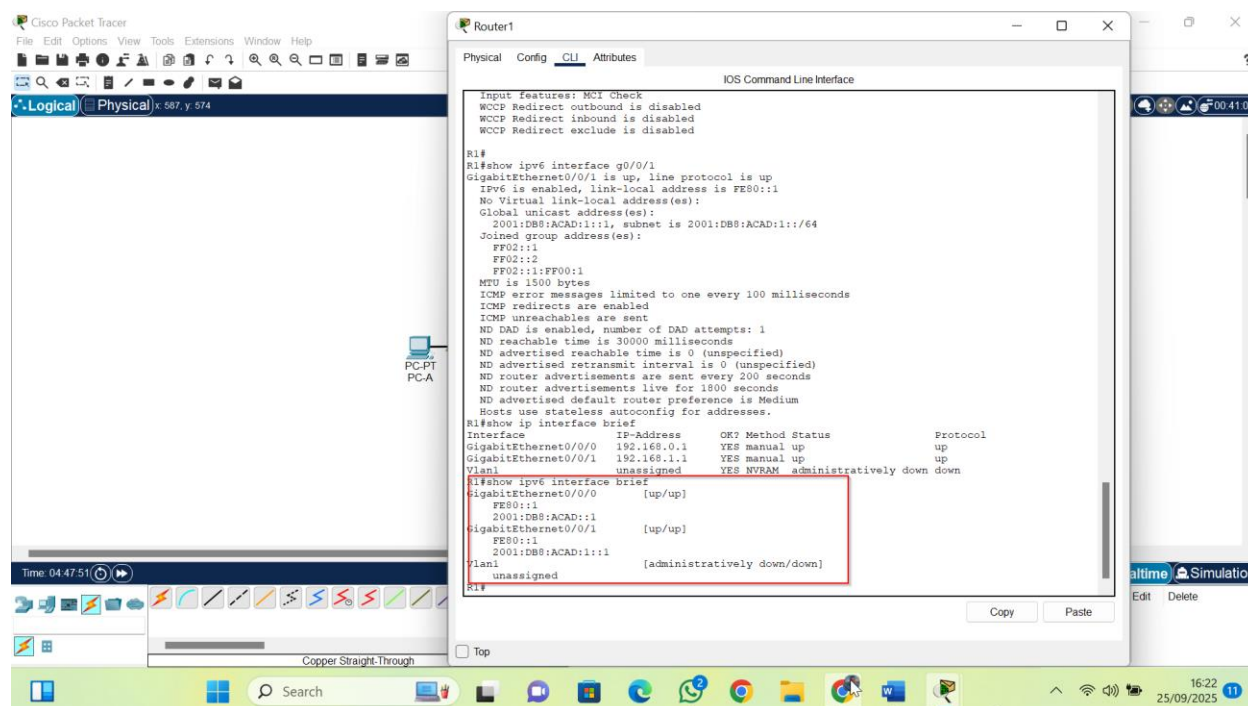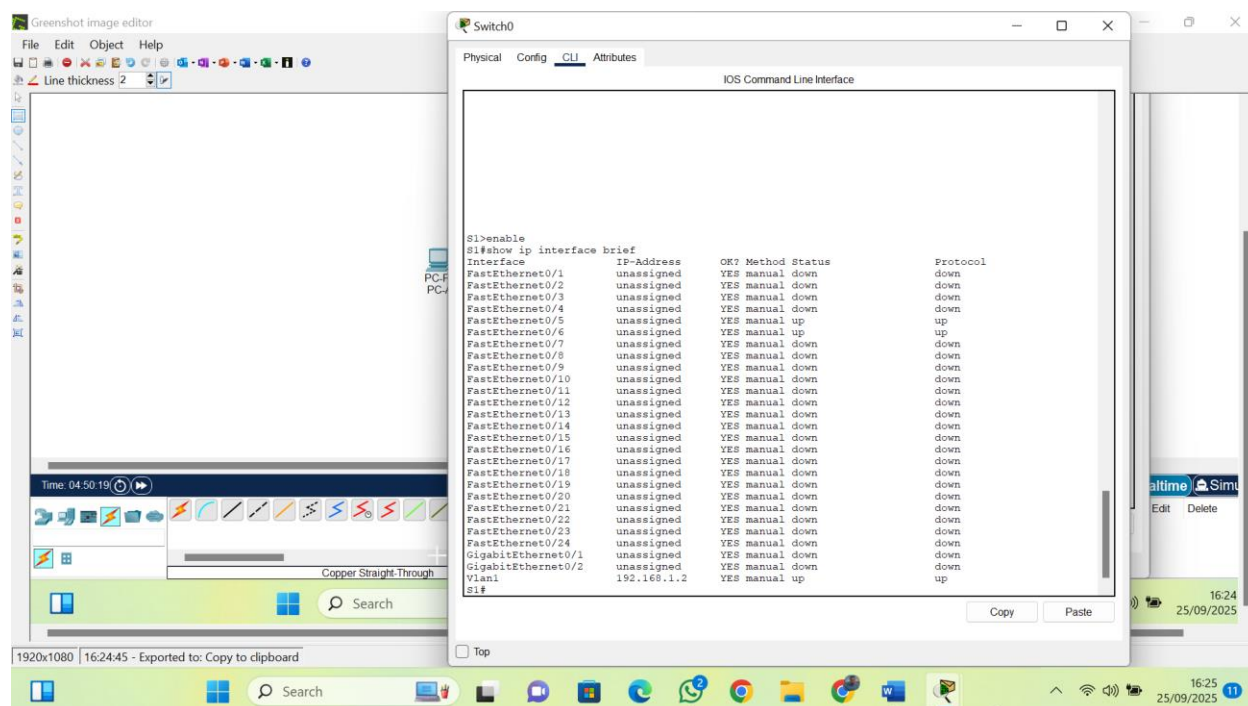
1. **If the G0/0/1 interface showed that it was administratively down, what interface configuration command would you use to turn the interface up?**

R1(config)# interface g0/0/1

R1(config-if) # no shutdown

2. **What would happen if you had incorrectly configured interface G0/0/1 on the router with an IP address of 192.168.1.2?**

If G0/0/1 were set to 192.168.1.2 (the same subnet as PC-A or duplicate with the switch), the router would no longer have the intended gateway address 192.168.1.1 for that subnet. As a result, PC-A (configured to use 192.168.1.1 as its default gateway) would not be able to reach remote subnets (e.g., PC-B's 192.168.0.0/24) because its gateway address would not exist on the LAN routing would fail and pings would fail. In short: inter-subnet communication would break due to incorrect gateway addressing.

Conclusion

By successfully completing this lab, we demonstrated the ability to configure and verify network connectivity between devices using a router and a switch. The process involved setting up IP addresses, enabling interfaces, and testing communication between PCs. The use of verification commands like ping, show ip route, and show ipv6 interface allowed us to confirm correct configuration and identify potential issues. Through this lab, we gained practical skills in network setup and troubleshooting, as well as an understanding of how routers and switches work together to enable communication across different network segments. This foundational knowledge is essential for building more complex networks in future networking tasks.