COURSE: CLOUD AND NETWORK SECURITY
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PACKET TRACER - BUILD A SWITCH AND ROUTER NETWORK

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INTRODUCTION

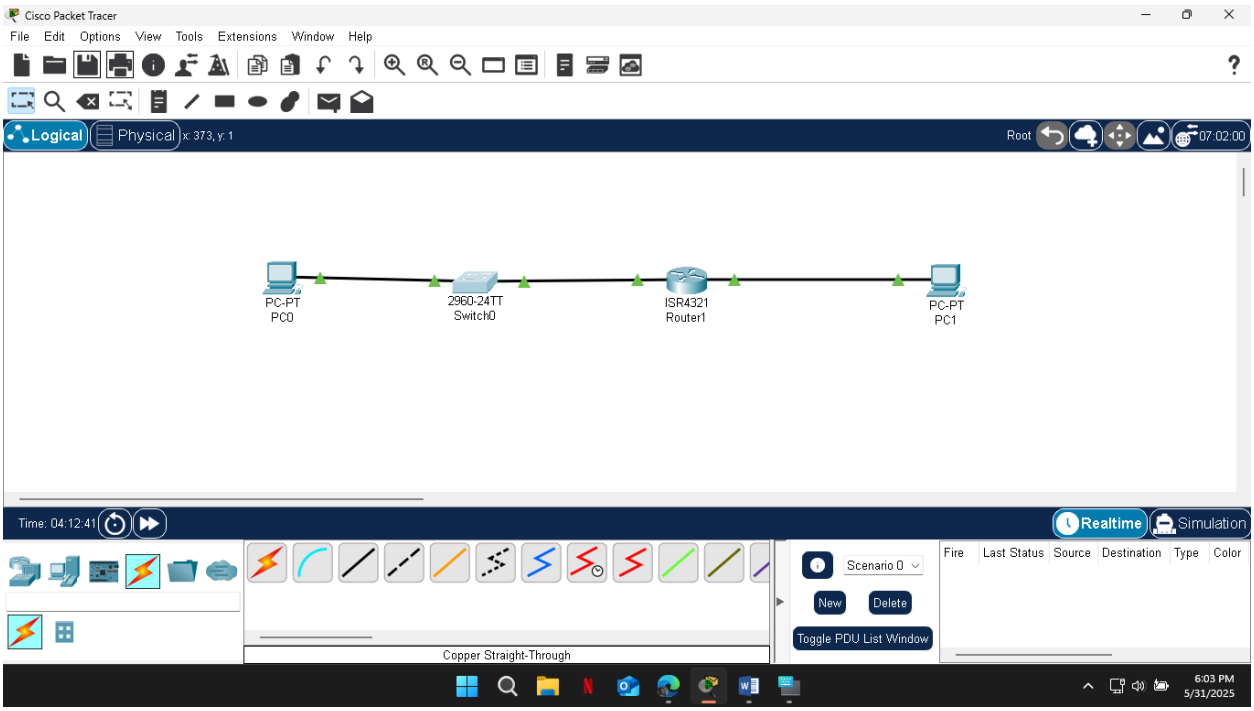
In this Packet Tracer assignment, the primary objective is to configure a router and its interfaces for both IPv4 and IPv6 communication. The setup involves assigning appropriate hostnames, securing access through password protection, enabling routing protocols, and ensuring interface connectivity across the network. By applying core Cisco IOS commands, we aim to simulate a functional, secure, and well-documented network infrastructure. This exercise enhances practical skills in router configuration, interface management, and troubleshooting—key competencies for any aspiring network professional.

PART 1: SET UP TOPOLOGY AND INITIALIZE DEVICES

Step 1: Cable the network as shown in the topology.

a. Attach the devices shown in the topology diagram, and cable, as necessary.

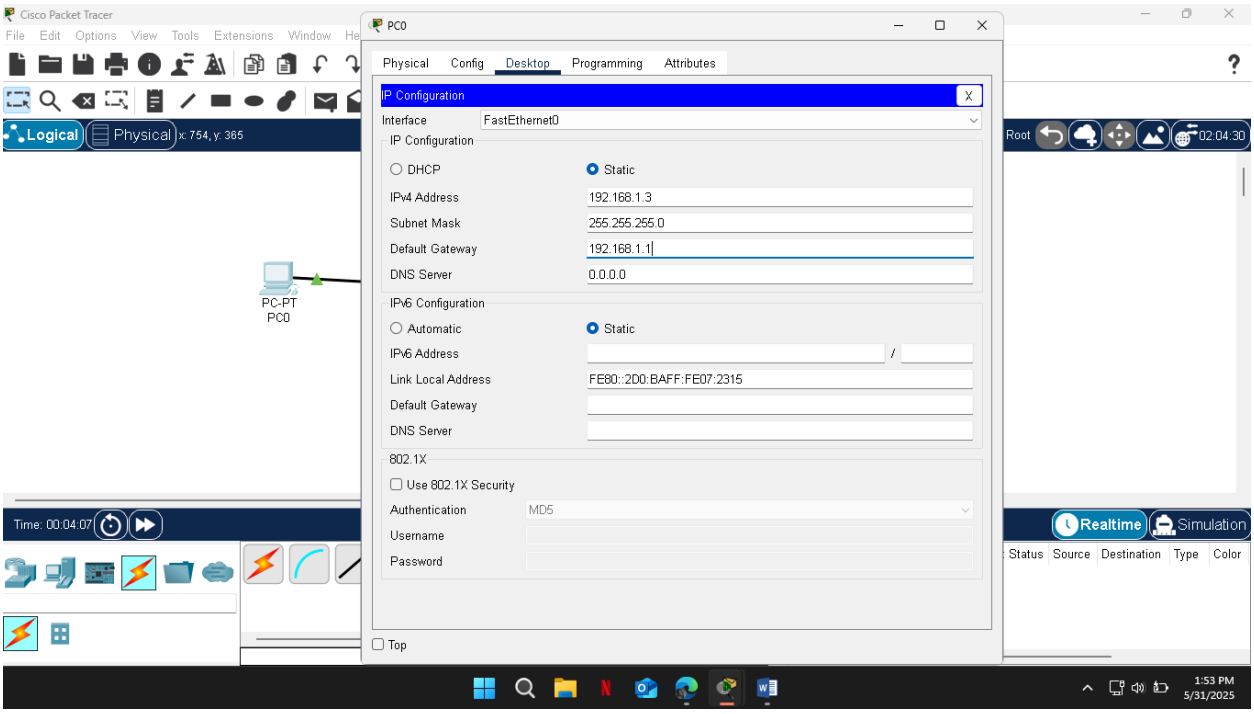
b. Power on all the devices in the topology.



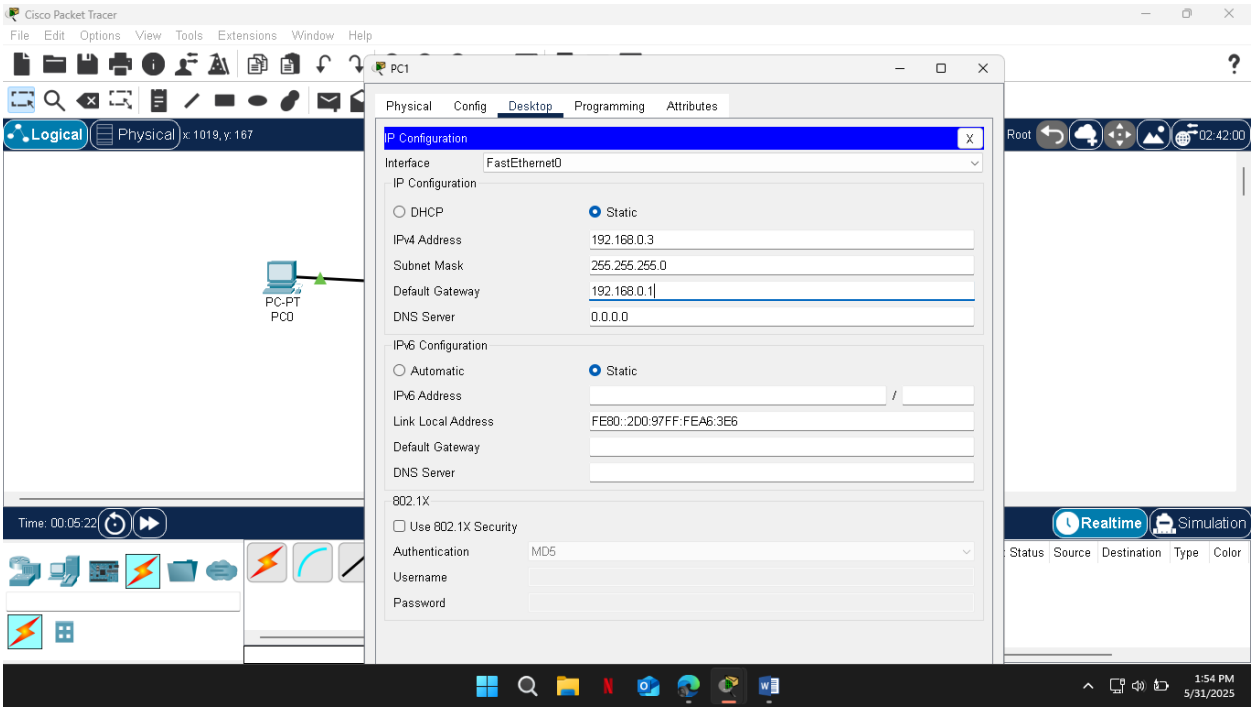
PART 2: CONFIGURE DEVICES AND VERIFY CONNECTIVITY

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

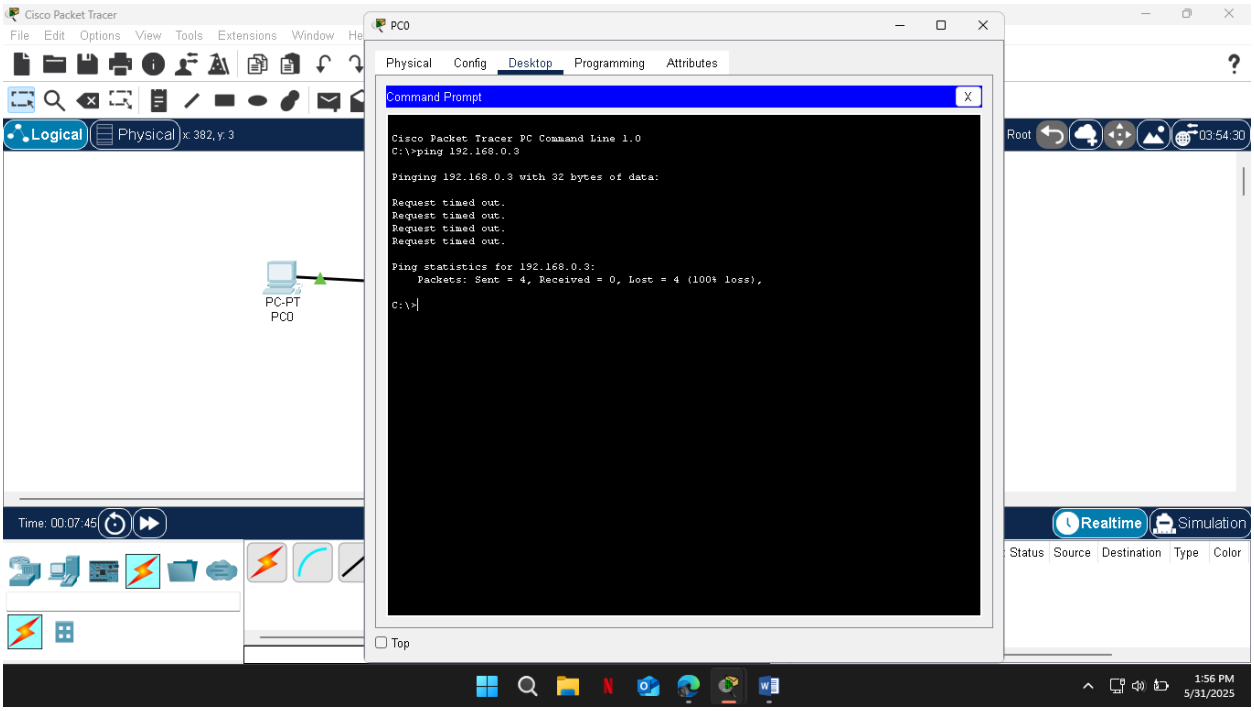
a. Configure the IP address, subnet mask, and default gateway settings on PC-A.



b. Configure the IP address, subnet mask, and default gateway settings on PC-B.



c. Ping PC-B from a command prompt window on PC-A.



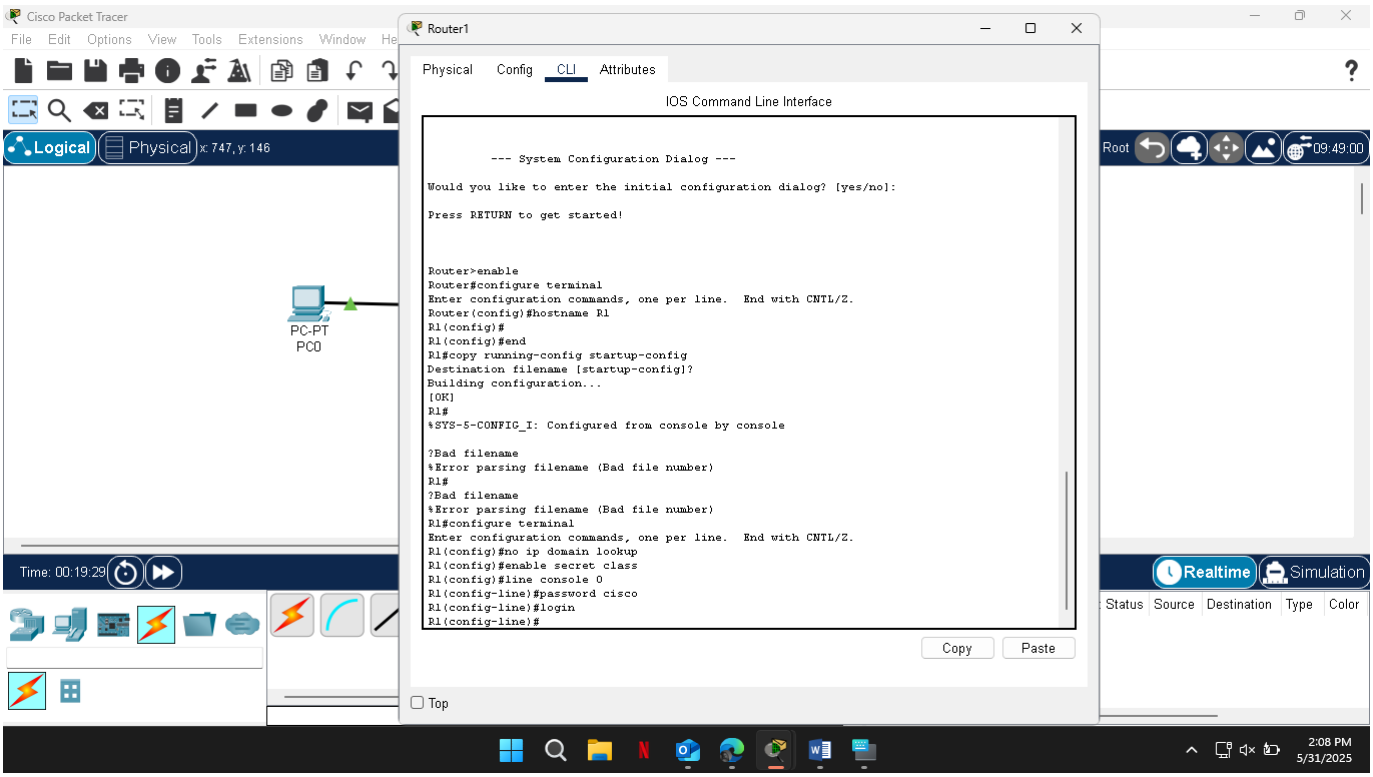
Why were the pings not successful?

These are two distinct networks. Without a router or another Layer 3 device to interconnect them, communication between the two is not possible—similar to two isolated islands with no bridge linking them.

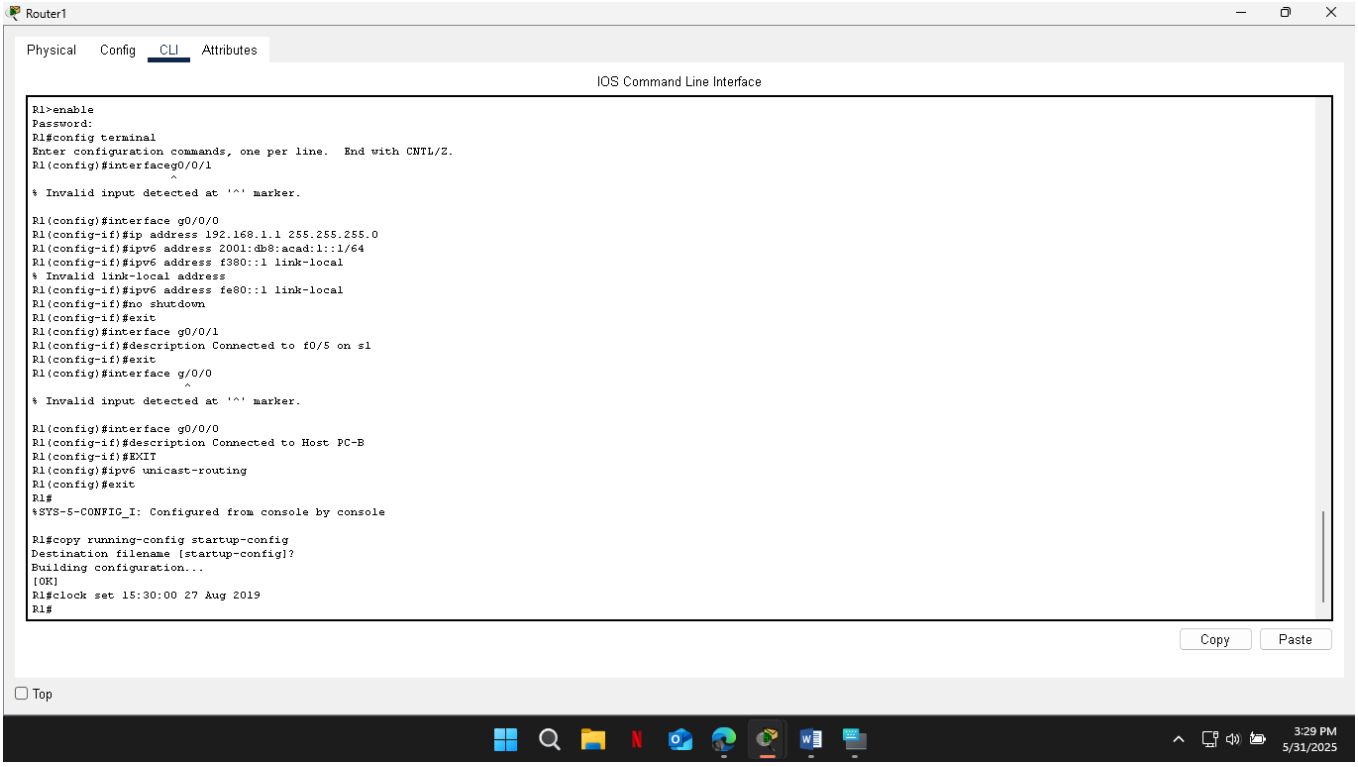
Step 2: Configure the router.

This initial configuration ensures the router is properly identified, secured, and optimized for basic administrative use:

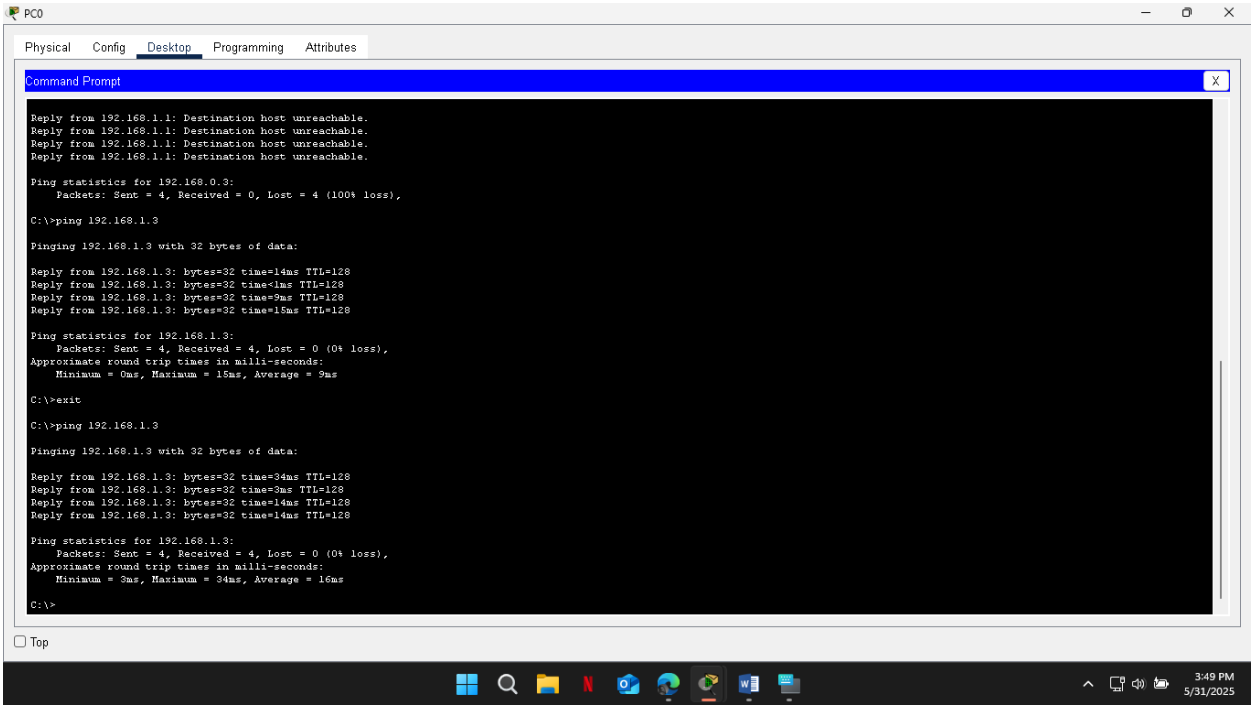
1. **Device Identification:**
   The router is assigned a hostname (R1) to provide a clear and unique identity within the network.
2. **Command Input Optimization:**
   DNS lookup is disabled (no ip domain-lookup) to prevent delays caused by misentered commands being interpreted as hostnames.
3. **Privilege Access Security:**
   An encrypted privileged EXEC mode password is configured using the enable secret command, enhancing access security.
4. **Console Access Control:**
   A console line password is set with login enabled, ensuring that only authorized users can access the device through the console port.



The router configuration includes setting the VTY password to cisco and enabling login for remote access security. All plaintext passwords are encrypted to enhance device protection. A warning banner is created to notify users that unauthorized access is prohibited. Both router interfaces are configured and activated, with descriptive labels indicating their connected devices for easy identification. IPv6 routing is enabled using the ipv6 unicast-routing command to support modern networking protocols. The current running configuration is saved to the startup configuration to ensure persistence after reboot. Finally, the router's clock is set to maintain accurate system time.

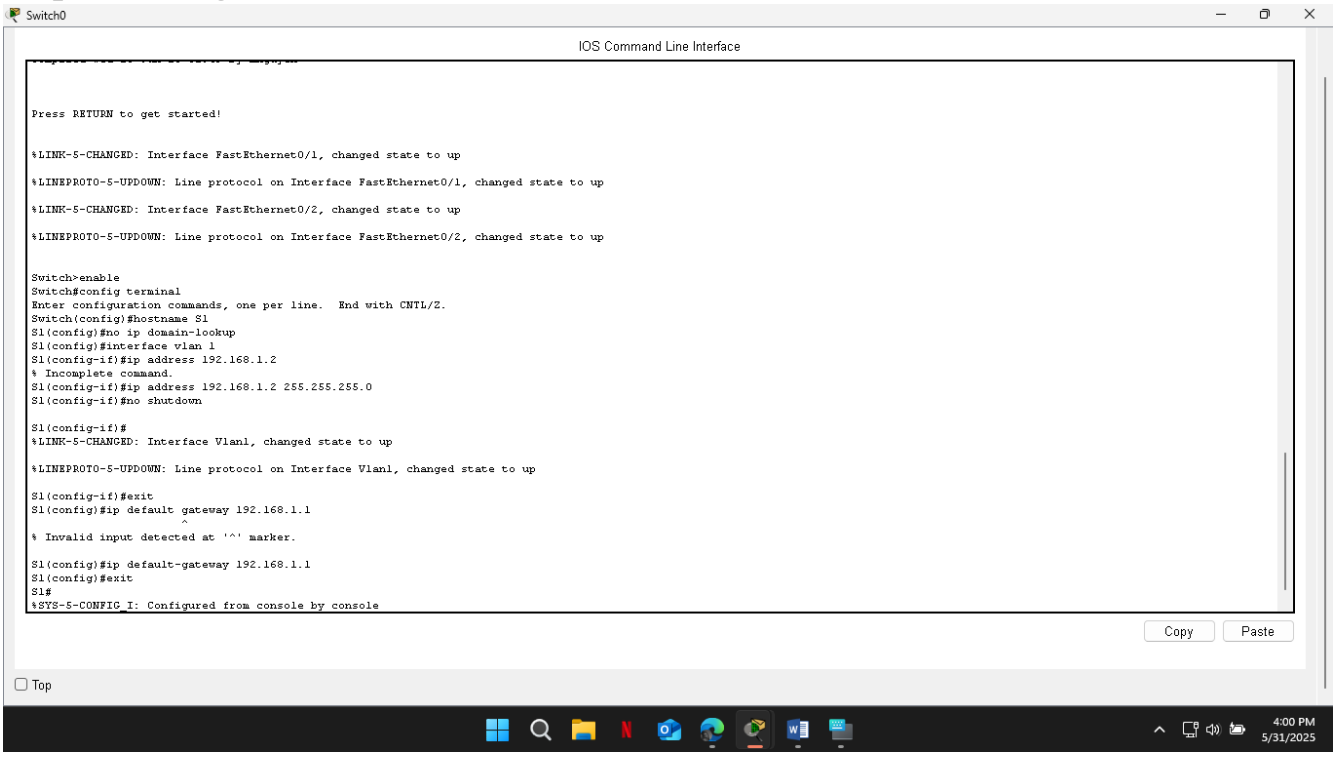


Ping PC-B from a command prompt window on PC-A.



The ping test between the two devices was successful, indicating proper network connectivity.The successful ping replies demonstrate that the IP addressing, subnet masks, and routing are set up properly, allowing seamless communication across the network.

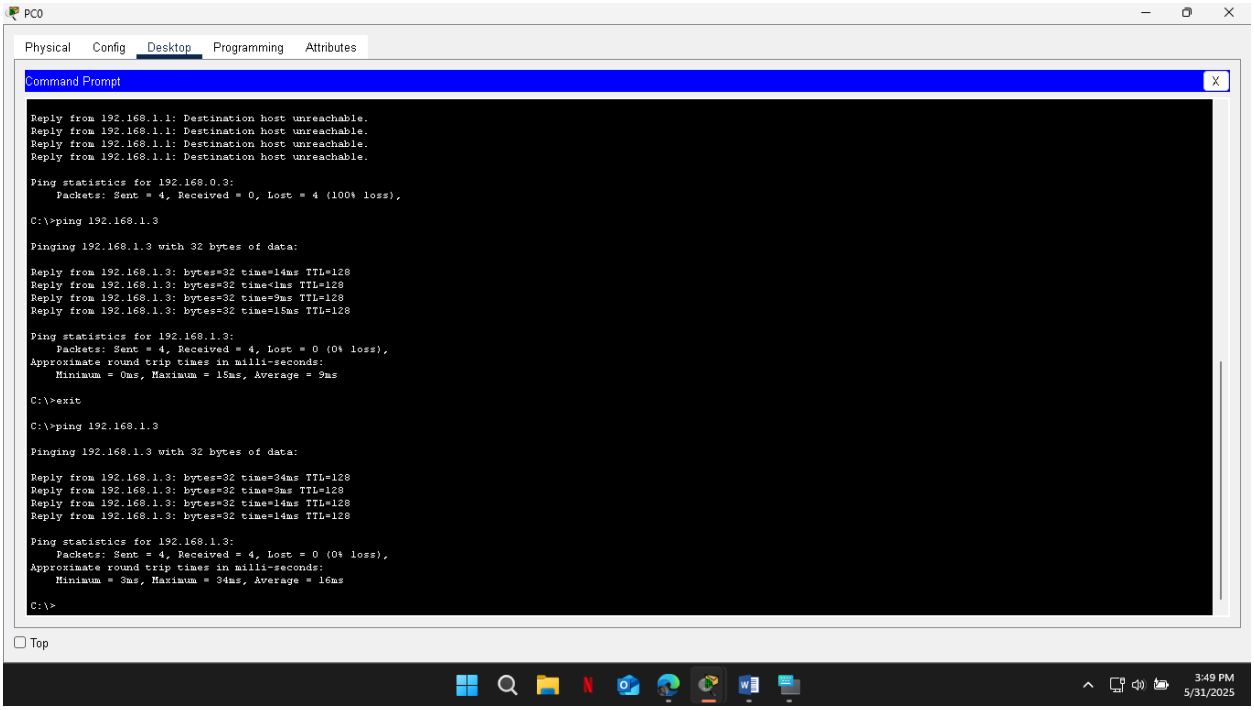
Step 3: Configure the switch.



We configured the switch by first enabling privileged EXEC mode and entering global configuration mode. The device was named S1 for easy identification. To prevent unnecessary delays, DNS lookup was disabled. The VLAN 1 interface was assigned the IP address 192.168.1.2 with the subnet mask 255.255.255.0 and activated to enable network communication. The default gateway was set to 192.168.1.1 to allow the switch to communicate beyond its local network.

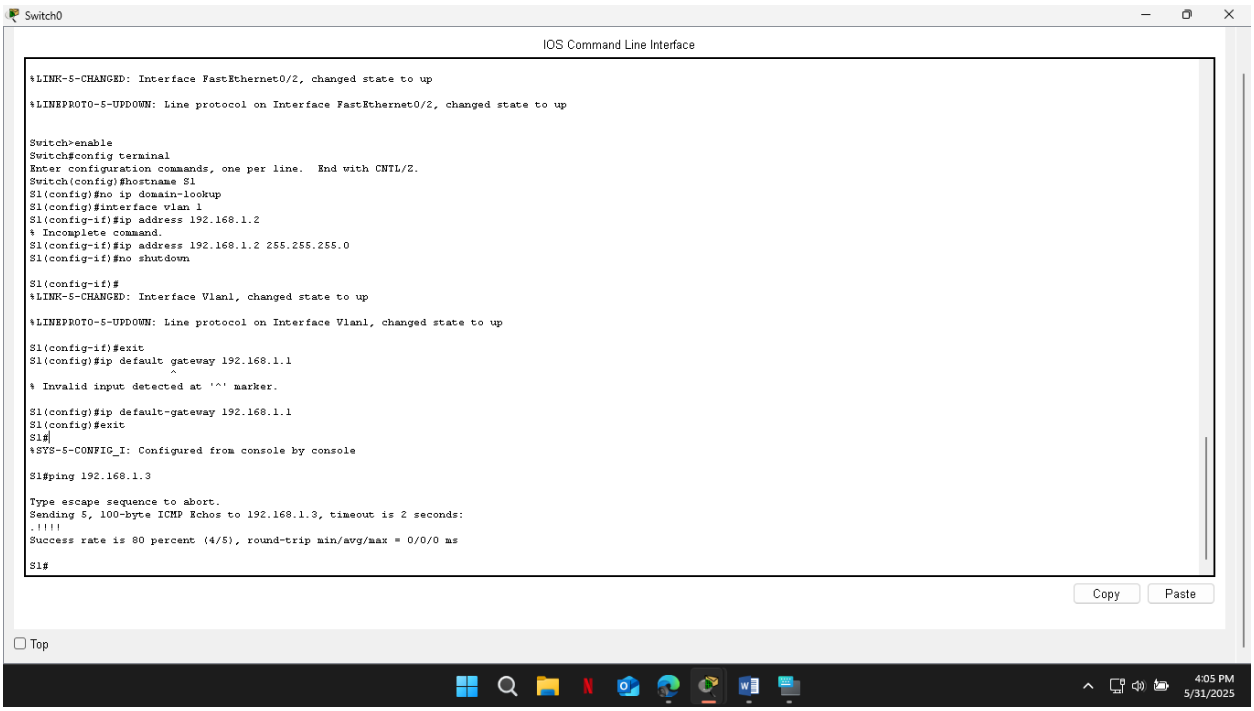
Step 4: Verify connectivity end-to-end connectivity.

a. From PC-A, ping PC-B.



PING FROM PC-A TO PC-B IS SUCCESSFUL

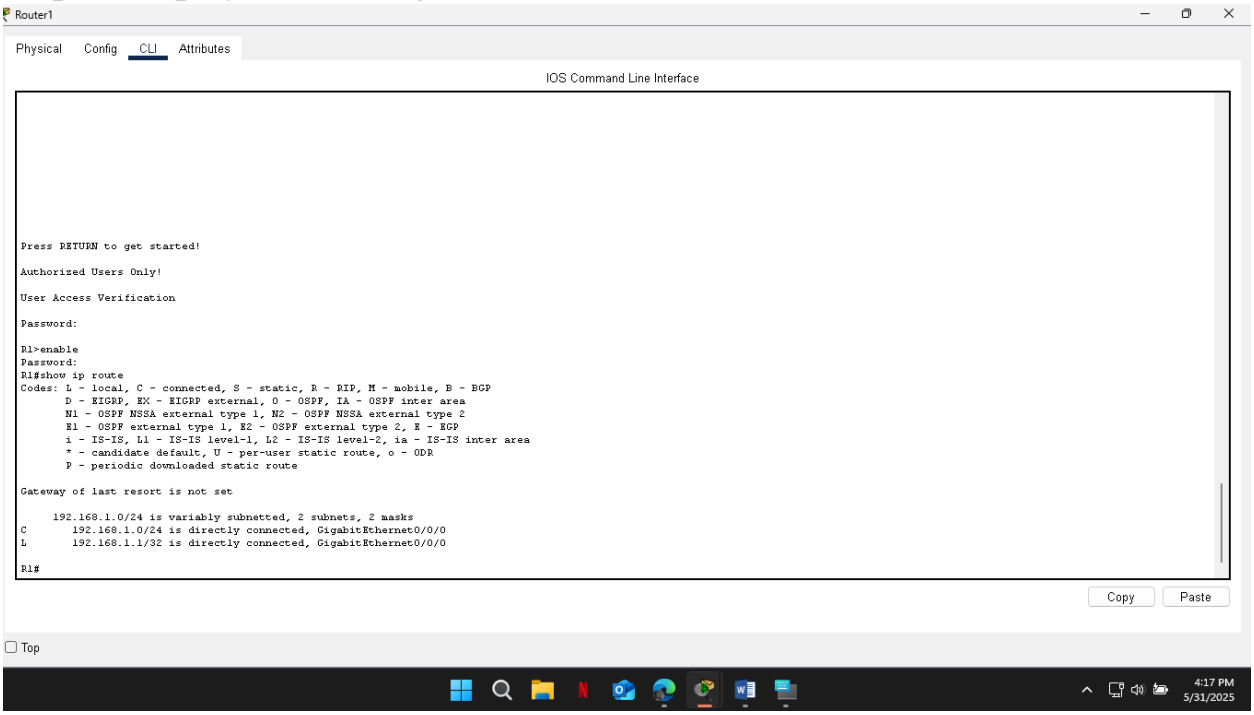
b. From S1, ping PC-B.



PING FROM S1 TO PC-B IS SUCCESSFUL.

PART 3: DISPLAY DEVICE INFORMATION

Step 1: Display the routing table on the router.



What code is used in the routing table to indicate a directly connected network?

C is the code for directly connected networks.

How many route entries are coded with a C code in the routing table?

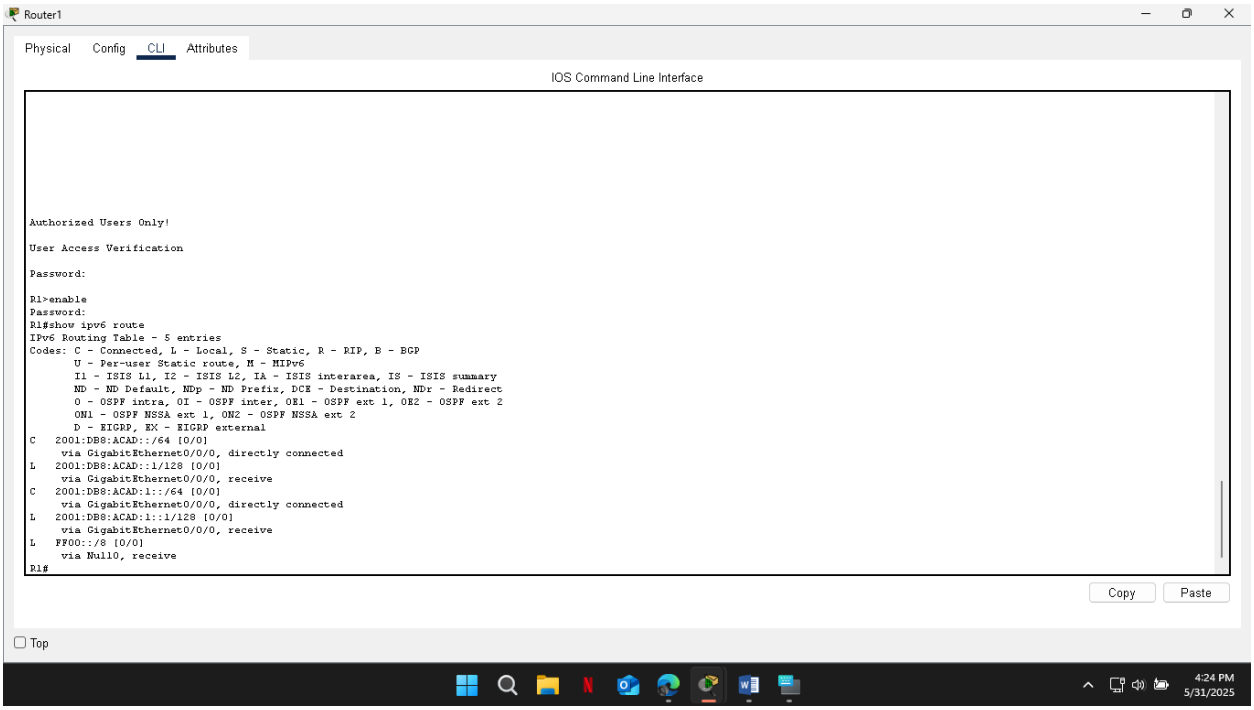
2:192.168.0.1 and 192.168.1.1

What interface types are associated to the C coded routes?

C coded routes are tied to physical router interfaces you configured with IPs.

GigabitEthernet0/0/0 and GigabitEthernet0/0/1

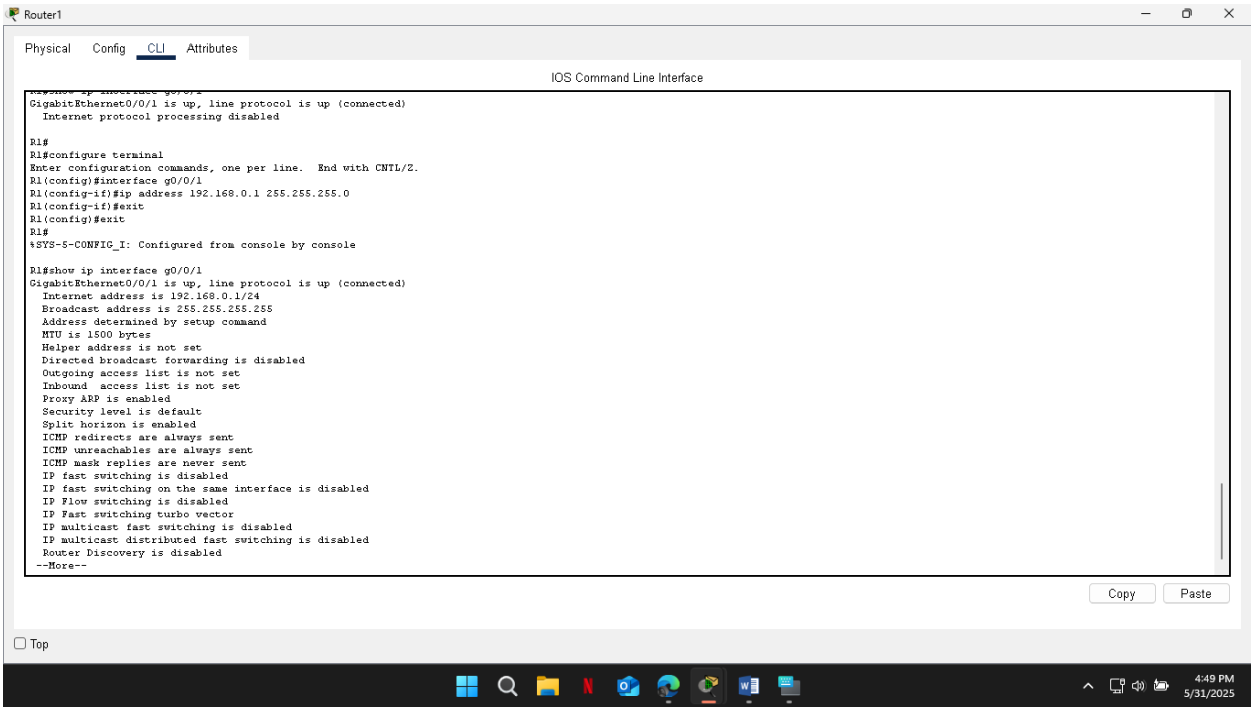
Use the show ipv6 route command on router R1 to display the IPv6 routes.



The IPv6 routing table on router R1 contains five entries. Two of these are marked with a C, indicating they are directly connected networks: 2001:DB8:ACAD::/64 via interface GigabitEthernet0/0/0, and 2001:DB8:ACAD:1::/64 via GigabitEthernet0/0/1. Two additional entries are marked with an L, which means they are local addresses assigned to the router's own interfaces—2001:DB8:ACAD::1/128 and 2001:DB8:ACAD:1::1/128, associated with the same interfaces respectively. Lastly, the route FF00::/8 is a special multicast address received via the Null0 interface. These entries confirm that both interfaces are active and the router is properly configured for IPv6 communication.

Step 2: Display interface information on the router R1.

Use the show ip interface g0/0/1 to answer the following questions.



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

The interface GigabitEthernet0/0/1 is **up**, and the line protocol is **up (connected)**. This means the physical connection is active and the data link layer is functioning correctly — the interface is fully operational and ready to transmit data.

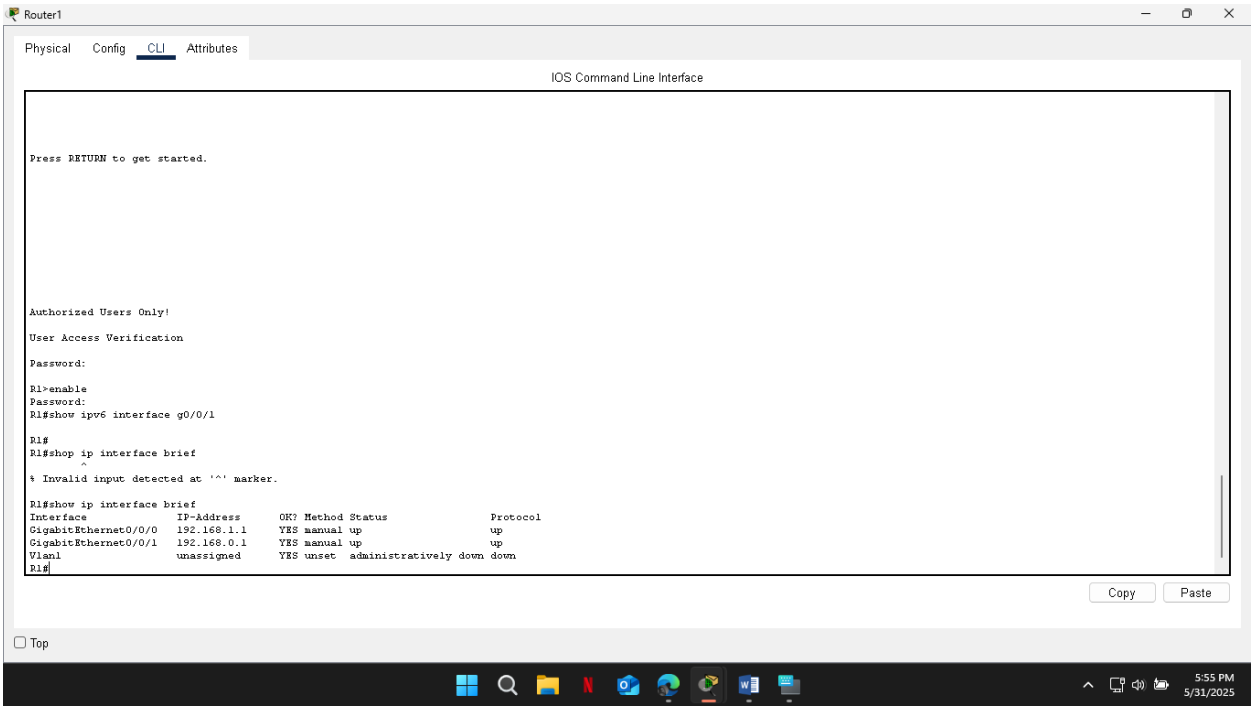
2. How is the Internet address displayed in this command?

The internet address is 192.168.0.1/24

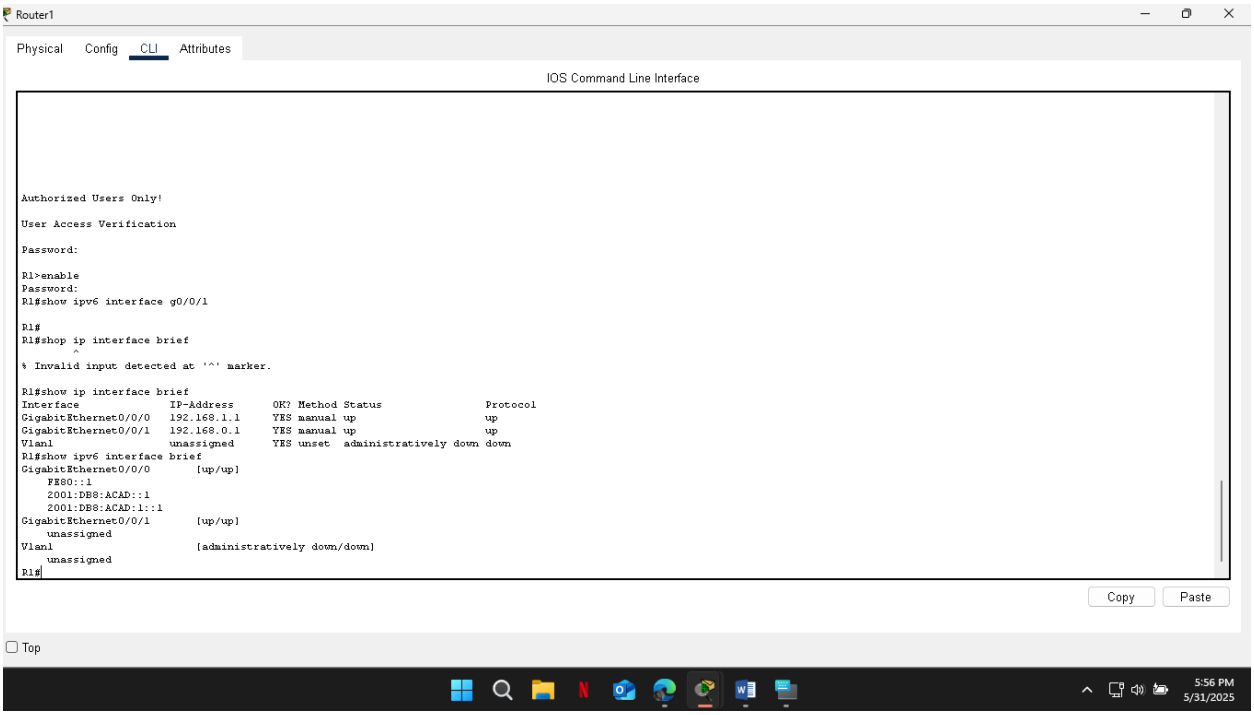
Step 3: Display a summary list of the interfaces on the router and switch.

Enter the show ip interface brief command on the router R1.

R1# show ip interface brief

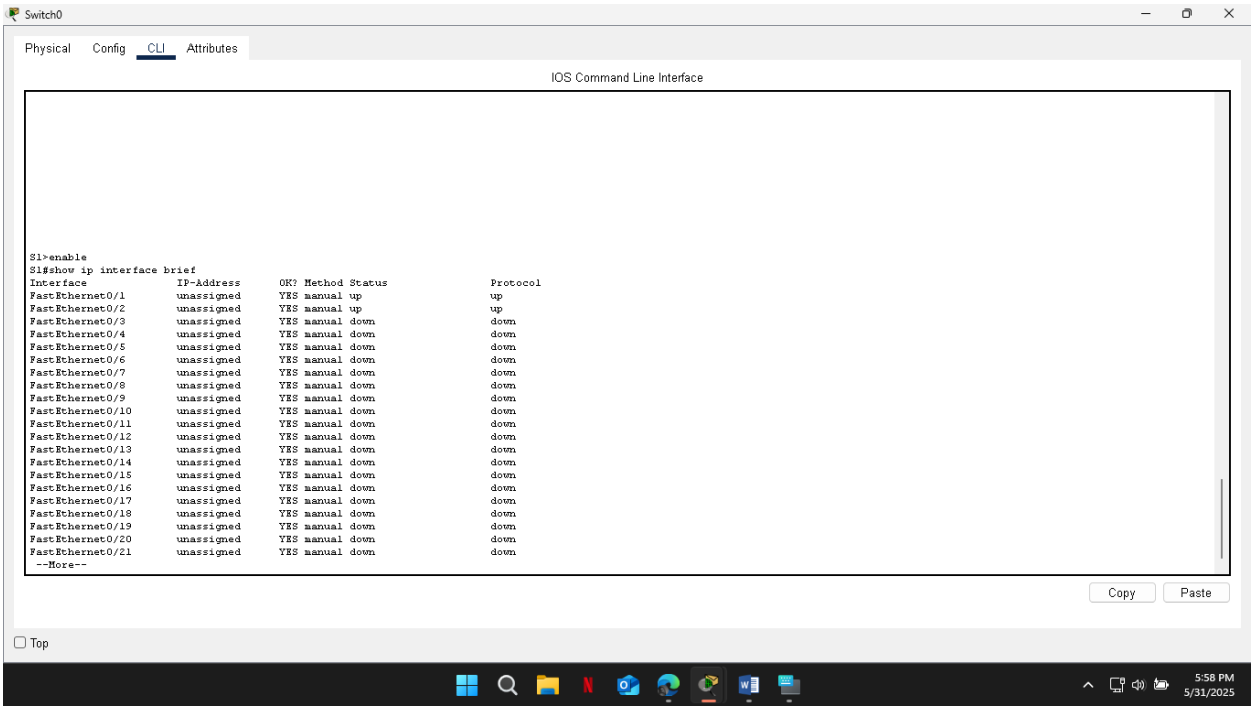


To see the IPv6 interface information, enter the show ipv6 interface brief command on R1. R1# show ipv6 interface brief



Enter the show ip interface brief command on the switch S1.

Open configuration windowS1# show ip interface brief



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?

You'd use the no shutdown command while in interface configuration mode.

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?

Network mismatch- The router's G0/0/1 interface would now belong to the 192.168.1.0/24 network instead of the intended 192.168.0.0/24.

Communication breakdown- PC-B (which is on 192.168.0.0/24) wouldn't be able to reach the router via G0/0/1, since they'd be on different networks and the router wouldn't be routing traffic correctly between them.

Ping fails- Connectivity tests like ping from PC-B to the router would fail, and routing between the two LANs would not function as intended.

CONCLUSION

Through this hands-on simulation, we successfully configured the router with both IPv4 and IPv6 addresses, enabled secure access via encrypted passwords, and ensured that all interfaces were operational and correctly addressed. The use of commands like `no shutdown`, `ipv6 unicast-routing`, and `copy running-config startup-config` demonstrated how to activate interfaces, enable IPv6 support, and save configurations for persistent networking. This assignment not only reinforced theoretical networking concepts but also developed confidence in navigating Cisco's command-line interface to manage real-world routing scenarios.