Course: **Cloud and Network Security -C2 -2025**

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Saturday, May, 31st 2025

Week 2 Assignment 1:

Packet Tracer - Build a Switch and Router Network

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Introduction

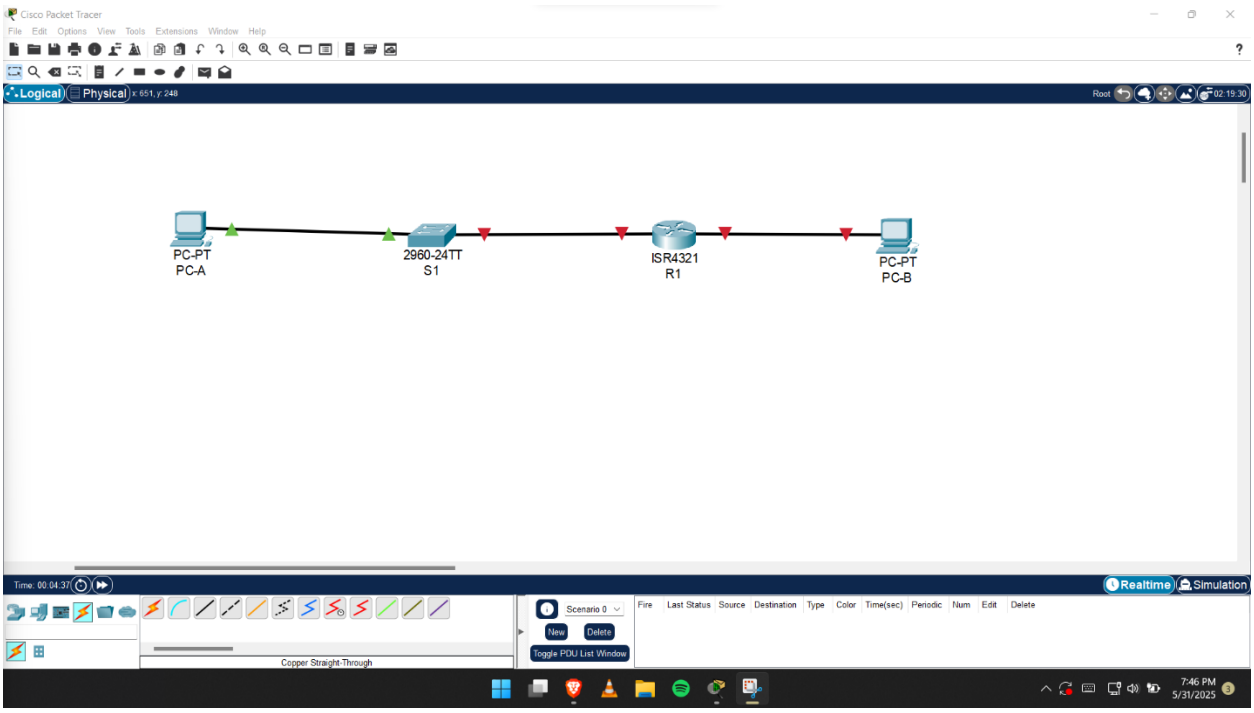
In this lab, I was tasked with building and configuring a basic network using Cisco Packet Tracer. The network involved a router, a switch, and two PCs, all of which were interconnected and assigned both IPv4 and IPv6 addresses. The goal was to simulate a functional environment where devices on different subnets could communicate with each other. The exercise focused on reinforcing key concepts such as interface configuration, static addressing, command-line interaction with Cisco devices, and connectivity testing.

Objectives

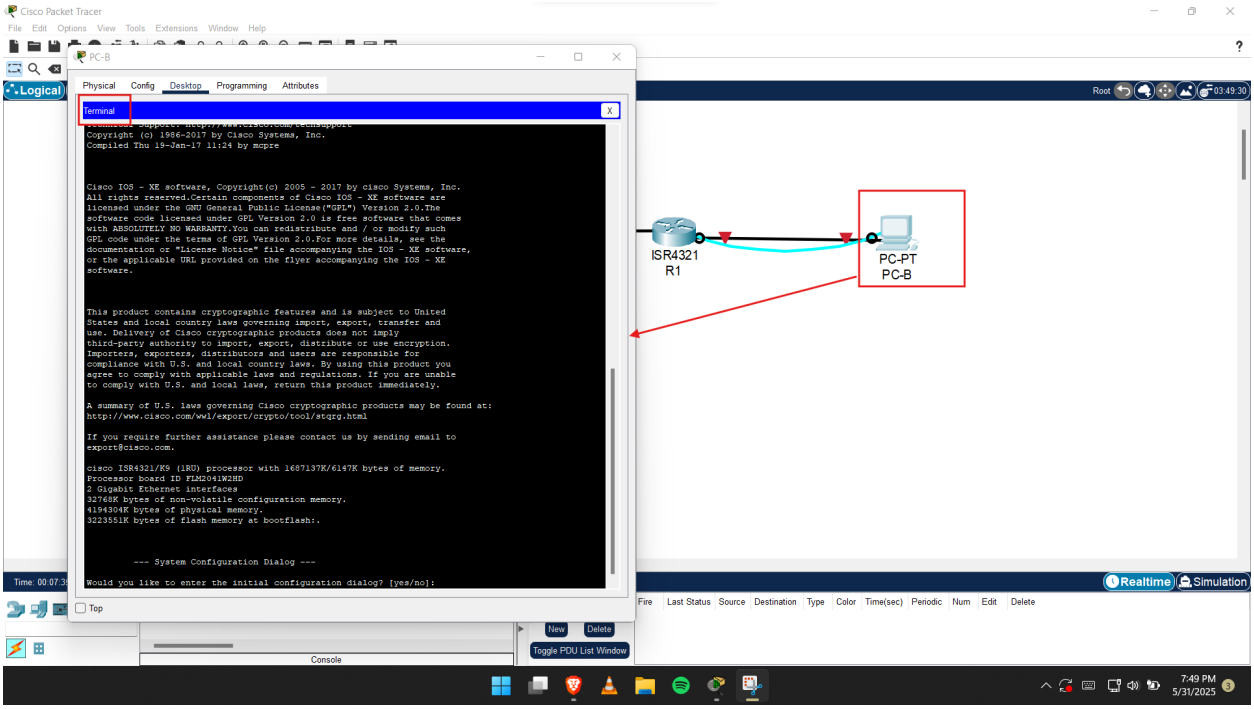
- To create and connect a simple routed and switched network topology.
- To assign IP addresses to all devices and configure gateway settings.
- To apply basic security settings such as passwords and banner messages.
- To verify connectivity and interface status using diagnostic commands.

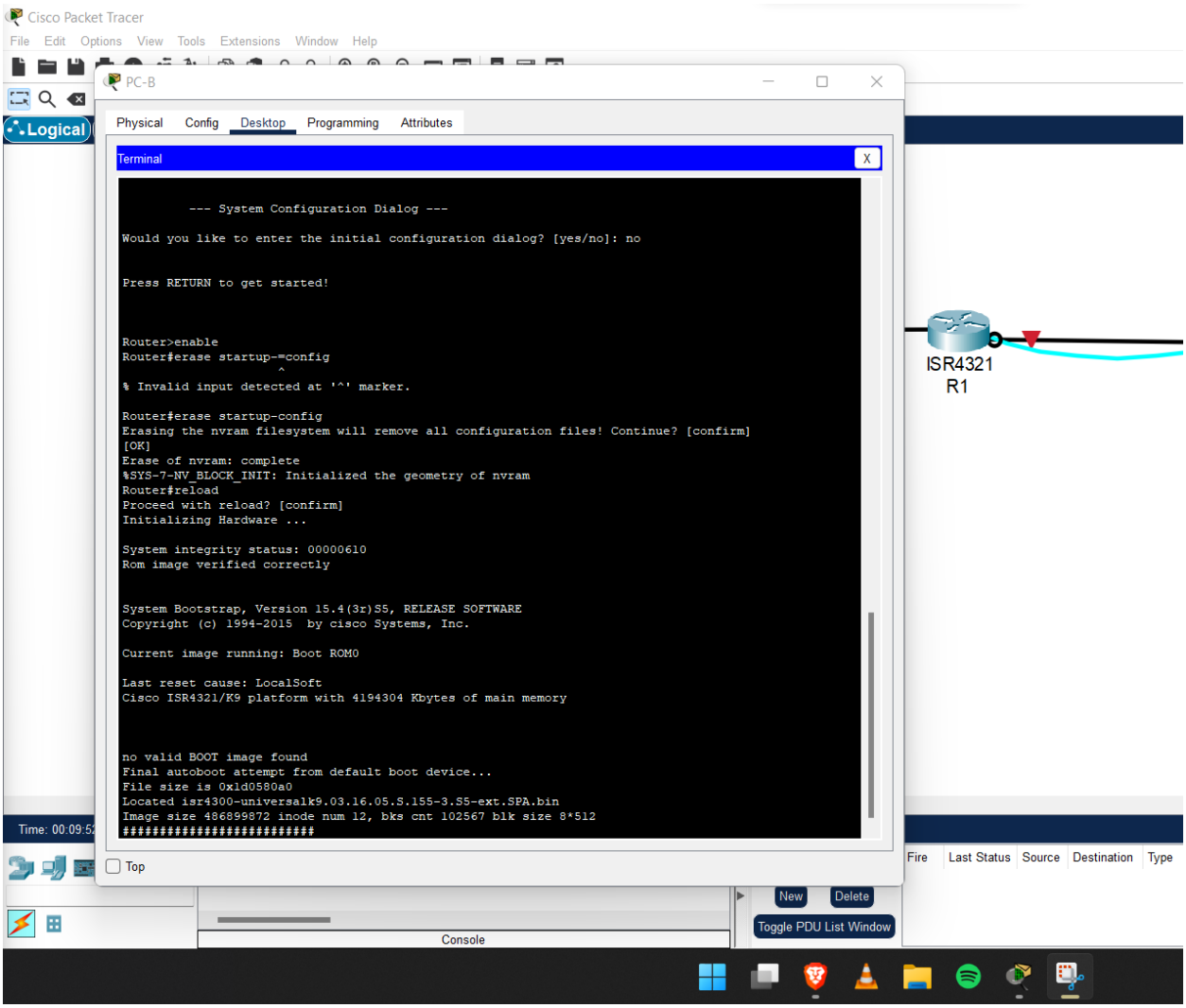
Part 1: Topology Setup and Device Initialization

I began by assembling the network topology based on the lab instructions. This included connecting Router R1 to Switch S1 and linking PC-A and PC-B to the appropriate interfaces. Once the physical layout was complete in Packet Tracer, I ensured all devices were powered on.

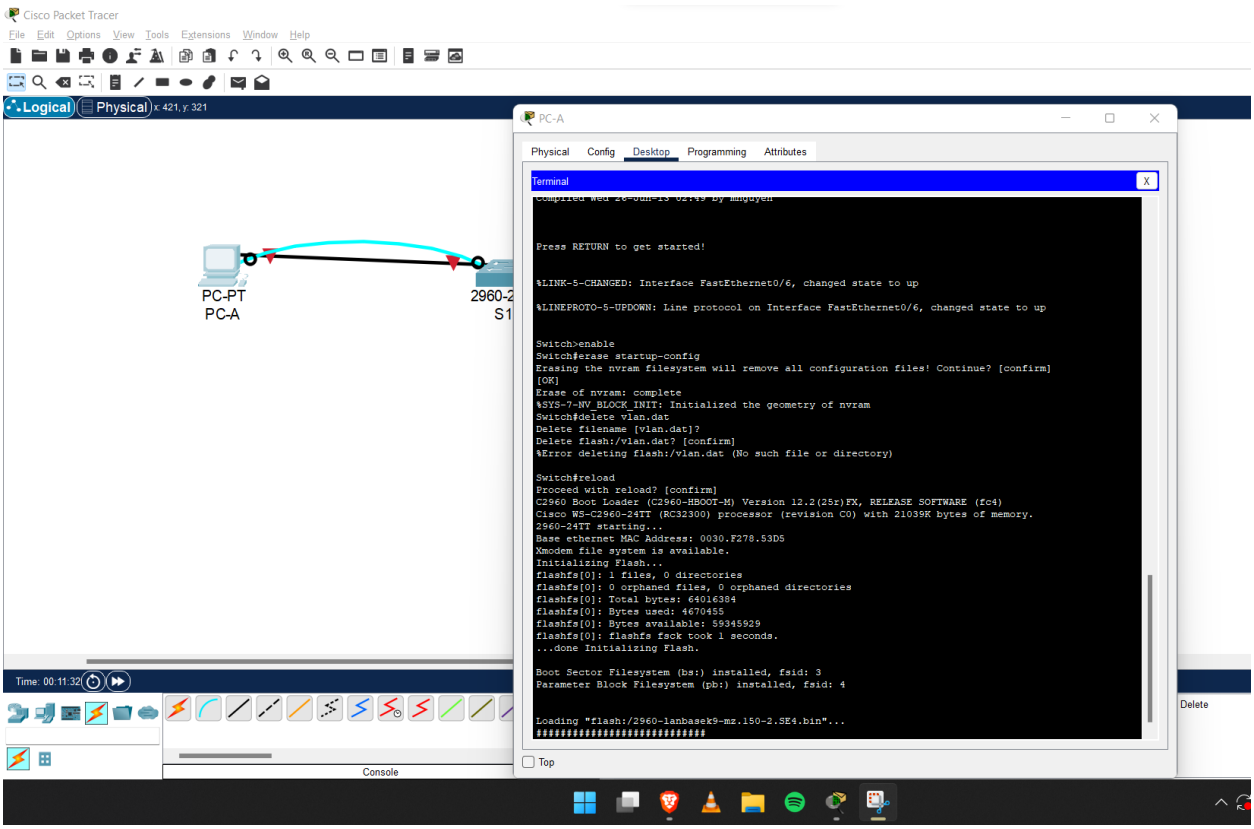


Before starting any configurations, I reset both the router and switch to their default states by erasing their startup configurations and reloading them.





(Reset for Router1~R1)



(Reset for Switch 1~S1)

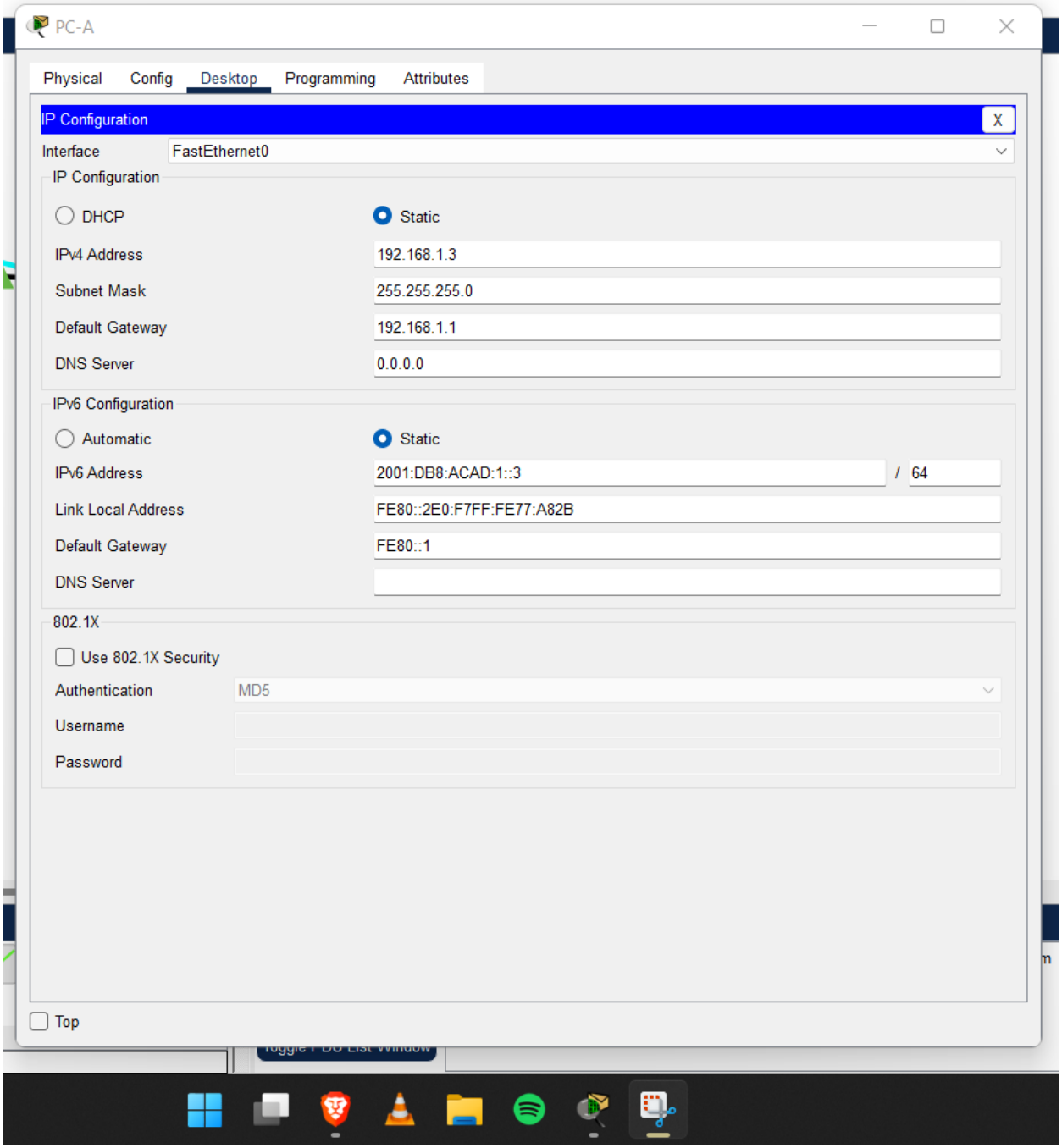
Part 2: Device Configuration and Connectivity Verification

Step 1: Static IP Assignment on PCs

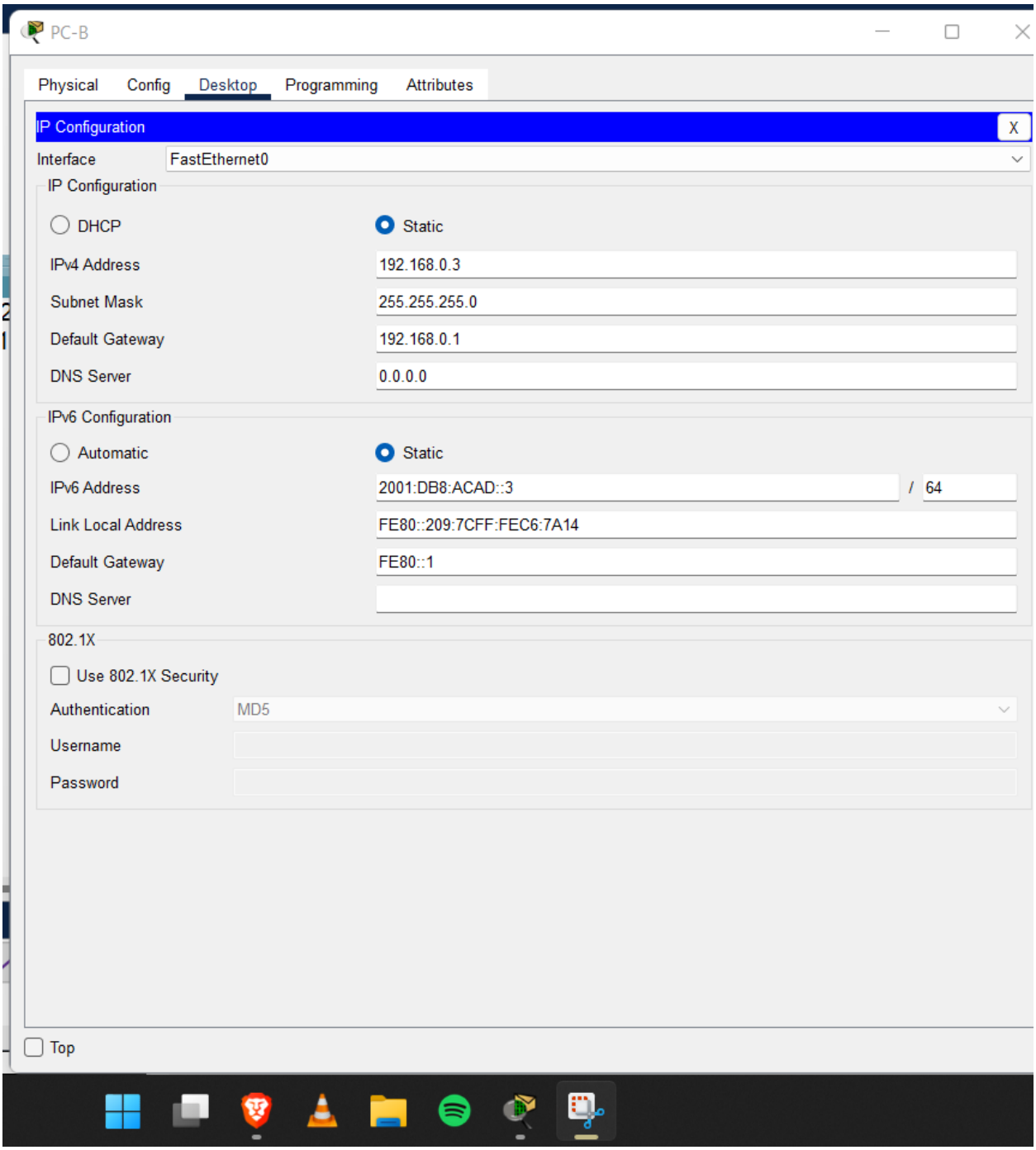
I manually assigned static IPv4 and IPv6 addresses to PC-A and PC-B. For PC-A, I used the IP address *192.168.1.3/24* with the default gateway *192.168.1.1*, and IPv6 *2001:db8:acad:1::3/64*. For PC-B, I configured it with *192.168.0.3/24* and gateway *192.168.0.1*, along with IPv6 *2001:db8:acad::3/64*.

Addressing Table

Device	Interface	IP Address / Prefix	Default Gateway
R1	G0/0/0	192.168.0.1 /24	N/A
		2001:db8:acad::1/64	
		fe80::1	
	G0/0/1	192.168.1.1 /24	N/A
		200:db8:acad:1::1/64	
		fe80::1	
S1	VLAN 1	192.168.1.2 /24	192.168.1.1
PC-A	NIC	192.168.1.3 /24	192.168.1.1
		2001:db8:acad:1::3/64	fe80::1
PC-B	NIC	192.168.0.3 /24	192.168.0.1
		2001:db8:acad::3/64	fe80::1

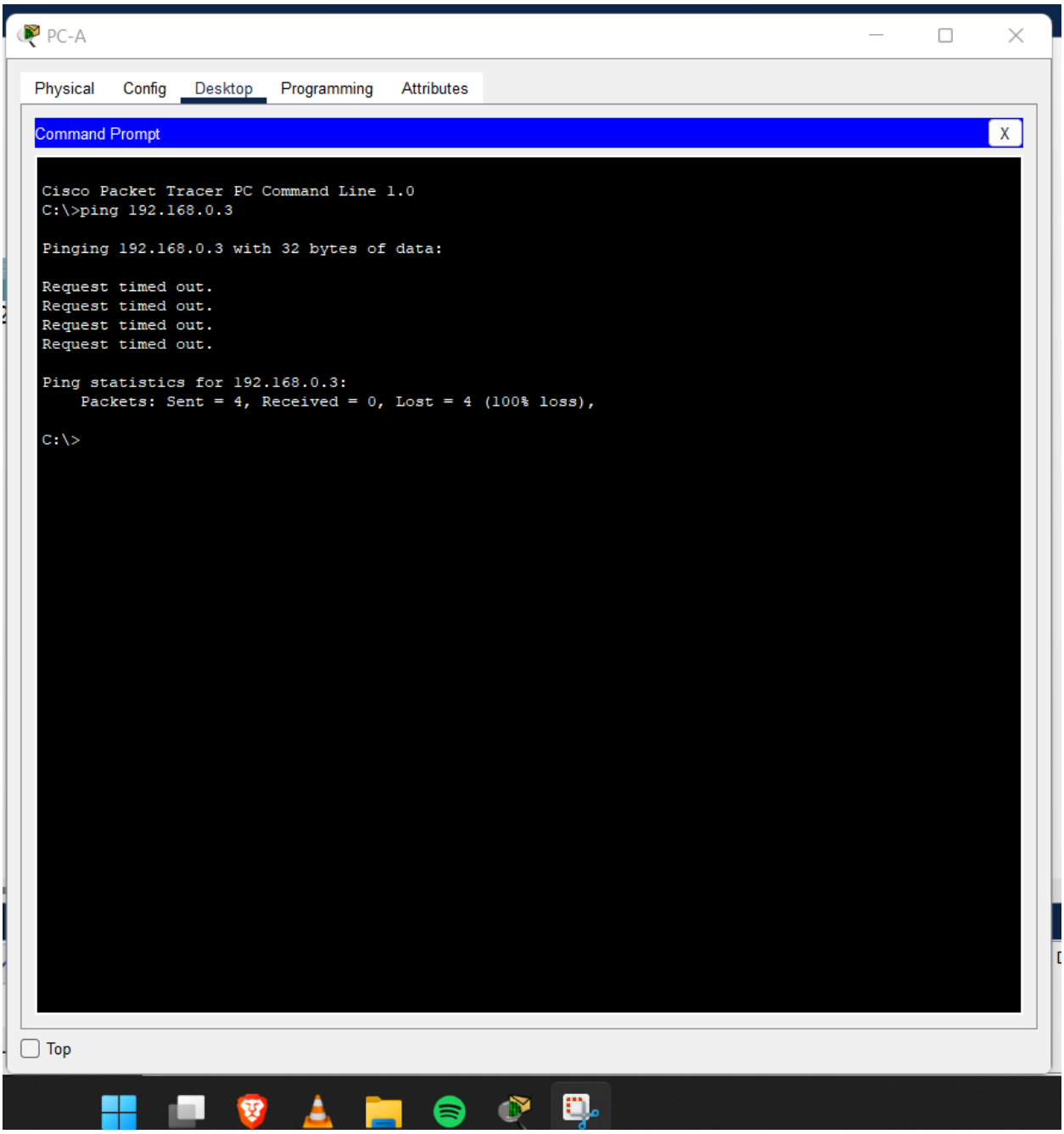


(Manual IP Configuration for PC-A)



(Manual IP Configuration for PC-B)

When I attempted to ping PC-B from PC-A at this stage, the pings failed, which made sense because the router was not yet configured to route traffic between the two networks.



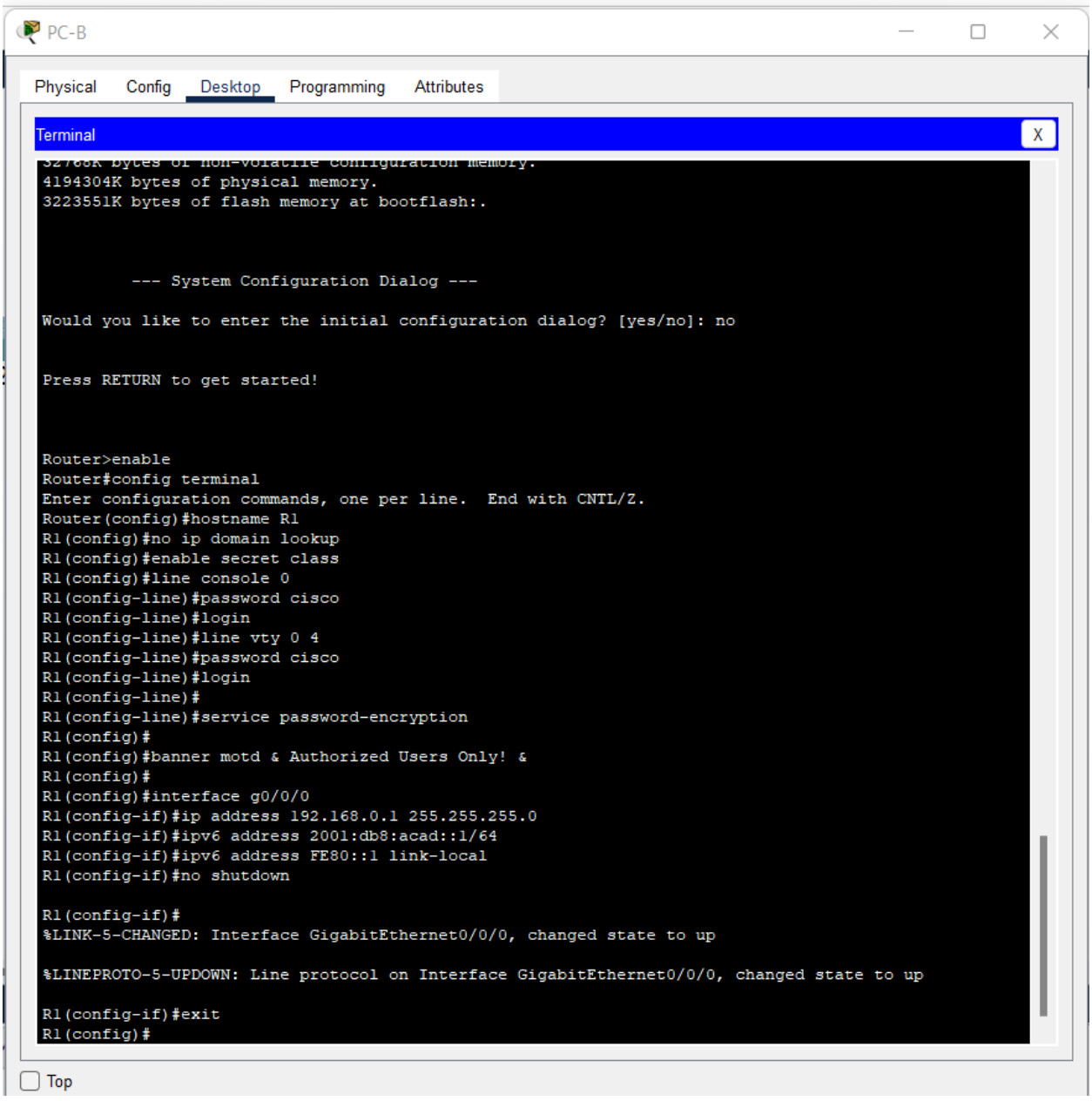
Step 2: Router Configuration (R1)

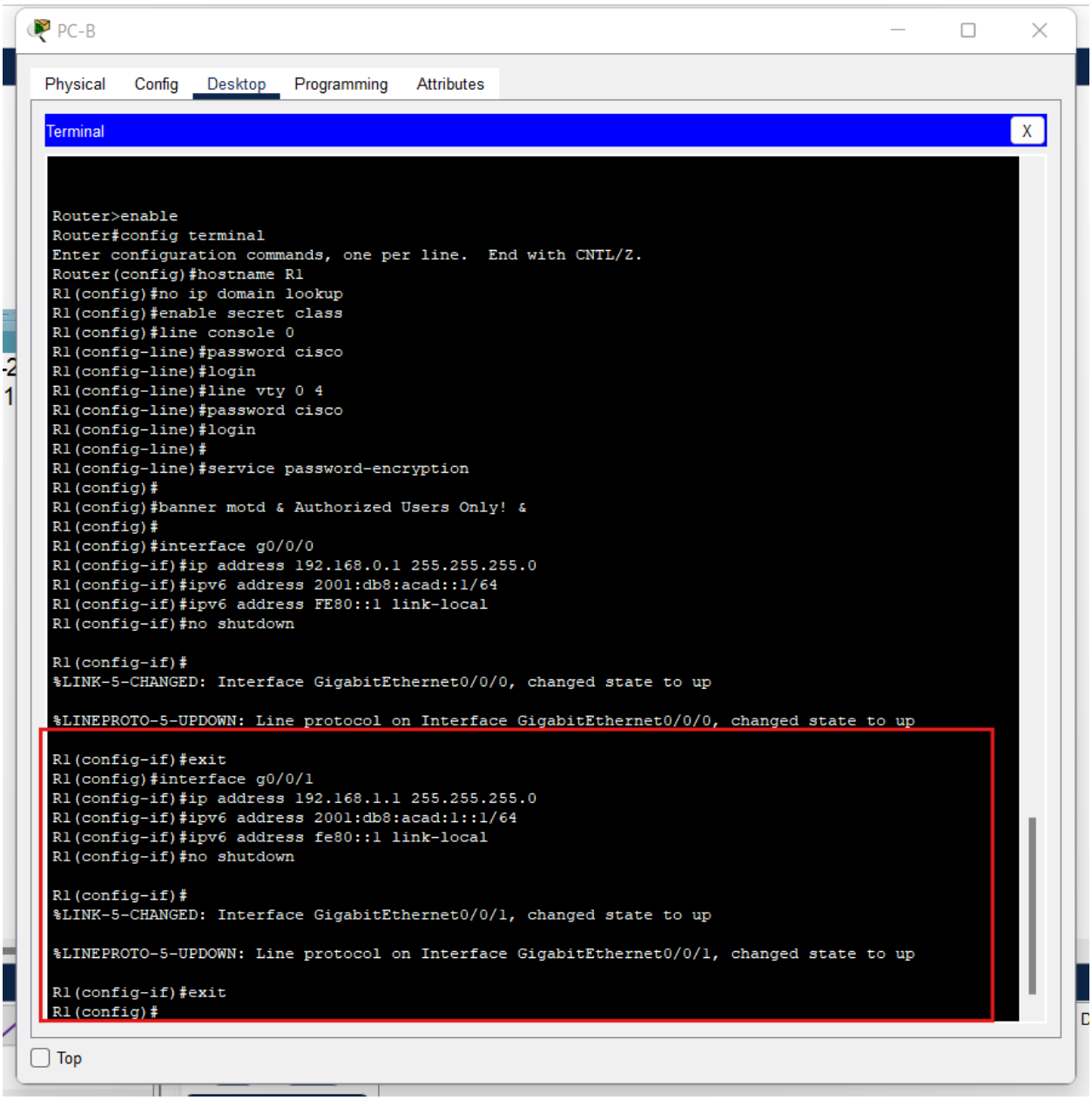
I accessed the router via the console and entered privileged EXEC mode. I then moved into global configuration mode and performed the following steps:

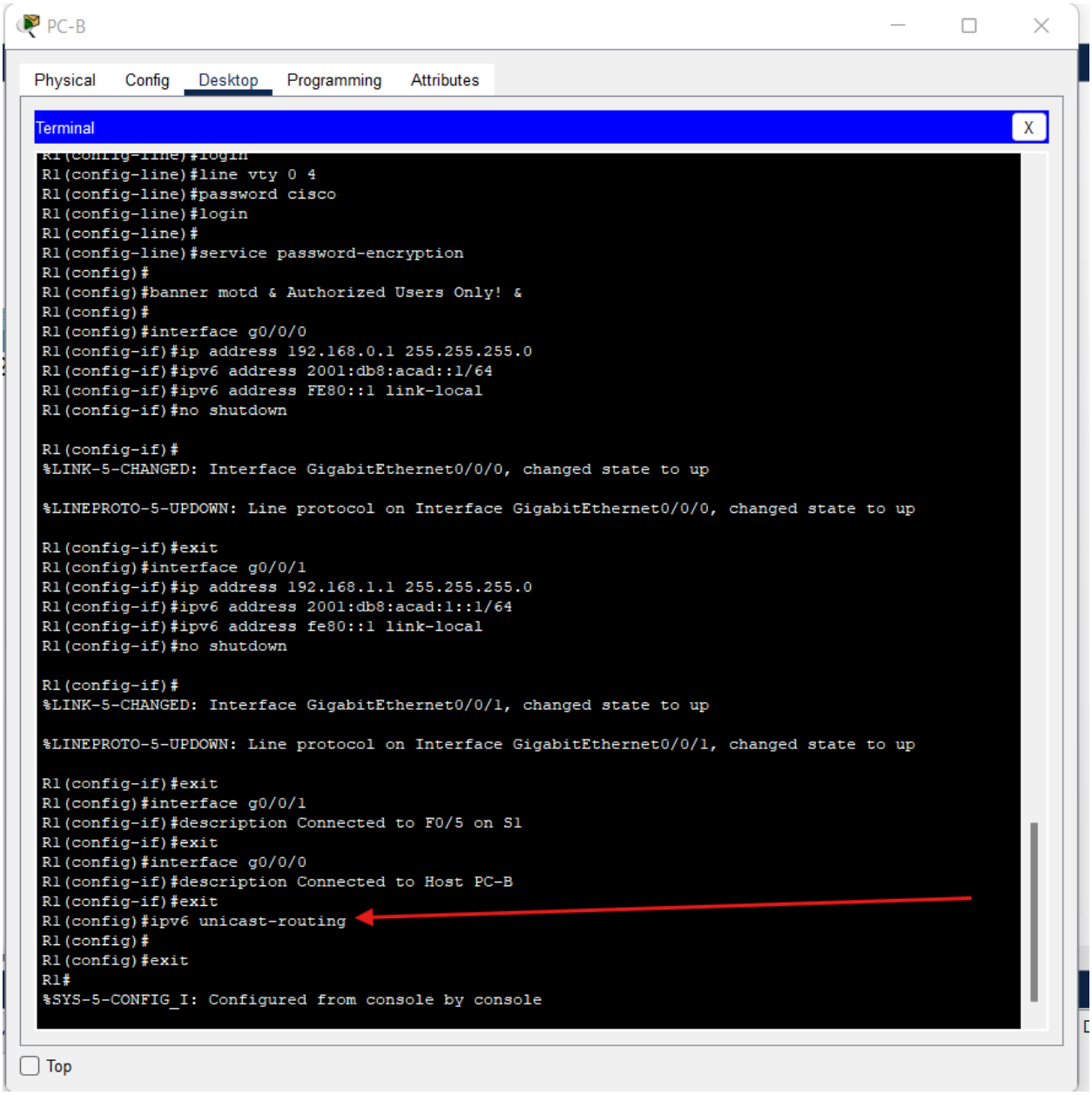
- Set the hostname to ***R1***
- Disabled DNS lookup to avoid delays caused by mistyped commands

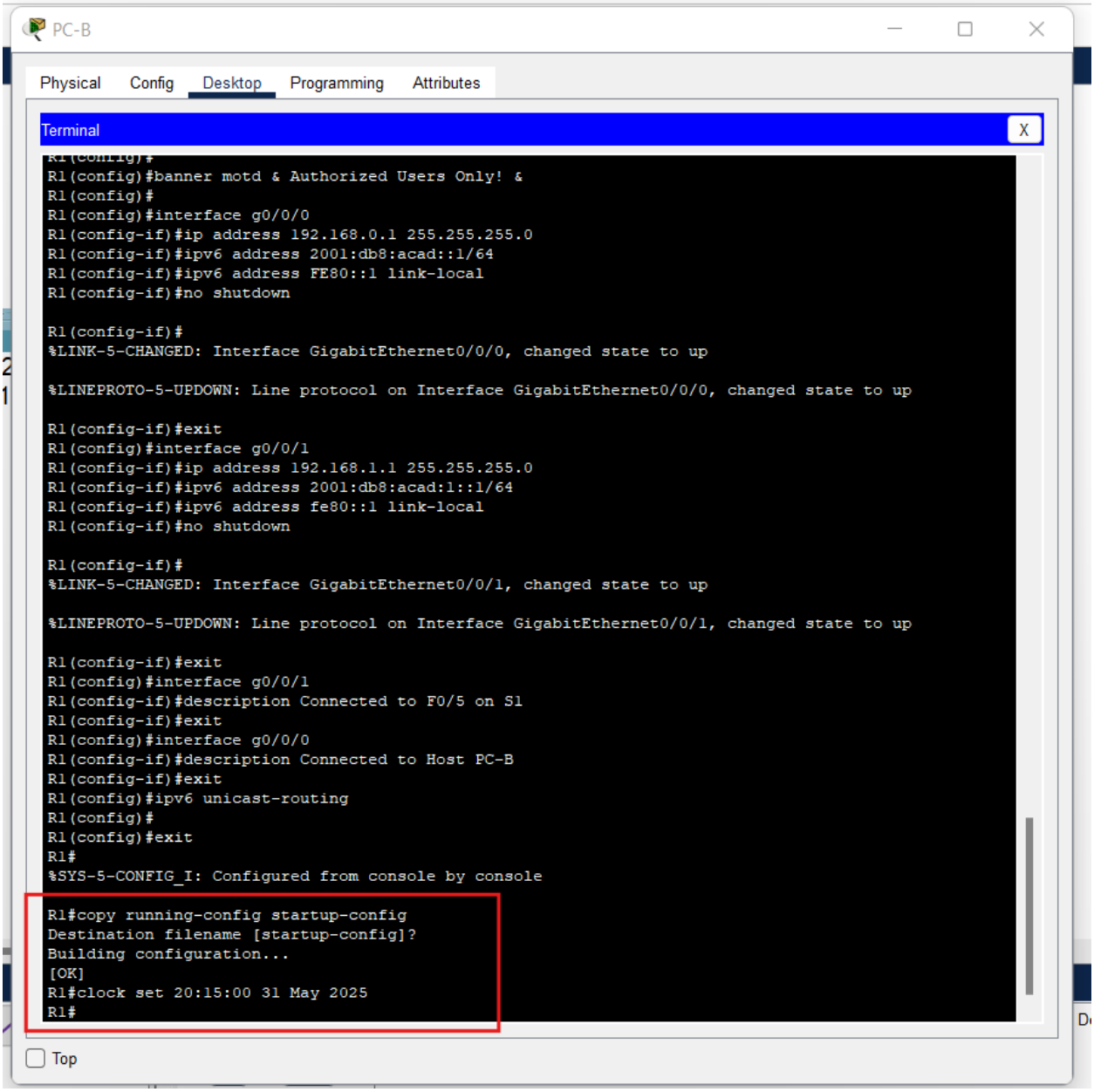
- Set encrypted ***enable*** password (***class***) and plain-text console/VTY passwords (***cisco***)
- Enabled password encryption using ***service password-encryption***
- Configured a login banner: ***Authorized Users Only!***
- Assigned IP addresses and descriptions to interfaces G0/0/0 and G0/0/1
- Enabled both IPv4 and IPv6 on the interfaces
- Activated IPv6 routing with ***ipv6 unicast-routing***
- Saved the configuration and set the system clock

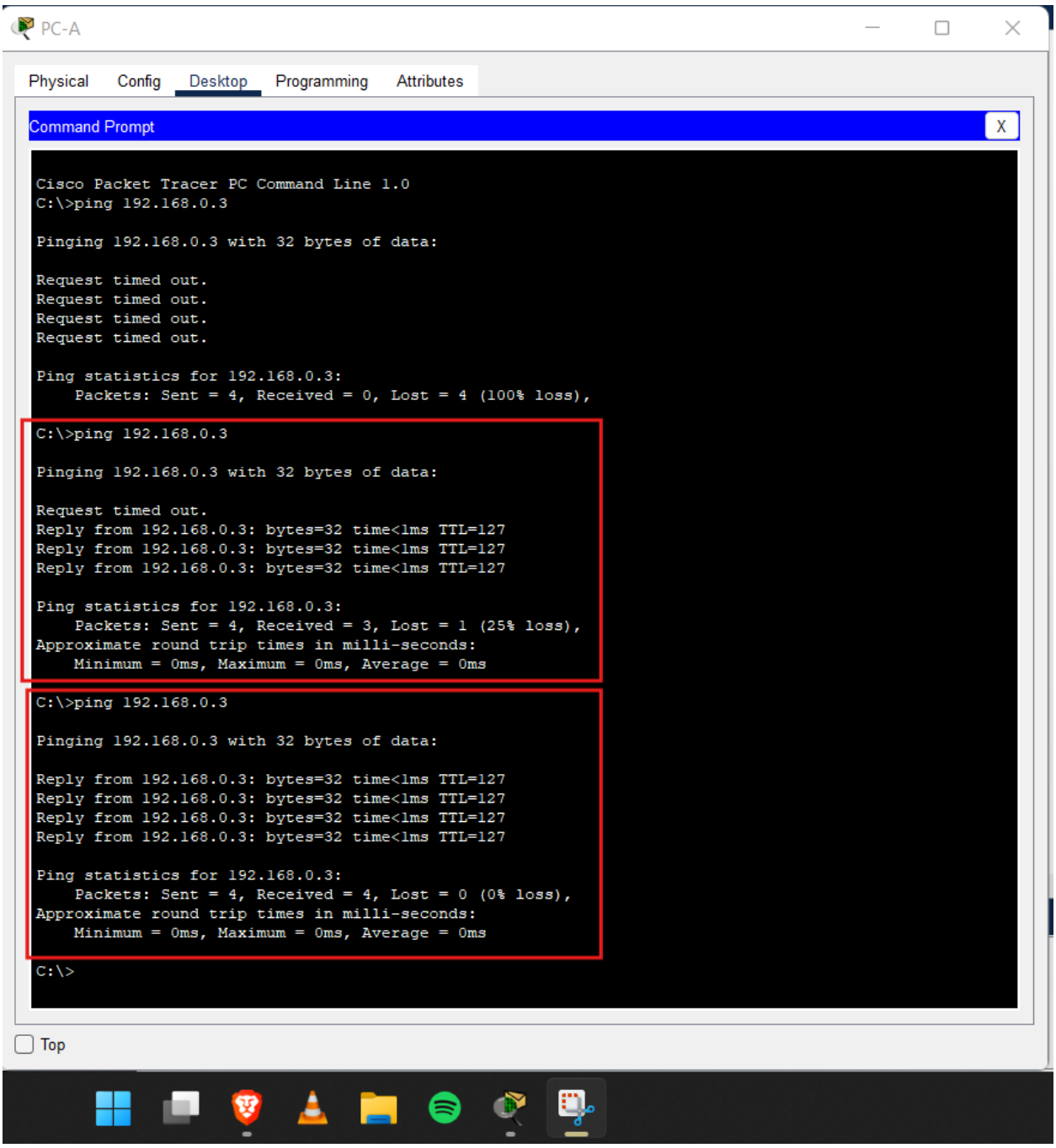
Once the router was properly configured, I retried the ping from PC-A to PC-B, and this time the ping was successful.

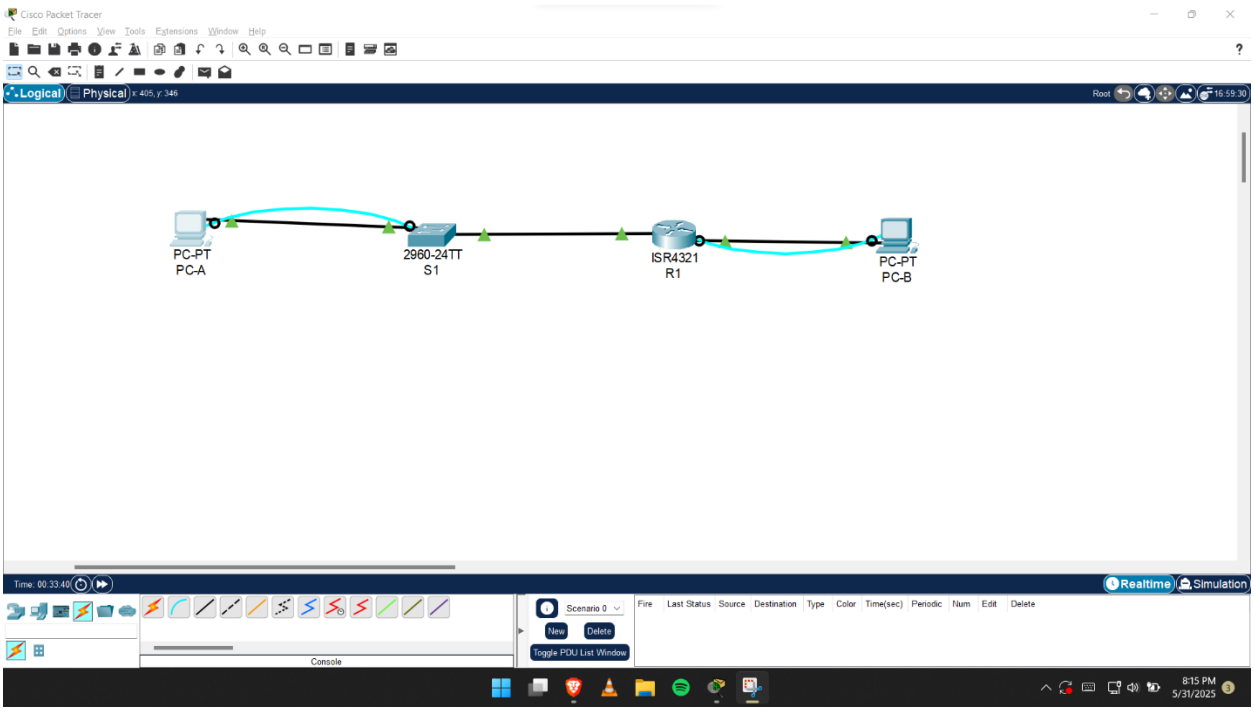



PC-B
Physical
Config
Desktop
Programming
Attributes
Terminal
X
Router>enable
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname R1
R1(config)#no ip domain lookup
R1(config)#enable secret class
R1(config)#line console 0
R1(config-line)#password cisco
R1(config-line)#login
R1(config-line)#line vty 0 4
R1(config-line)#password cisco
R1(config-line)#login
R1(config-line)#
R1(config-line)#service password-encryption
R1(config)#
R1(config)#banner motd & Authorized Users Only! &
R1(config)#
R1(config)#interface g0/0/0
R1(config-if)#ip address 192.168.0.1 255.255.255.0
R1(config-if)#ipv6 address 2001:db8:acad::1/64
R1(config-if)#ipv6 address FE80::1 link-local
R1(config-if)#no shutdown
R1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/0, changed state to up
R1(config-if)#exit
R1(config)#interface g0/0/1
R1(config-if)#ip address 192.168.1.1 255.255.255.0
R1(config-if)#ipv6 address 2001:db8:acad:1::1/64
R1(config-if)#ipv6 address fe80::1 link-local
R1(config-if)#no shutdown
R1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/1, changed state to up
R1(config-if)#exit
R1(config)#
Top


PC-B
Physical
Config
Desktop
Programming
Attributes
Terminal
X
R1(config-line)#login
R1(config-line)#line vty 0 4
R1(config-line)#password cisco
R1(config-line)#login
R1(config-line)#
R1(config-line)#service password-encryption
R1(config)#
R1(config)#banner motd & Authorized Users Only! &
R1(config)#
R1(config)#interface g0/0/0
R1(config-if)#ip address 192.168.0.1 255.255.255.0
R1(config-if)#ipv6 address 2001:db8:acad::1/64
R1(config-if)#ipv6 address FE80::1 link-local
R1(config-if)#no shutdown
R1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/0, changed state to up
R1(config-if)#exit
R1(config)#interface g0/0/1
R1(config-if)#ip address 192.168.1.1 255.255.255.0
R1(config-if)#ipv6 address 2001:db8:acad:1::1/64
R1(config-if)#ipv6 address fe80::1 link-local
R1(config-if)#no shutdown
R1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/1, changed state to up
R1(config-if)#exit
R1(config)#interface g0/0/1
R1(config-if)#description Connected to F0/5 on S1
R1(config-if)#exit
R1(config)#interface g0/0/0
R1(config-if)#description Connected to Host PC-B
R1(config-if)#exit
R1(config)#ipv6 unicast-routing
R1(config)#
R1(config)#exit
R1#
%SYS-5-CONFIG_I: Configured from console by console
Top

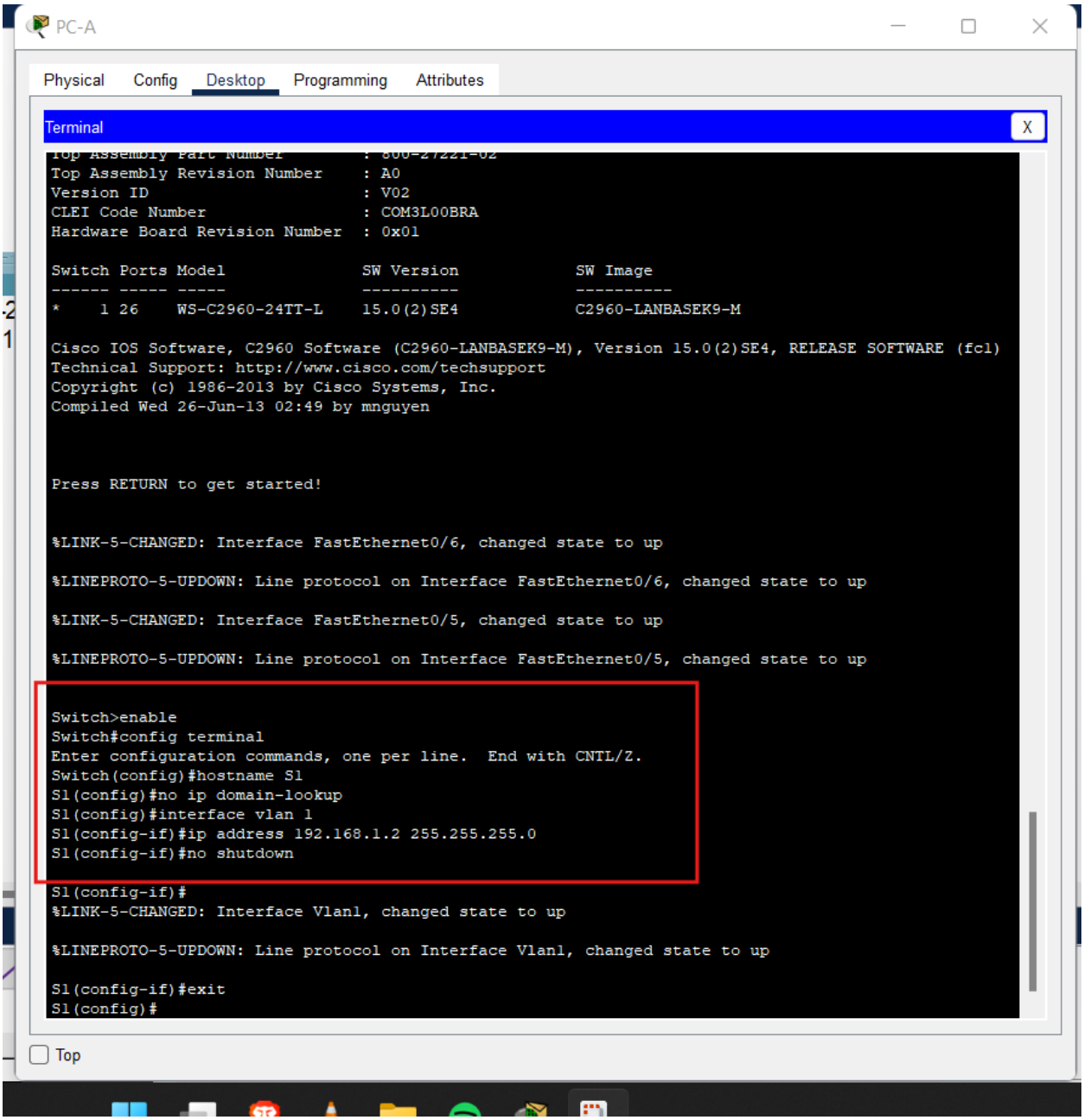

PC-B
Physical
Config
Desktop
Programming
Attributes
Terminal
X
R1(config)#banner motd & Authorized Users Only! &
R1(config)#
R1(config)#interface g0/0/0
R1(config-if)#ip address 192.168.0.1 255.255.255.0
R1(config-if)#ipv6 address 2001:db8:acad::1/64
R1(config-if)#ipv6 address FE80::1 link-local
R1(config-if)#no shutdown
R1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/0, changed state to up
R1(config-if)#exit
R1(config)#interface g0/0/1
R1(config-if)#ip address 192.168.1.1 255.255.255.0
R1(config-if)#ipv6 address 2001:db8:acad:1::1/64
R1(config-if)#ipv6 address fe80::1 link-local
R1(config-if)#no shutdown
R1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/1, changed state to up
R1(config-if)#exit
R1(config)#interface g0/0/1
R1(config-if)#description Connected to F0/5 on S1
R1(config-if)#exit
R1(config)#interface g0/0/0
R1(config-if)#description Connected to Host PC-B
R1(config-if)#exit
R1(config)#ipv6 unicast-routing
R1(config)#
R1(config)#exit
R1#
%SYS-5-CONFIG_I: Configured from console by console
R1#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
R1#clock set 20:15:00 31 May 2025
R1#
Top

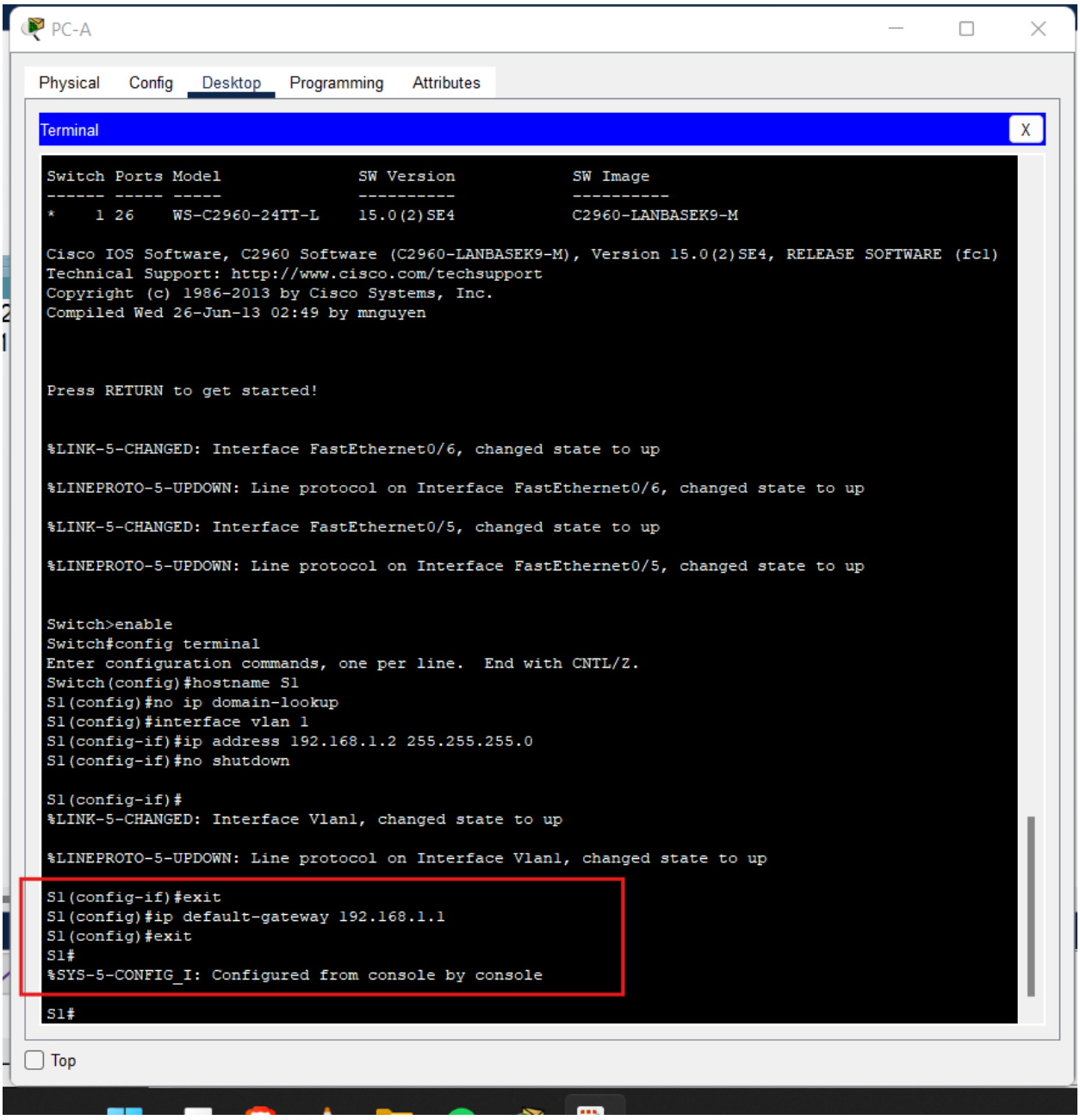

PC-A
Physical
Config
Desktop
Programming
Attributes
Command Prompt
X
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.0.3
Pinging 192.168.0.3 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.
Ping statistics for 192.168.0.3:
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>ping 192.168.0.3
Pinging 192.168.0.3 with 32 bytes of data:
Request timed out.
Reply from 192.168.0.3: bytes=32 time<1ms TTL=127
Reply from 192.168.0.3: bytes=32 time<1ms TTL=127
Reply from 192.168.0.3: bytes=32 time<1ms TTL=127
Ping statistics for 192.168.0.3:
Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
C:\>ping 192.168.0.3
Pinging 192.168.0.3 with 32 bytes of data:
Reply from 192.168.0.3: bytes=32 time<1ms TTL=127
Reply from 192.168.0.3: bytes=32 time<1ms TTL=127
Reply from 192.168.0.3: bytes=32 time<1ms TTL=127
Reply from 192.168.0.3: bytes=32 time<1ms TTL=127
Ping statistics for 192.168.0.3:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
C:\>
Top

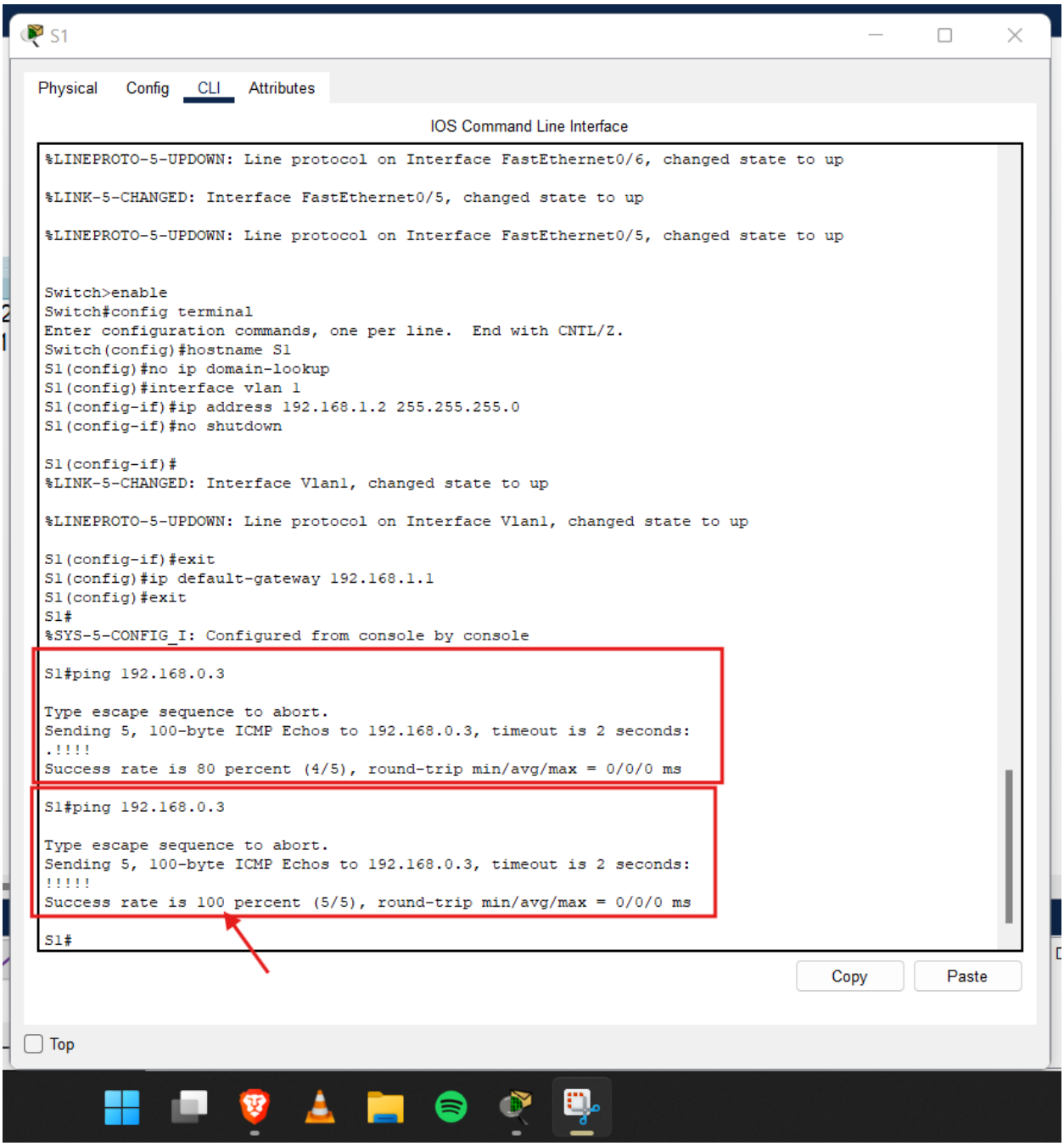


Step 3: Switch Configuration (S1)

I repeated a similar configuration process for the switch. After setting the hostname to `S1` and disabling DNS lookup, I configured the VLAN1 interface with the IP address ***192.168.1.2/24.*** I also set the default gateway to ***192.168.1.1***, ensuring the switch could communicate outside its subnet.


PC-A
Physical
Config
Desktop
Programming
Attributes
Terminal
X
Top Assembly Part Number : 800-27221-02
Top Assembly Revision Number : A0
Version ID : V02
CLEI Code Number : COM3L00BRA
Hardware Board Revision Number : 0x01
Switch Ports Model SW Version SW Image
------ ----- ----- ---------- ----------
* 1 26 WS-C2960-24TT-L 15.0(2)SE4 C2960-LANBASEK9-M
Cisco IOS Software, C2960 Software (C2960-LANBASEK9-M), Version 15.0(2)SE4, RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2013 by Cisco Systems, Inc.
Compiled Wed 26-Jun-13 02:49 by mnguyen
Press RETURN to get started!
%LINK-5-CHANGED: Interface FastEthernet0/6, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/6, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/5, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/5, changed state to up
Switch>enable
Switch#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname S1
S1(config)#no ip domain-lookup
S1(config)#interface vlan 1
S1(config-if)#ip address 192.168.1.2 255.255.255.0
S1(config-if)#no shutdown
S1(config-if)#
%LINK-5-CHANGED: Interface Vlan1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up
S1(config-if)#exit
S1(config)#
Top


PC-A
Physical
Config
Desktop
Programming
Attributes
Terminal
X
Switch Ports Model SW Version SW Image
------ ----- ----- ---------- ----------
* 1 26 WS-C2960-24TT-L 15.0(2)SE4 C2960-LANBASEK9-M
Cisco IOS Software, C2960 Software (C2960-LANBASEK9-M), Version 15.0(2)SE4, RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2013 by Cisco Systems, Inc.
Compiled Wed 26-Jun-13 02:49 by mnguyen
Press RETURN to get started!
%LINK-5-CHANGED: Interface FastEthernet0/6, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/6, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/5, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/5, changed state to up
Switch>enable
Switch#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname S1
S1(config)#no ip domain-lookup
S1(config)#interface vlan 1
S1(config-if)#ip address 192.168.1.2 255.255.255.0
S1(config-if)#no shutdown
S1(config-if)#
%LINK-5-CHANGED: Interface Vlan1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up
S1(config-if)#exit
S1(config)#ip default-gateway 192.168.1.1
S1(config)#exit
S1#
%SYS-5-CONFIG_I: Configured from console by console
S1#
Top

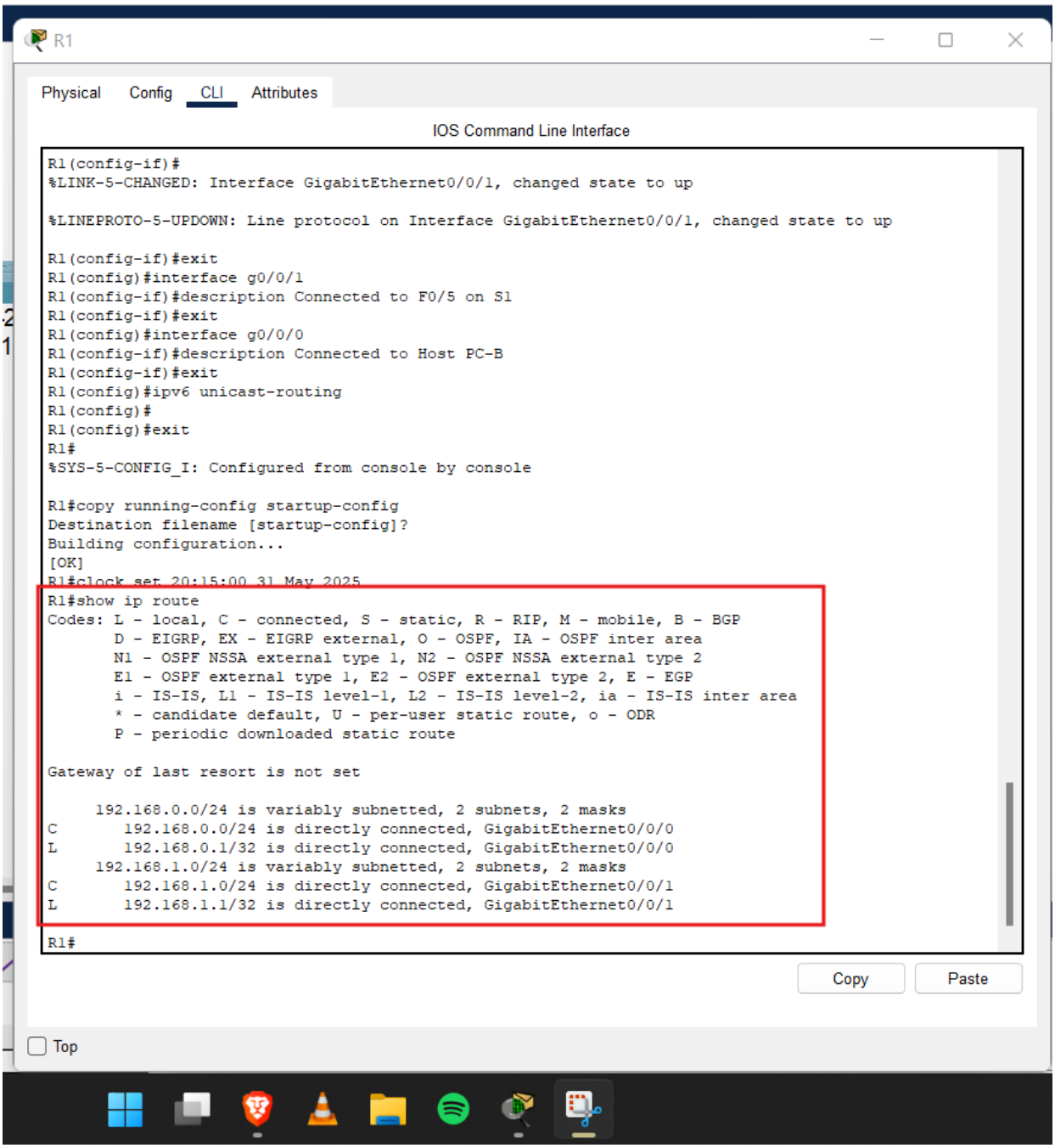


Part 3: Verifying Device Information

Routing Table on Router

Using the ***show ip route*** and ***show ipv6 route*** commands on R1, I observed that the directly connected networks were marked with a ***C*** code, and the local router interfaces were shown with

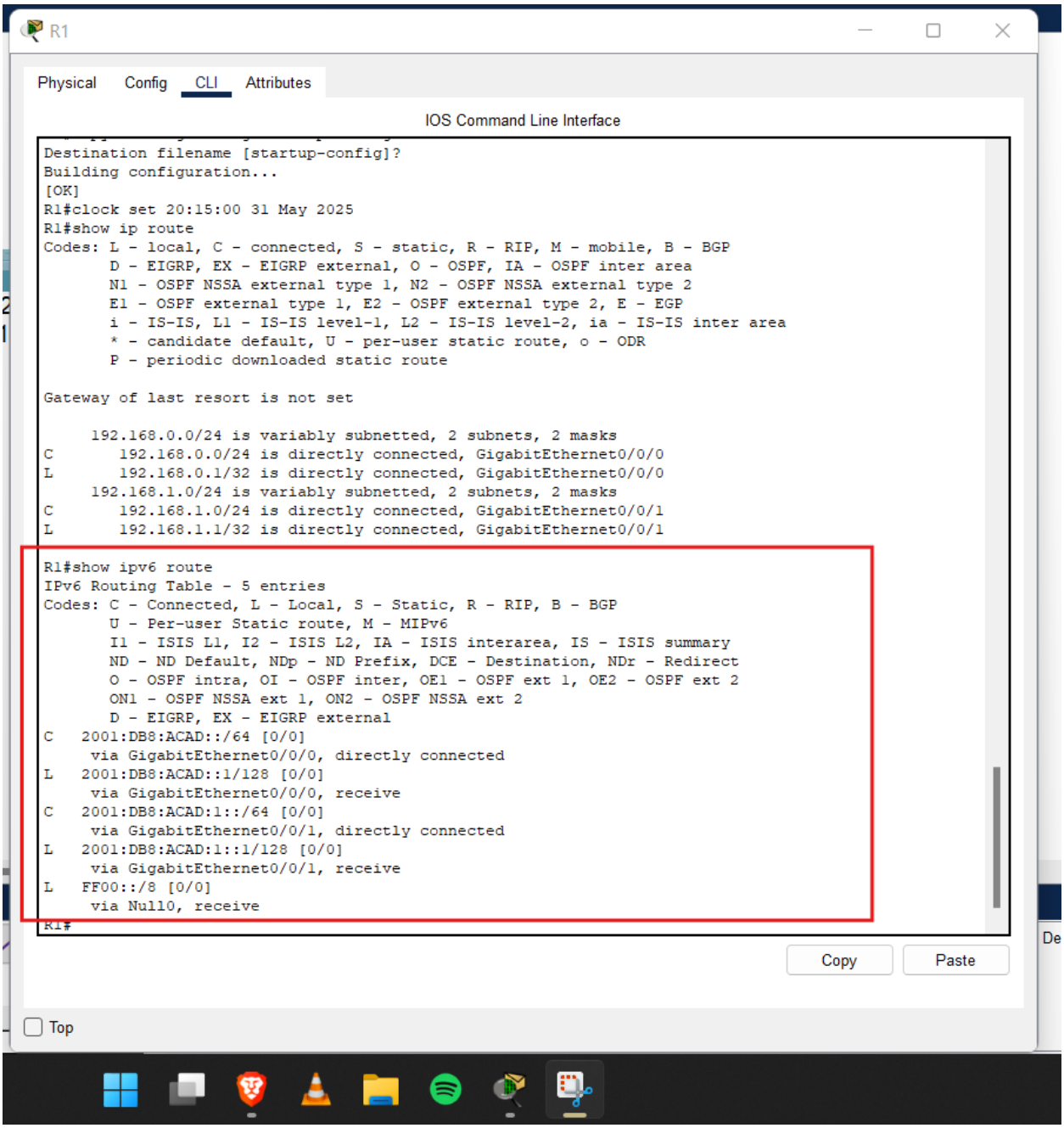
an *L* code. I confirmed that there were two connected routes for both IPv4 and IPv6, each pointing to the correct interfaces.



What interface types are associated to the C coded routes?

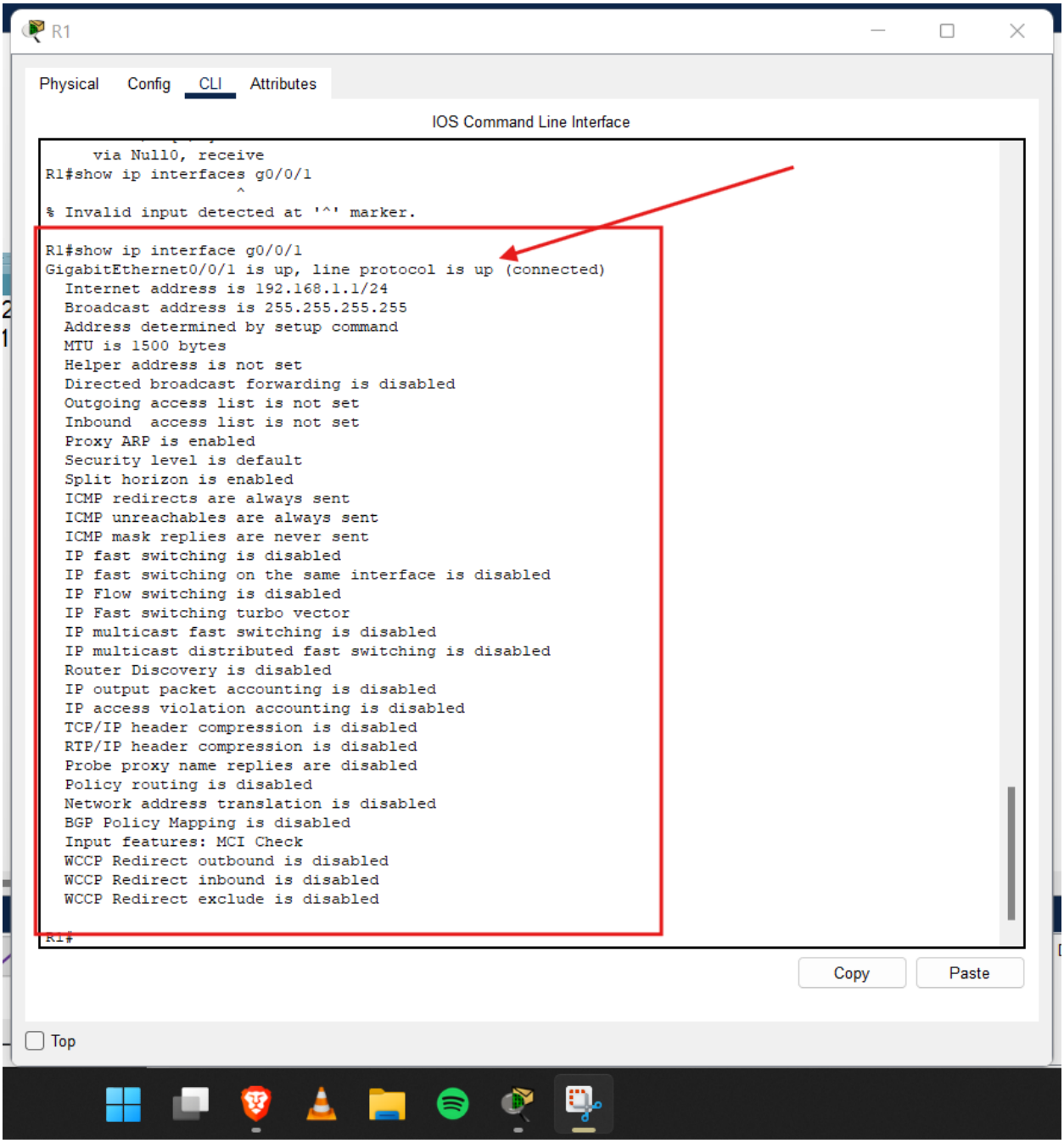
192.168.0.0/24 is directly connected, GigabitEthernet0/0/0

192.168.1.0/24 is directly connected, GigabitEthernet0/0/1



Interface Information

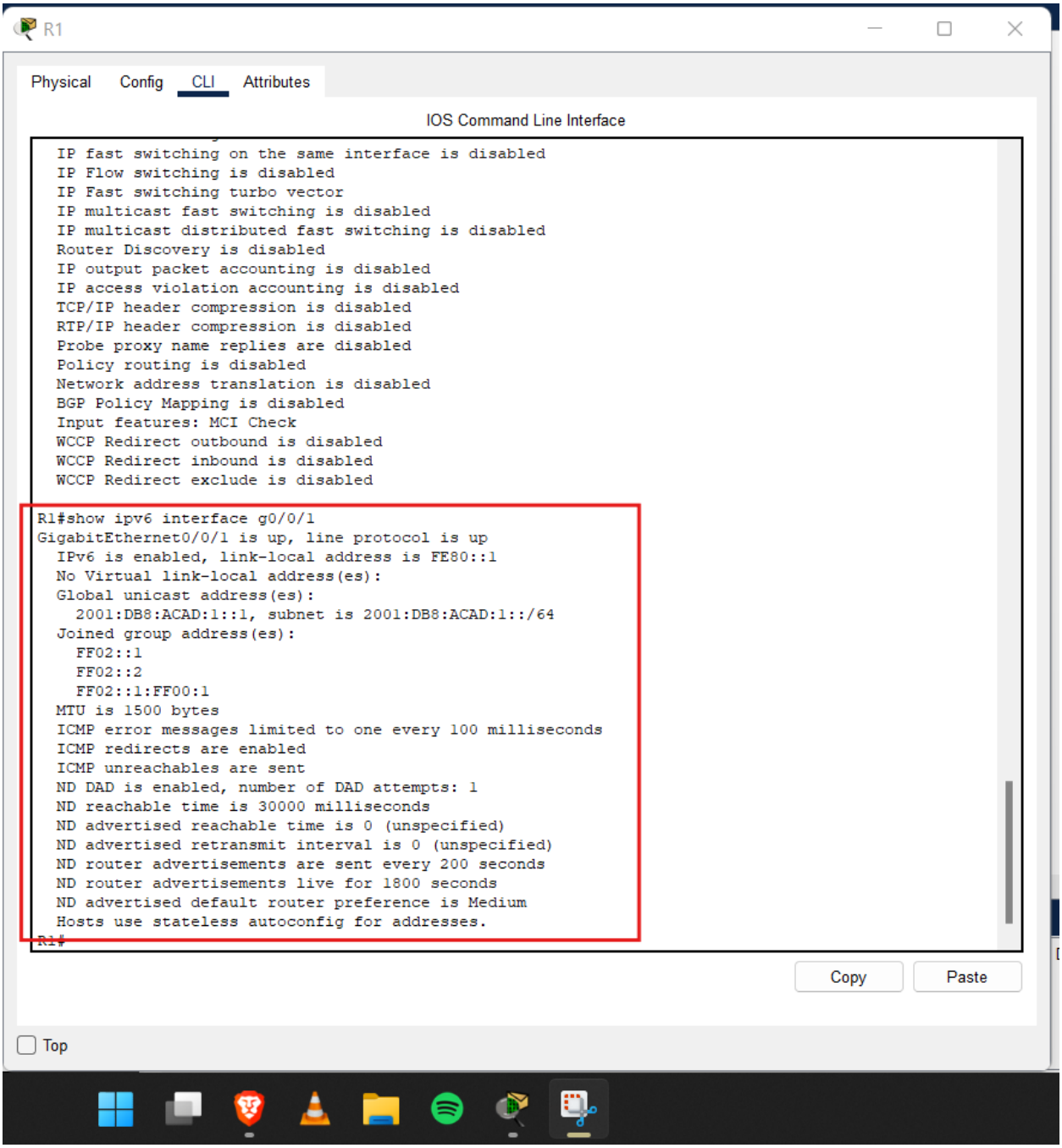
I examined the configuration and operational status of G0/0/1 using ***show ip interface*** and ***show ipv6 interface***. The interface was up, and the MAC address and IP addresses matched my configuration. IPv6 showed that the router had correctly joined the expected multicast groups and was sending router advertisements.



Questions:

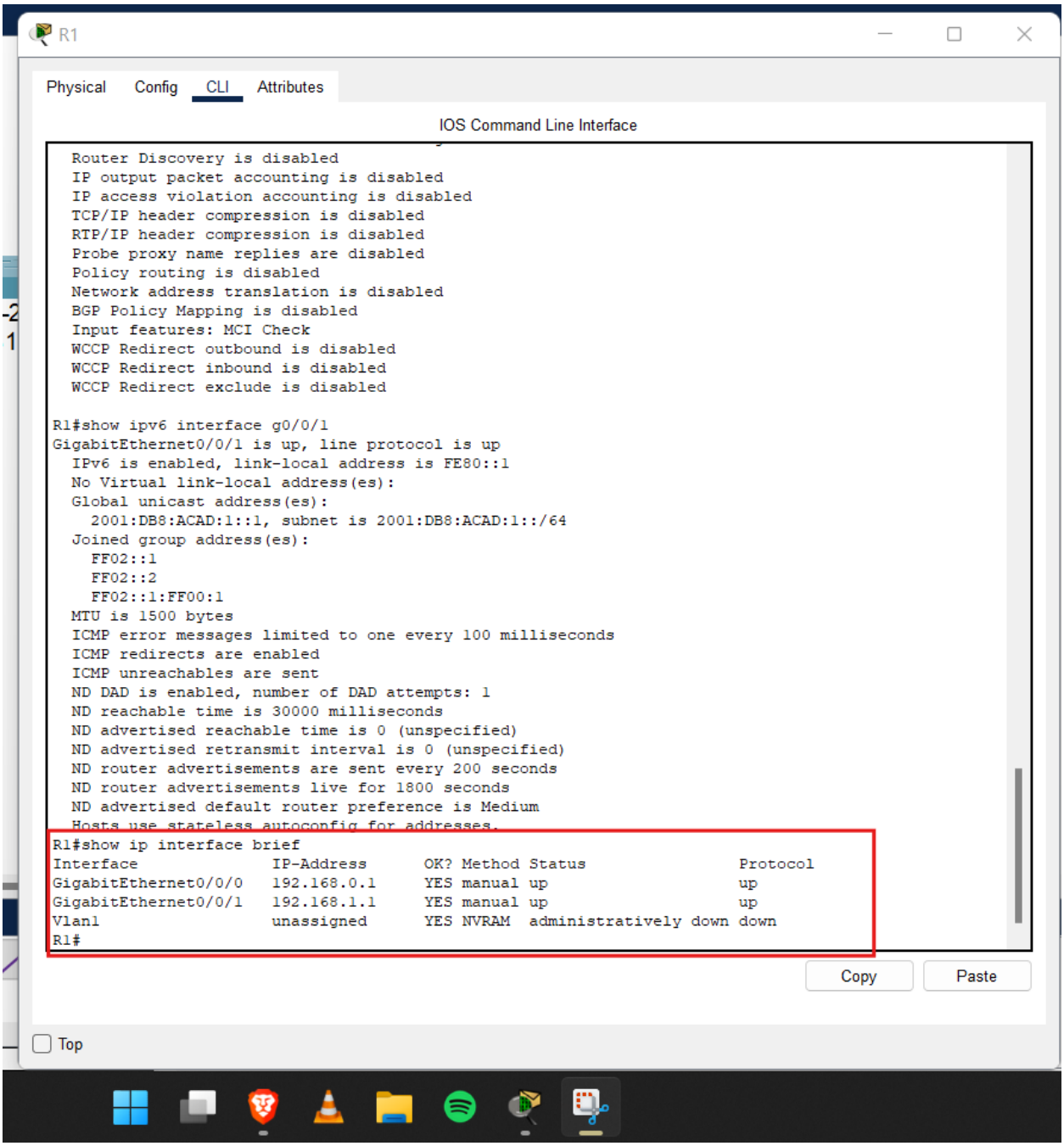
What is the operational status of the G0/0/1 interface?

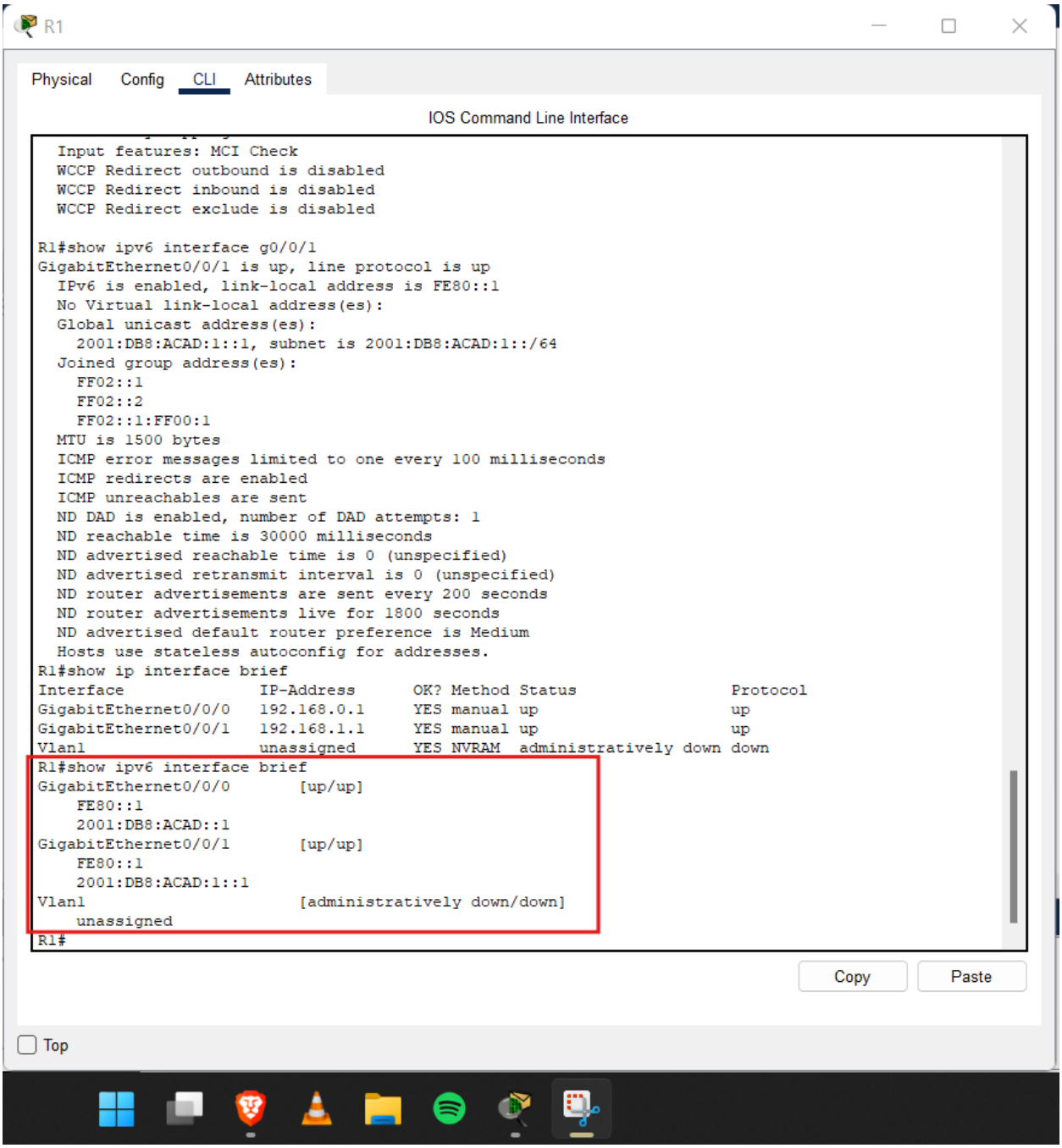
GigabitEthernet0/0/1 is up, line protocol is up



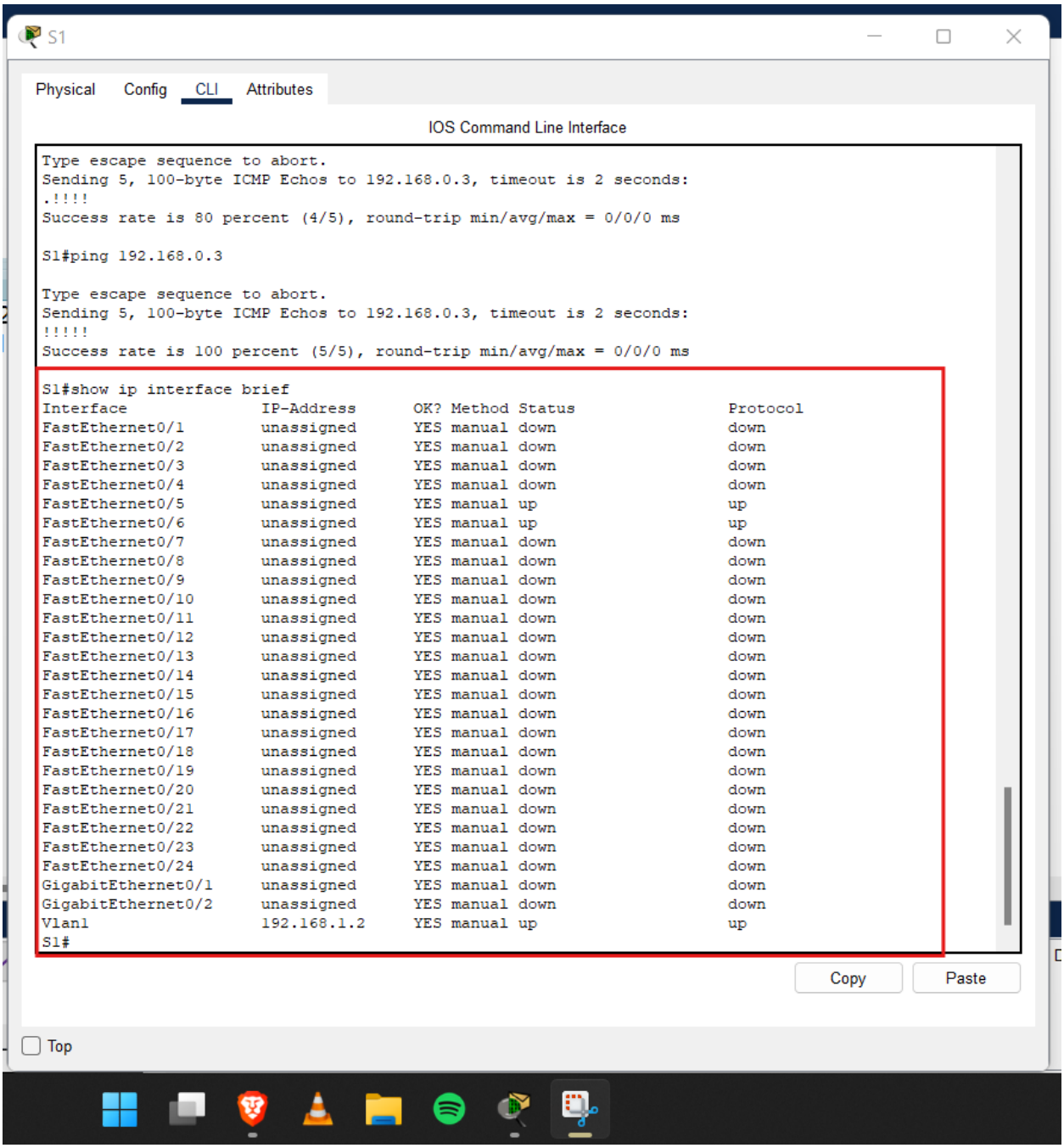
Interface Summary

I used ***show ip interface brief*** and ***show ipv6 interface brief*** to get a summary of all interfaces. These commands were especially useful for quickly verifying which interfaces were up and whether IP addresses had been correctly assigned. Everything looked good on both the router and switch.


R1
Physical
Config
CLI
Attributes
IOS Command Line Interface
Router Discovery is disabled
IP output packet accounting is disabled
IP access violation accounting is disabled
TCP/IP header compression is disabled
RTP/IP header compression is disabled
Probe proxy name replies are disabled
Policy routing is disabled
Network address translation is disabled
BGP Policy Mapping is disabled
Input features: MCI Check
WCCP Redirect outbound is disabled
WCCP Redirect inbound is disabled
WCCP Redirect exclude is disabled
R1#show ipv6 interface g0/0/1
GigabitEthernet0/0/1 is up, line protocol is up
IPv6 is enabled, link-local address is FE80::1
No Virtual link-local address(es):
Global unicast address(es):
2001:DB8:ACAD:1::1, subnet is 2001:DB8:ACAD:1::/64
Joined group address(es):
FF02::1
FF02::2
FF02::1:FF00:1
MTU is 1500 bytes
ICMP error messages limited to one every 100 milliseconds
ICMP redirects are enabled
ICMP unreachables are sent
ND DAD is enabled, number of DAD attempts: 1
ND reachable time is 30000 milliseconds
ND advertised reachable time is 0 (unspecified)
ND advertised retransmit interval is 0 (unspecified)
ND router advertisements are sent every 200 seconds
ND router advertisements live for 1800 seconds
ND advertised default router preference is Medium
Hosts use stateless autoconfig for addresses.
R1#show ip interface brief
Interface IP-Address OK? Method Status Protocol
GigabitEthernet0/0/0 192.168.0.1 YES manual up up
GigabitEthernet0/0/1 192.168.1.1 YES manual up up
Vlan1 unassigned YES NVRAM administratively down down
R1#
Copy
Paste
Top



(Screenshots for Router1~R1)



(Screenshot for Switch1~S1)

Reflection Questions & Answers

1. If the G0/0/1 interface showed it was administratively down, what command would I use?

R1(config-if)# no shutdown

2. What if I accidentally configured G0/0/1 on the router with IP `192.168.1.2` instead of `192.168.1.1`?

This mistake would prevent PC-A from accessing PC-B. Since PC-A is set to use 192.168.1.1 as its default gateway, it wouldn't be able to route packets because that IP wouldn't exist on the router. All packets requiring routing would fail to leave the local subnet.

Conclusion

This lab was an excellent opportunity for me to apply theoretical concepts in a practical simulation. I not only configured a functioning network with both IPv4 and IPv6, but I also practiced setting up device security, using diagnostic tools, and troubleshooting connectivity issues.

By doing everything manually—from assigning addresses to verifying routes—I reinforced my understanding of how routers and switches operate in a layered network environment. I now feel more confident in managing small-scale network configurations and understanding what happens behind the scenes during device communication. This exercise also reminded me of the importance of attention to detail—one incorrect IP or interface command can break the entire setup.