

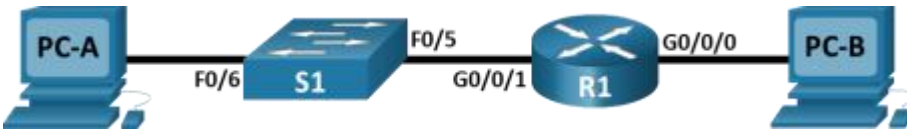
CLOUD AND NETWORK SECURITY

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CS-CNS07-24006

WEEK 2: Assignment 1

**Packet Tracer: Build a switch and
Router Network**



INTRODUCTIONS

This is a comprehensive lab to review previously covered IOS commands. You will cable the equipment in this lab as shown in the topology diagram. You will then configure the devices to match the addressing table. After the configurations have been saved, you will verify them by testing for network connectivity.

After the devices have been configured and network connectivity has been verified, you will use IOS commands to retrieve information from the devices and answer questions about your network equipment.

OBJECTIVES

1. To set up the topology and initialize the Devices
2. Configure Devices and Verify connectivity

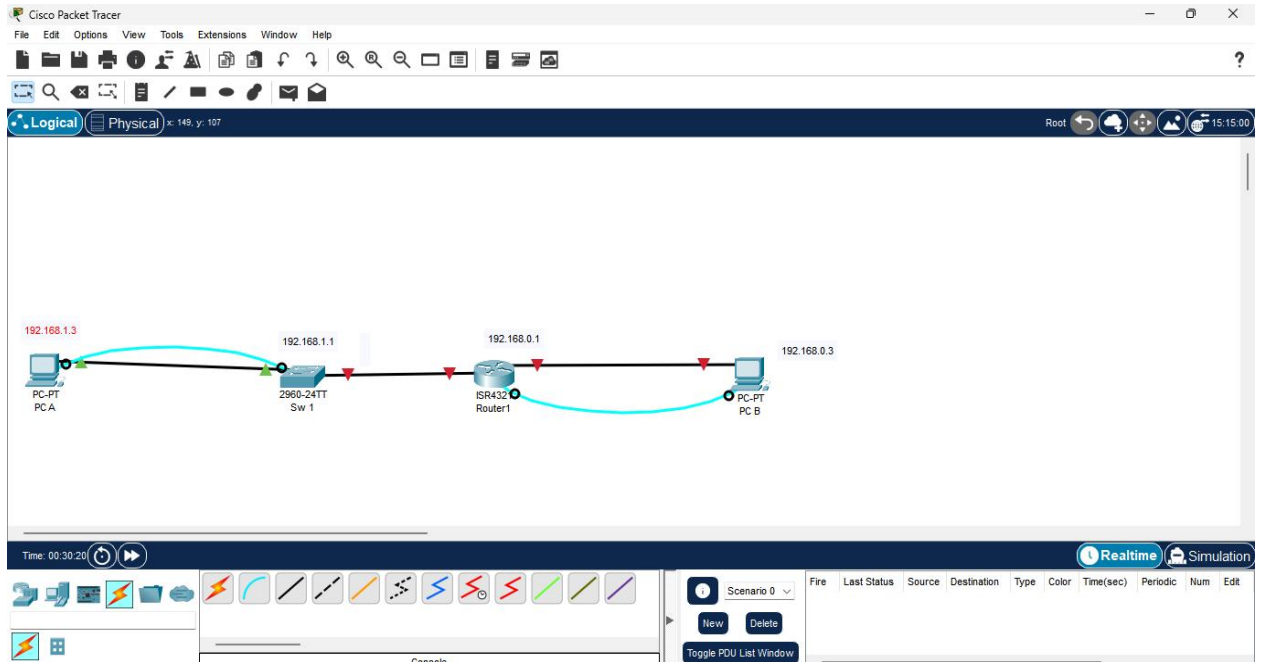
Required Resources

- 1 Router (Cisco 4221 with Cisco IOS XE Release 16.9.4 universal image or comparable)
- 1 Switch (Cisco 2960 with Cisco IOS Release 15.2(2) lanbasek9 image or comparable)
- 2 PCs (Windows with a terminal emulation program, such as Tera Term)
- Console cables to configure the Cisco IOS devices via the console ports
- Ethernet cables as shown in the topology

INSTRUCTIONS

Part 1: Set up Toplogy and initialize Devices

- a. Attach the devices shown in the topology diagram and cable as necessary
- b.** Power on all the devices in the topology



c.

Step 2: Initialize and reload the router and switch

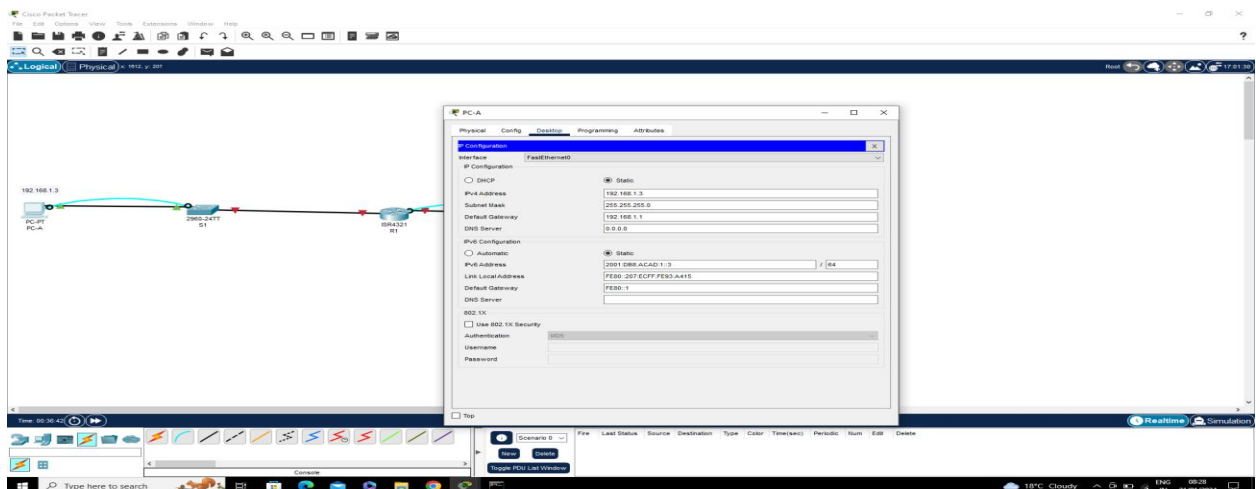
If the config files were previously saved on the router and switch, initialize and reload these devices back to their default configs.

Part 2: Configure Devices and verify connectivity

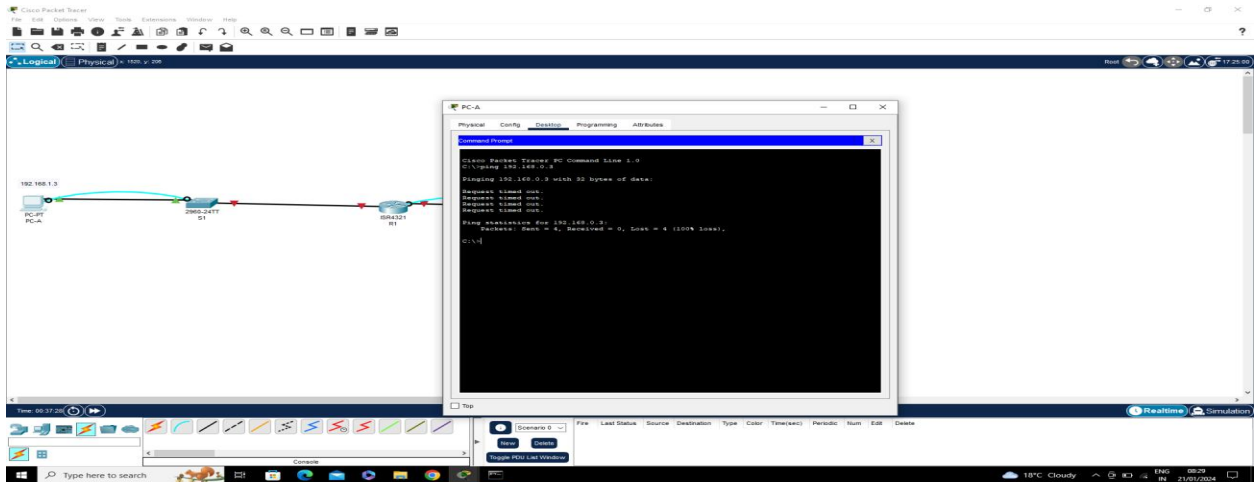
Here I will set up the network topology and configure basic settings, such as the interface IP addresses, device access, and passwords.

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

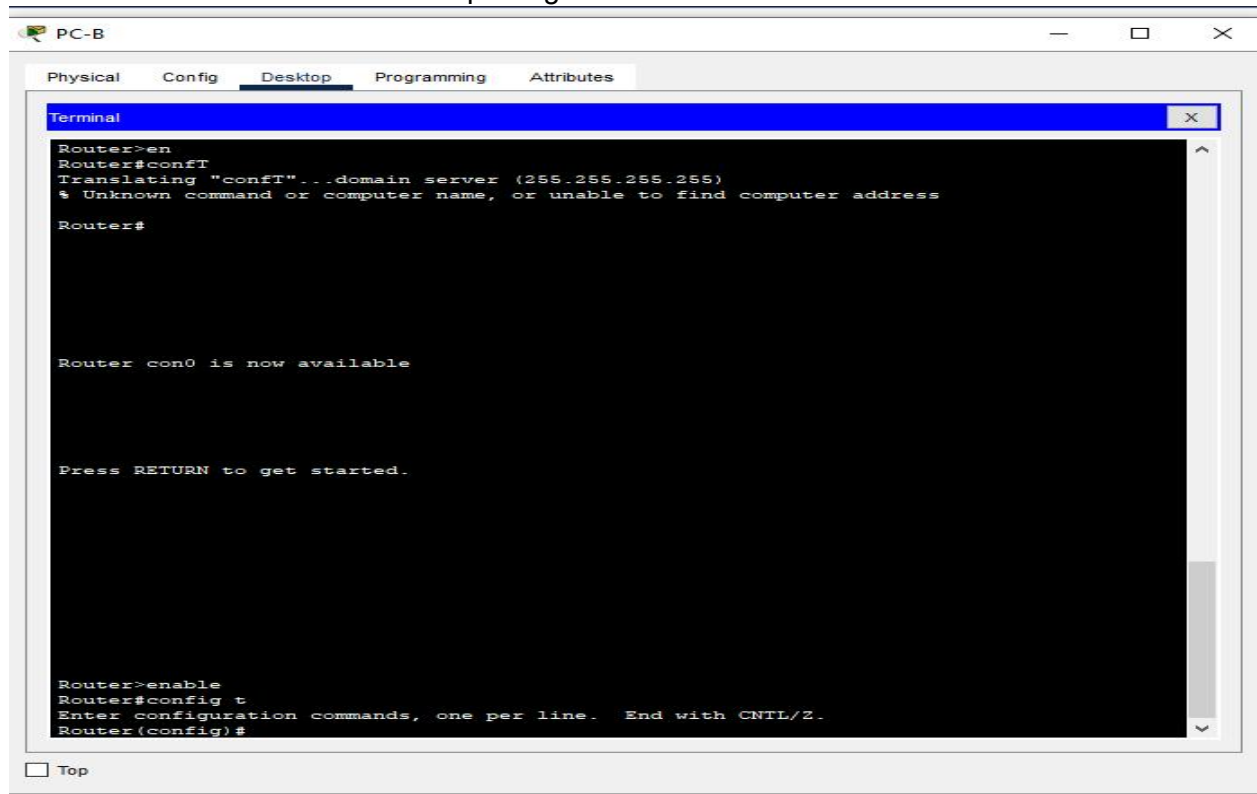


Why were the pings not successful?

The router interfaces(default gateways) have not been configured yet and layer 3 traffic is not being routed between subnets.

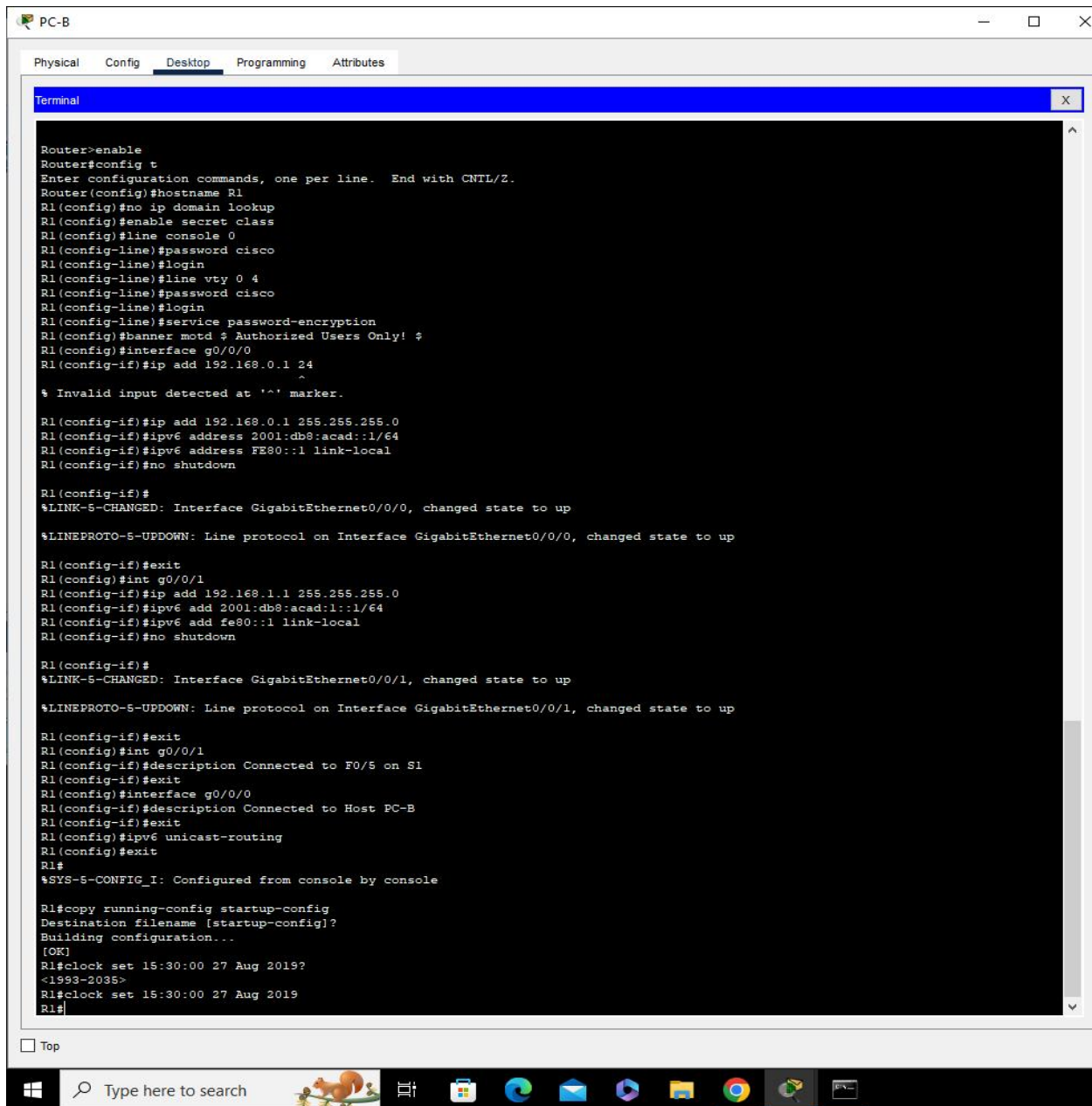
Step 2; Configure the router

- Console into the router and enable privileged EXEC mode.

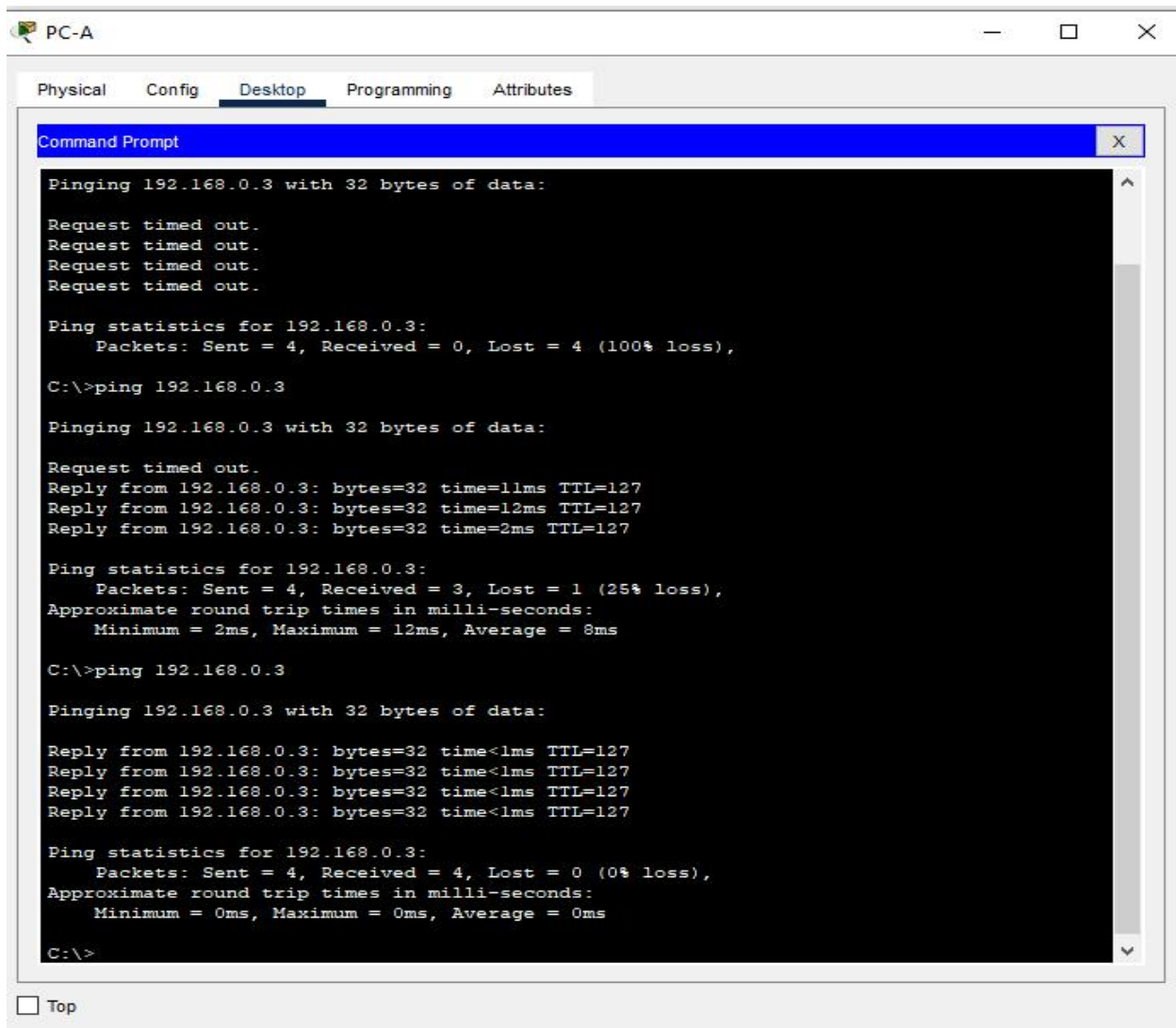


- Enter configuration mode.

- c. Assign a device name to the router.
- d. Disable DNS lookup to prevent the router from attempting to translate incorrectly entered commands as though they were host names.
- e. Assign **class** as the privileged EXEC encrypted password.
- f. Assign **Cisco** as the console password and enable login.
- g. Assign **Cisco** as the VTY password and enable login.
- h. Encrypt the plaintext passwords.
- i. Create a banner that warns anyone accessing the device that unauthorized access is prohibited.
- j. Configure and activate both interfaces on the router.
- k. Configure an interface description for each interface indicating which device is connected to it.
- l. To enable IPv6 routing, enter the command `ipv6 unicast-routing`.
- m. Save the running configuration to the startup configuration file.
- n. Set the clock on the router.



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



The screenshot shows a window titled "PC-A" with tabs for "Physical", "Config", "Desktop", "Programming", and "Attributes". The "Desktop" tab is active, displaying a "Command Prompt" window. The Command Prompt shows the results of three ping commands to 192.168.0.3. The first two commands result in 100% loss, while the third results in 0% loss.

```
Command Prompt

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=11ms TTL=127
Reply from 192.168.0.3: bytes=32 time=12ms TTL=127
Reply from 192.168.0.3: bytes=32 time=2ms 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 = 2ms, Maximum = 12ms, Average = 8ms

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:\>
```

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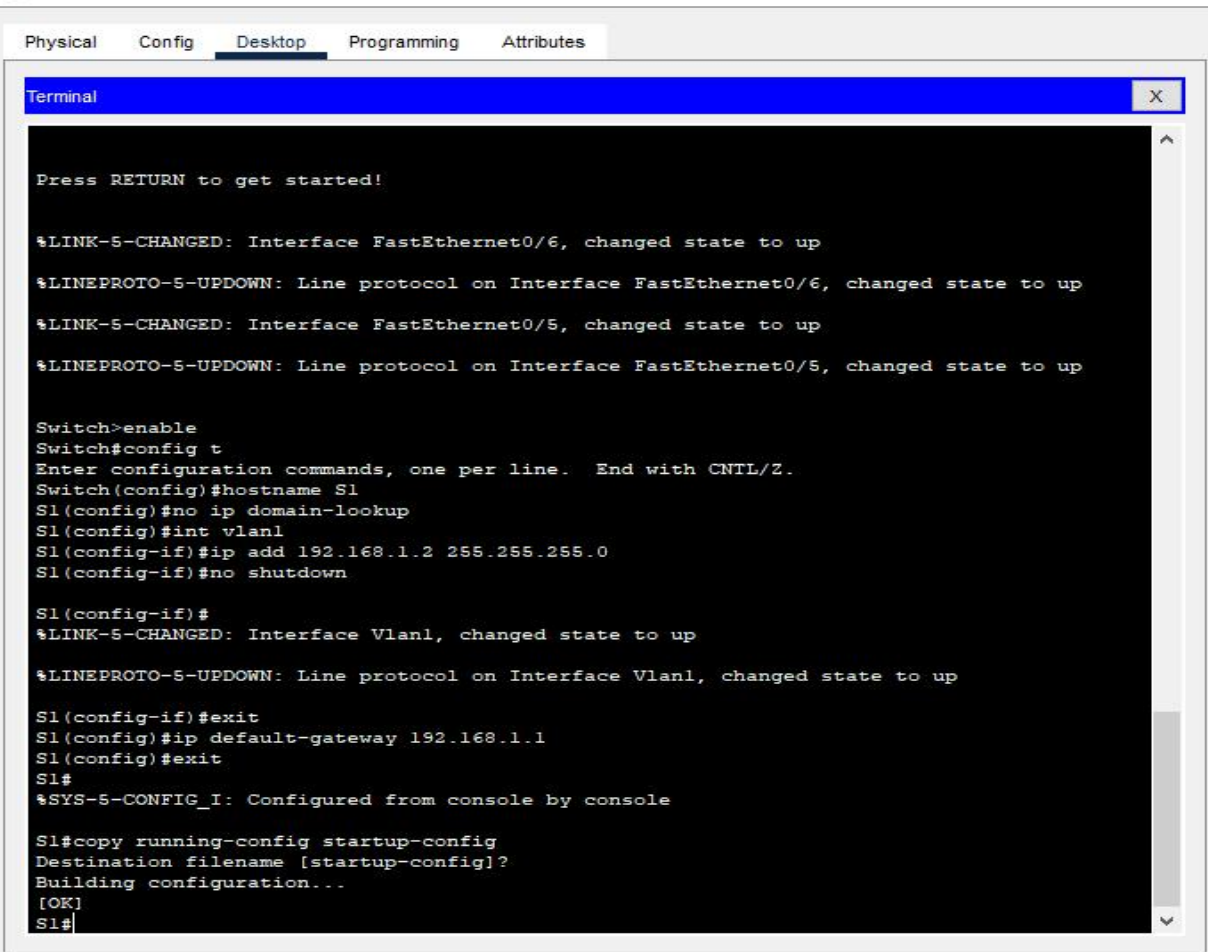
Were the pings successful? Explain.

Yes. The router is routing the ping traffic across the two subnets. The default settings for the 2960 switch will automatically turn up the interfaces that are connected to devices.

Step 3: Configure the switch.

- a. Console into the switch and enable privileged EXEC mode.
- b. Enter configuration mode
- c. Assign a device name to the switch.
- d. Disable DNS lookup to prevent the router from attempting to translate incorrectly entered commands as though they were host names
- e. Configure and activate the VLAN interface on the switch S1.

- f. Configure the default gateway for the switch S1.
- g. Save the running configuration to the startup configuration file.



The screenshot shows a terminal window titled "Terminal" with a blue header bar. The window is part of a larger application with tabs labeled "Physical", "Config", "Desktop", "Programming", and "Attributes". The "Desktop" tab is active. The terminal displays the following text:

```
Press RETURN to get started!

%LINK-S-CHANGED: Interface FastEthernet0/6, changed state to up
%LINEPROTO-S-UPDOWN: Line protocol on Interface FastEthernet0/6, changed state to up
%LINK-S-CHANGED: Interface FastEthernet0/5, changed state to up
%LINEPROTO-S-UPDOWN: Line protocol on Interface FastEthernet0/5, changed state to up

Switch>enable
Switch#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#hostname S1
S1(config)#no ip domain-lookup
S1(config)#int vlan1
S1(config-if)#ip add 192.168.1.2 255.255.255.0
S1(config-if)#no shutdown

S1(config-if)#
%LINK-S-CHANGED: Interface Vlan1, changed state to up
%LINEPROTO-S-UPDOWN: Line protocol on Interface Vlan1, changed state to up

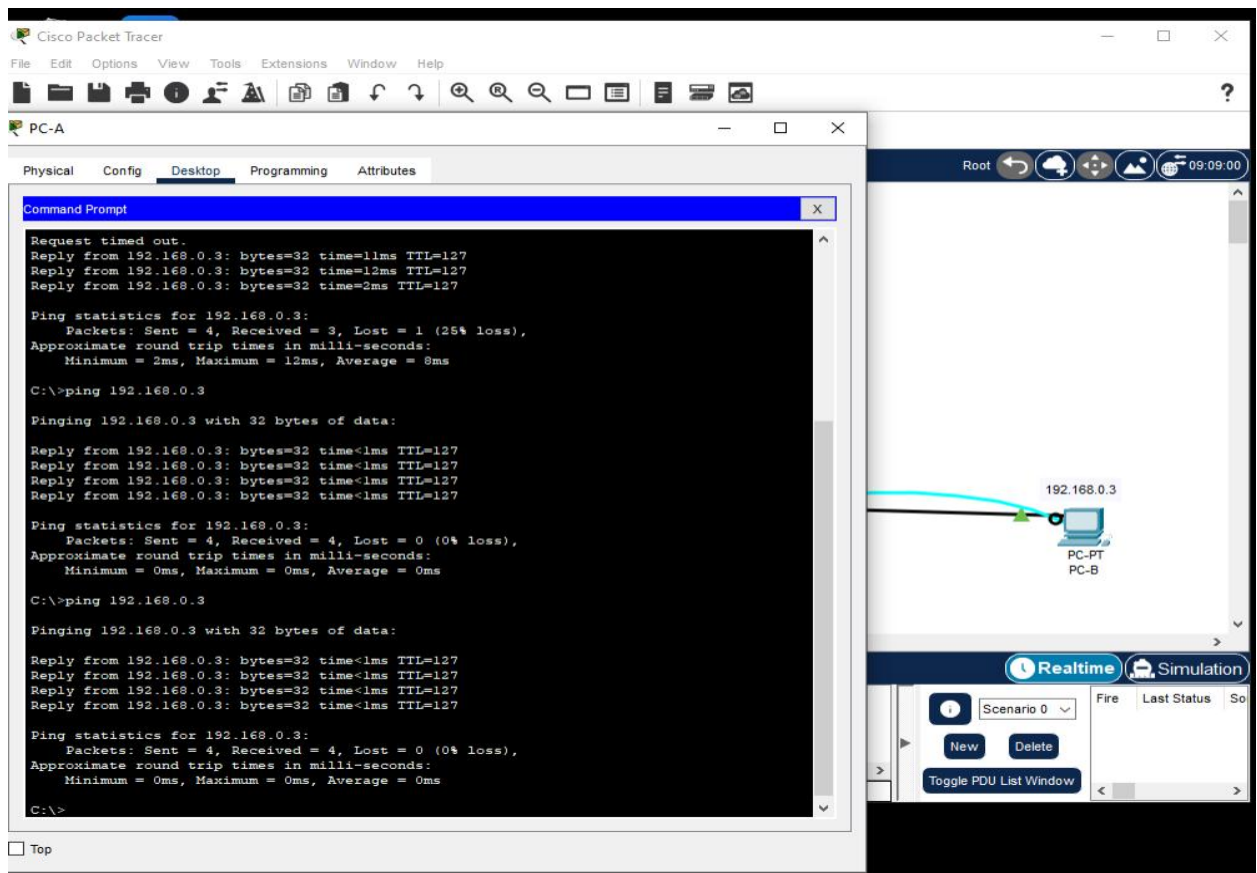
S1(config-if)#exit
S1(config)#ip default-gateway 192.168.1.1
S1(config)#exit
S1#
%SYS-S-CONFIG_I: Configured from console by console

S1#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
S1#
```

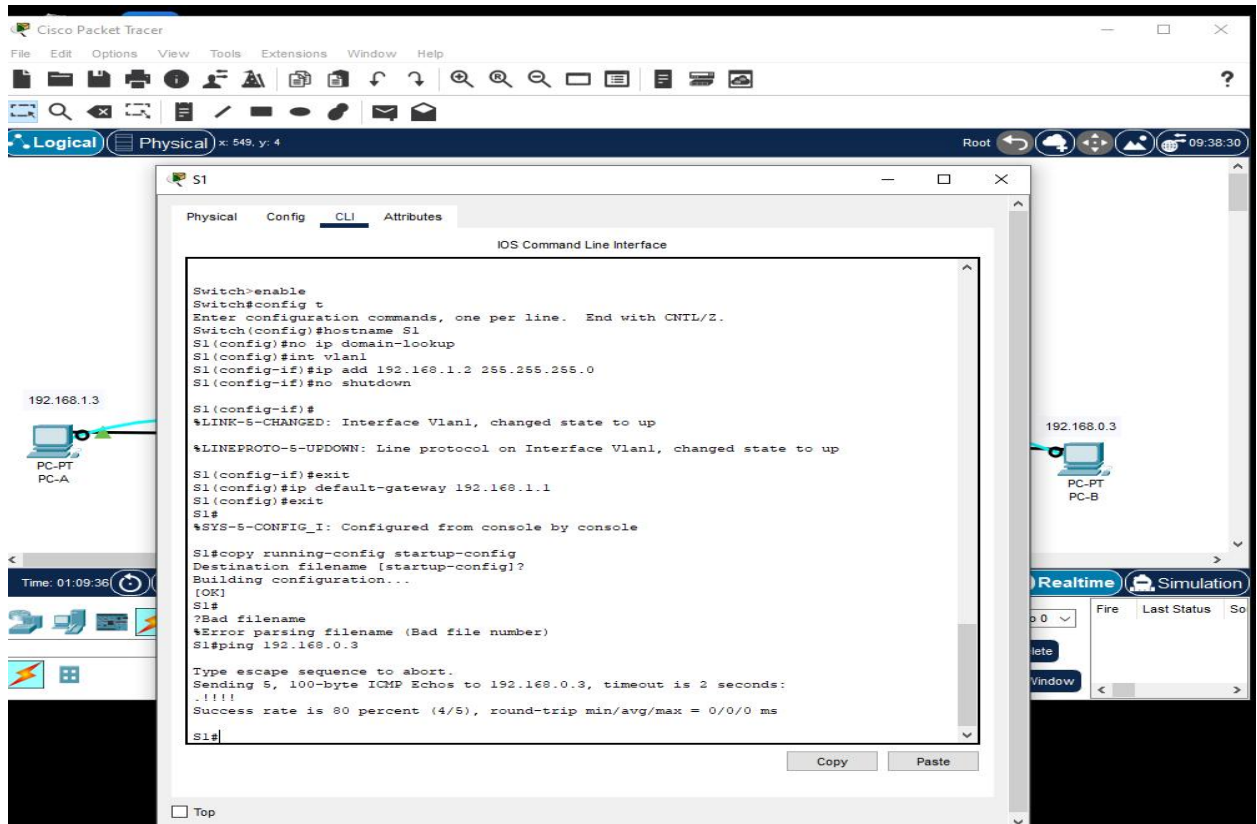
At the bottom left of the terminal window, there is a checkbox labeled "Top" which is currently unchecked.

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

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



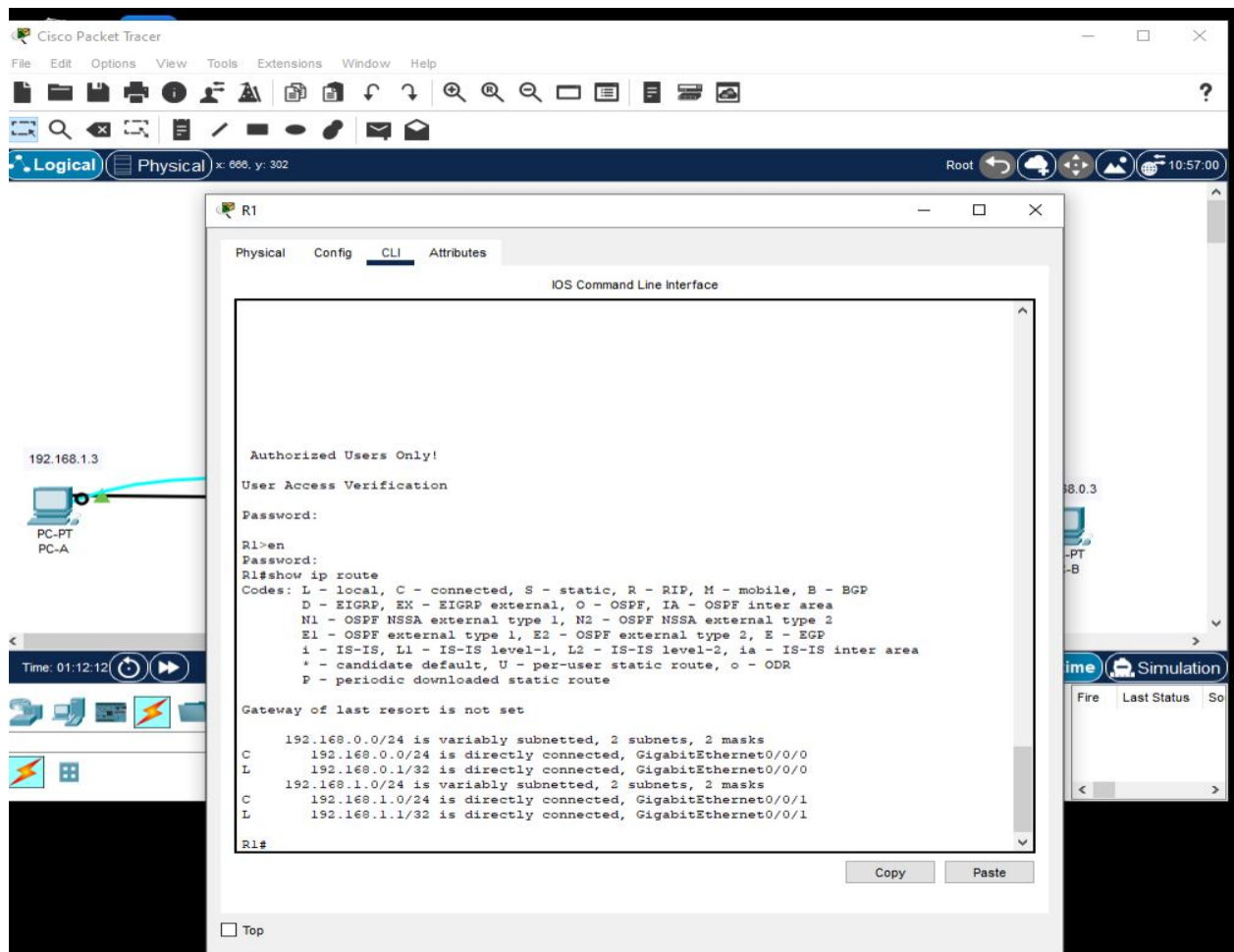
b. From S1, ping PC-B



Part 3: Display Device Information

Step 1: Display the routing table on the router.

- Use the **show ip route** command on the router R1 to answer the following questions.



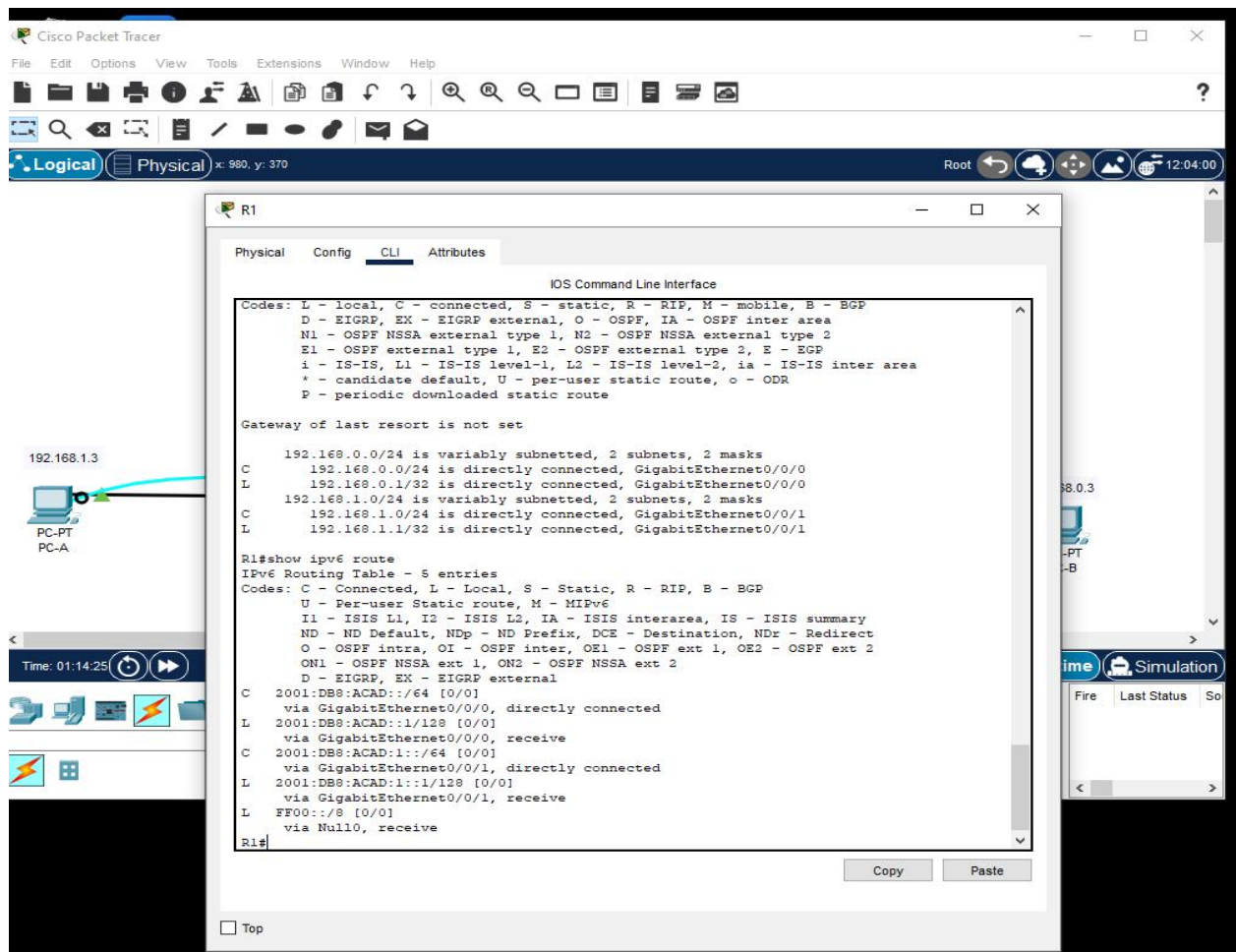
What code is used in the routing table to indicate a directly connected network?

The C designates a directly connected subnet.

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

2

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



Step 2: Display interface information on the router R1.

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

```
R1
Physical Config CLI Attributes
IOS Command Line Interface

R1#
R1# 192.168.1.0/24 is directly connected, 2 subnets, 2 hosts
C 192.168.1.0/24 is directly connected, GigabitEthernet0/0/1
L 192.168.1.1/24 is directly connected, GigabitEthernet0/0/1

R1#show ip route
IPv4 Routing Table - 5 entries
Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
U - Per-user Static route, H - HSRP
I1 - ISIS L1, I2 - ISIS L2, IS - ISIS Interarea, ISL - ISIS summary
RD - RD Default, RDp - RD Prefix, DCE - Destination, Hdr - Header
O - OSPF intra, OI - OSPF inter, OI1 - OSPF ext 1, OI2 - OSPF ext 2
OI1 - OSPF NSSA ext 1, OI2 - OSPF NSSA ext 2
D - EIGRP, EX - EIGRP external
C 2001:DB8:ACAD::/64 [0/0]
  via GigabitEthernet0/0/0, directly connected
L 2001:DB8:ACAD::1/128 [0/0]
  via GigabitEthernet0/0/0, receive
C 2001:DB8:ACAD::1::/64 [0/0]
  via GigabitEthernet0/0/1, directly connected
L 2001:DB8:ACAD::1::1/128 [0/0]
  via GigabitEthernet0/0/1, receive
L FF00::/8 [0/0]
  via Null0, receive
R1#show ip int g0/0/1
GigabitEthernet0/0/1 is up, line protocol is up (connected)
Internet address is 192.168.1.1/24
Broadcast address is 255.255.255.255
Address determined by setup command
MTU is 1500 bytes
Helper address is not set
Directed broadcast forwarding is disabled
Outgoing access list is not set
Inbound access list is not set
Proxy ARP is enabled
Security level is default
Split horizon is enabled
ICMP redirects are always sent
ICMP unreachable are always sent
ICMP mask replies are never sent
IP fast switching is disabled
IP fast switching on the same interface is disabled
IP flow switching is disabled
IP fast switching turbo vector
IP multicast fast switching is disabled
IP multicast distributed fast switching is disabled
Route Discovery is disabled
IP output packet accounting is disabled
IP access violation accounting is disabled
TCP/IP header compression is disabled
RTT/IP header compression is disabled
Pine proxy name replies are disabled
Policy routing is disabled
Network address translation is disabled
BGP Policy Mapping is disabled
Input features: WCCP Check
WCCP Redirect outbound is disabled
WCCP Redirect inbound is disabled
WCCP Redirect exclude is disabled

R1#
```

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

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

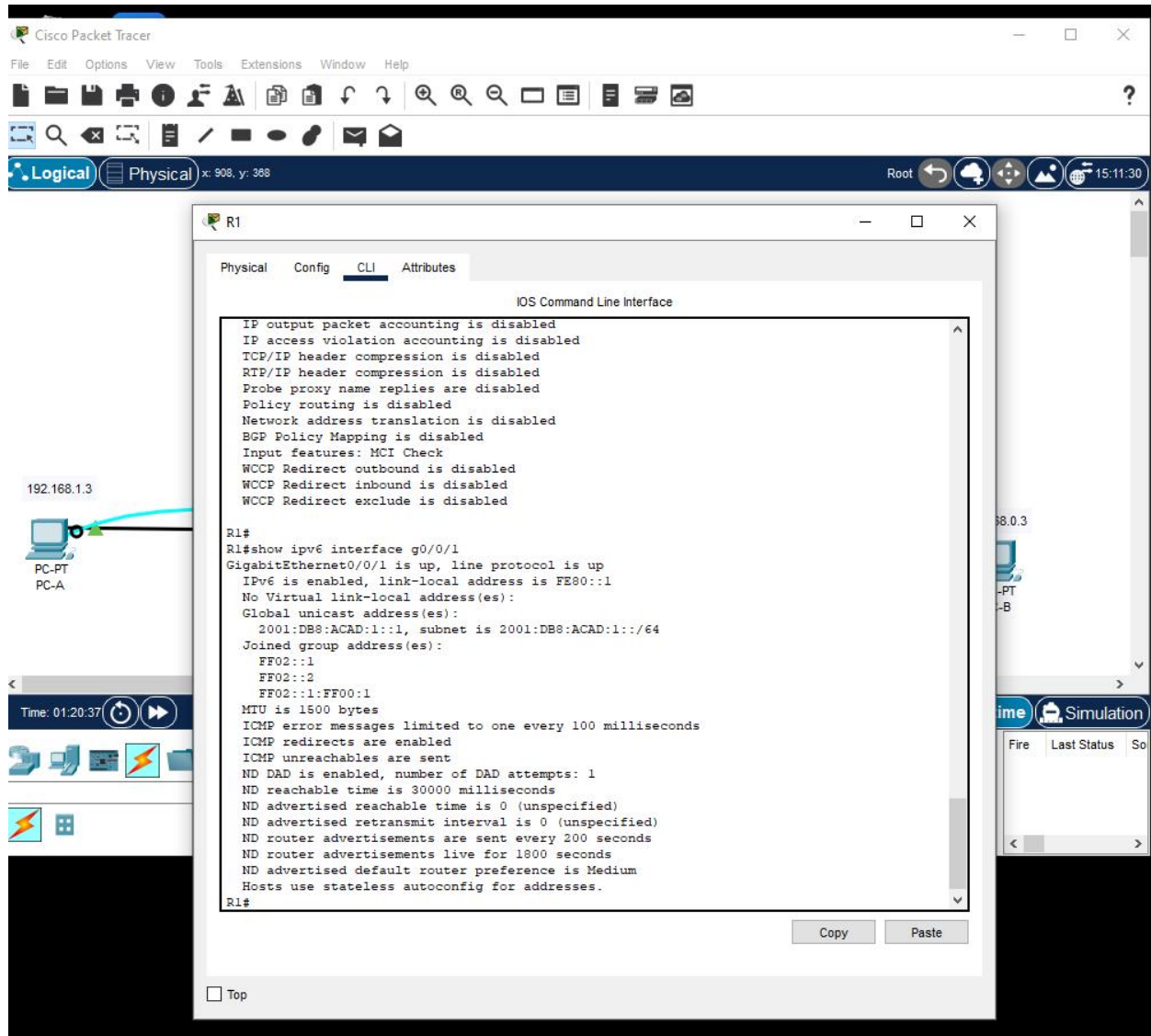
What is the Media Access Control (MAC) address of the G0/1 interface?

N/A

How is the Internet address displayed in this command?

Internet address is 192.168.1.1/24.

b. For the IPv6 information, enter the **show ipv6 interface**



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

Physical Config **CLI** Attributes

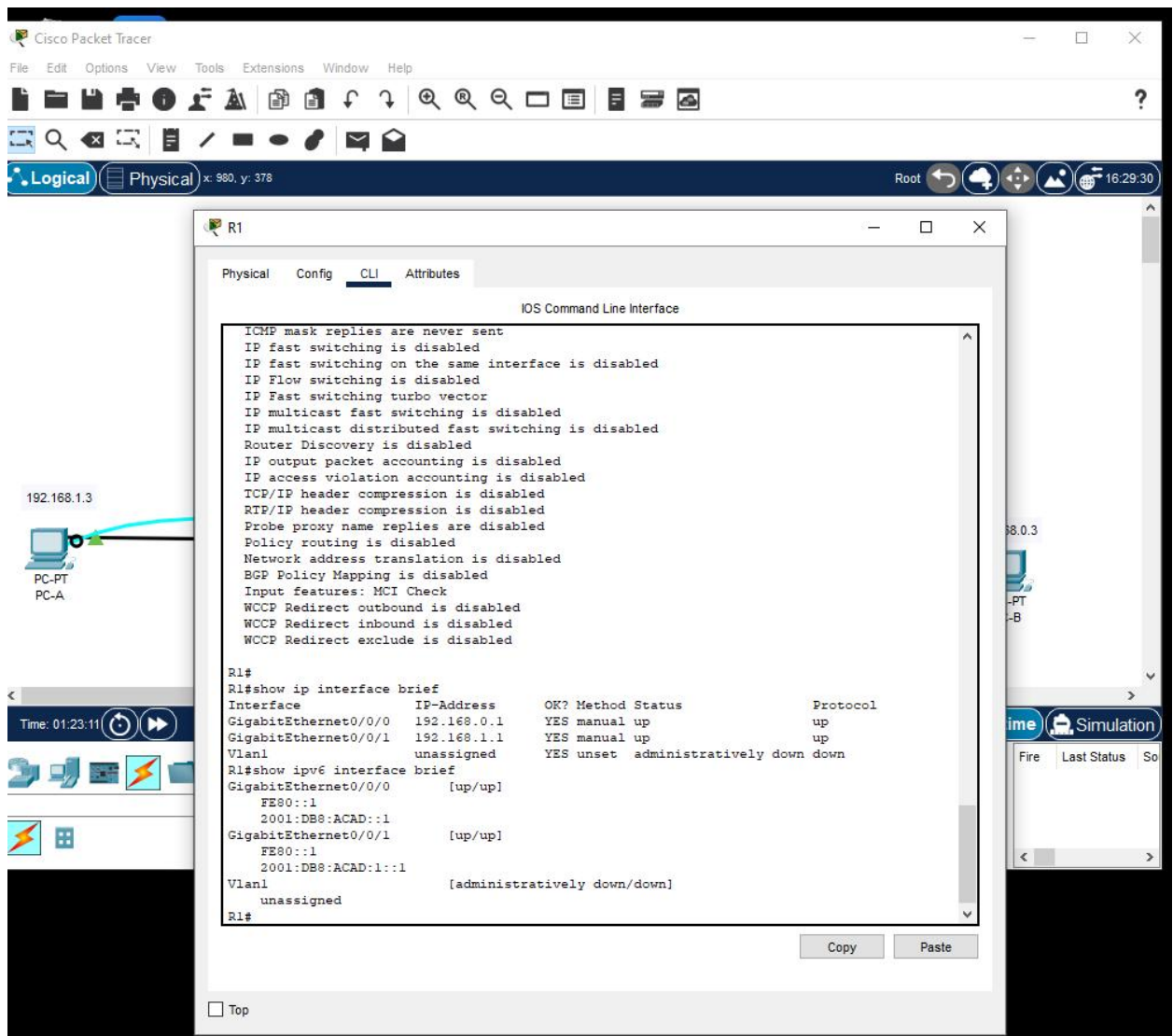
IOS Command Line Interface

```
Helper address is not set
Directed broadcast forwarding is disabled
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Proxy ARP is enabled
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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

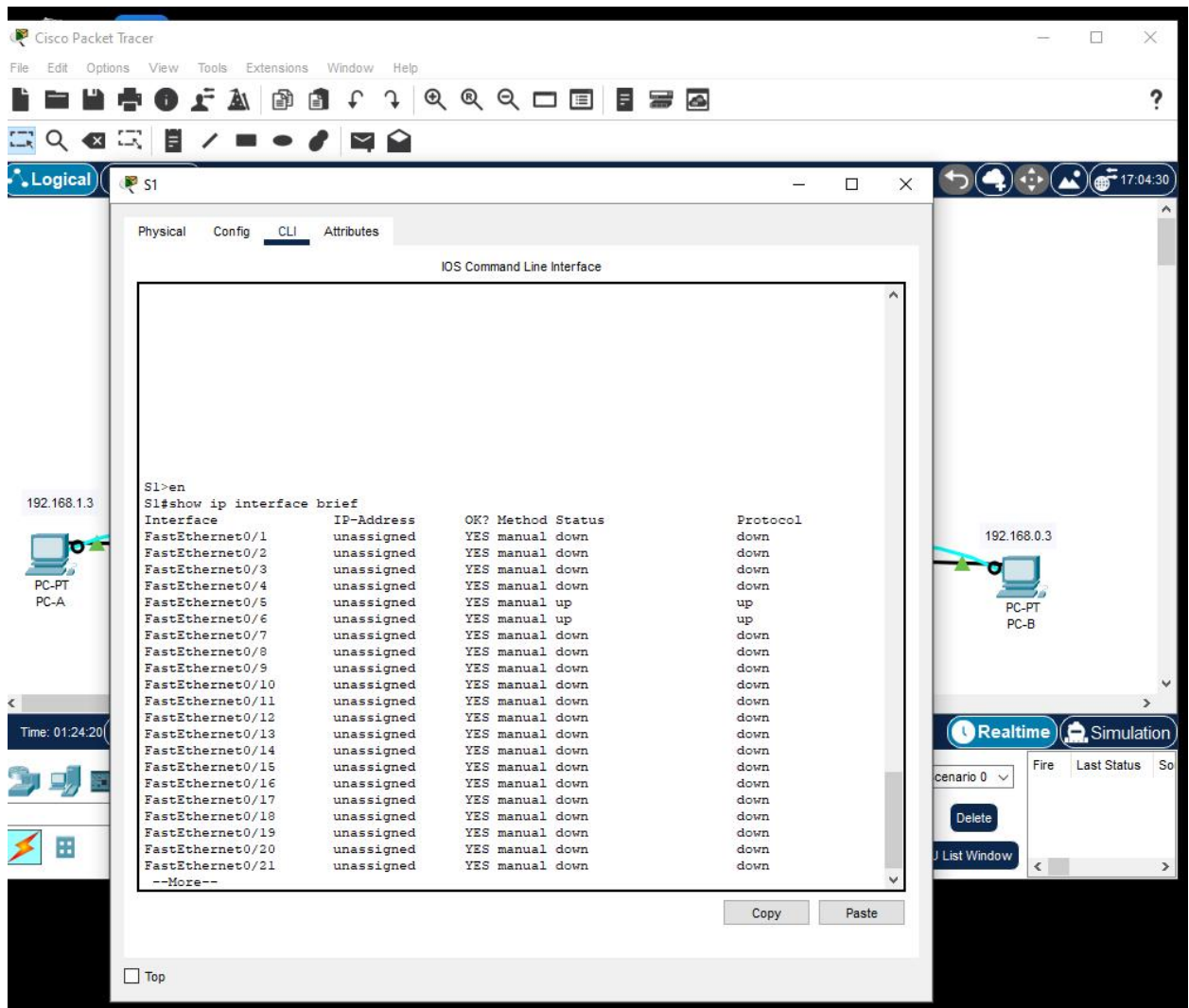
R1#
R1#show ip interface brief
Interface          IP-Address      OK? Method Status          Protocol
GigabitEthernet0/0/0 192.168.0.1    YES manual up              up
GigabitEthernet0/0/1 192.168.1.1    YES manual up              up
Vlan1              unassigned     YES unset  administratively down down
R1#
```

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- b. To see the IPv6 interface information, enter the **show ipv6 interface brief** command on R1.



- b. Enter the **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-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?

PC-A would not be able to ping PC-B. This is because PC-B is on a different network than PC-A which requires the default gateway router to route these packets. PC-A is configured to use the IP address 192.168.1.1 for the default gateway router, but this address is not assigned to any device on the LAN. Any packets that need to be sent to the default gateway for routing will never reach their destination.

CONCLUSION

In this lab, I learned how to cable the equipment, and how to configure the devices to match the addressing table. After the configurations had been saved, I was able to verify my configuration by testing for network connectivity.

Most of the concepts were new to me, which brought me a challenge but with the help of research I was able to overcome these and learn from them.