Course: Cloud and Network Security-C1-2026

Cyber Shujaa Program

Week 2: Examining Network Layers 1, 2 & 3

Assignment 1: Packet Tracer- build a Switch and Router Network

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Introduction

This assignment was carried out to help me understand basic networking concepts using Cisco Packet Tracer. Though this exercise, I learned how switches and routers work together to allow communication between devices in a network.

I build a simple network consisting of a switch, a router and the end devices the configured IP addresses and tested connectivity to ensure the network was working properly. This assignment helped me apply theory into practical networking skills

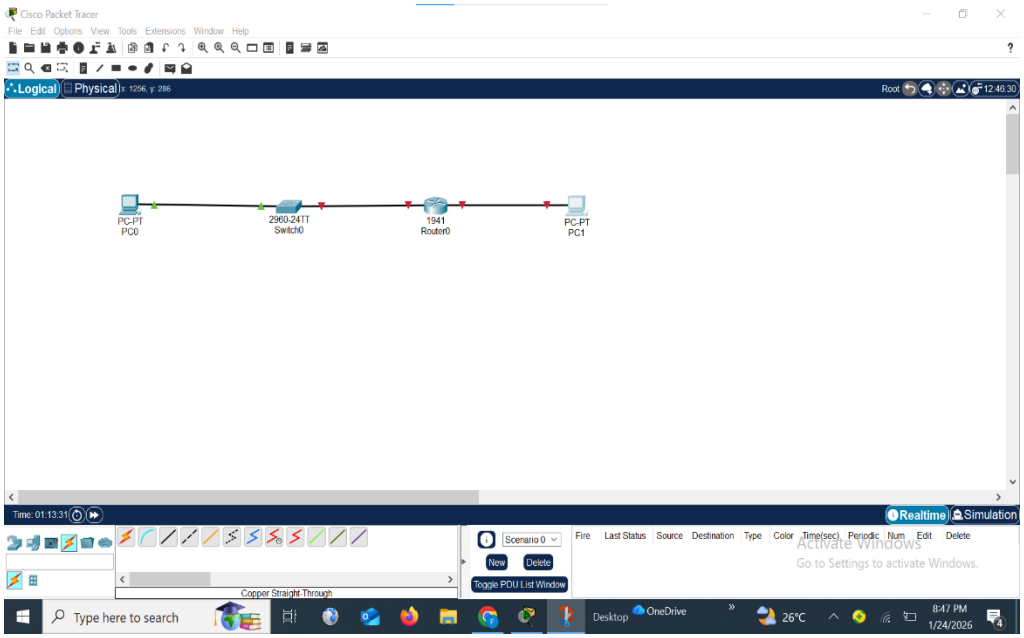
Objectives

The objectives of the assignment were:

1. To understand the functions of switches and routers in a network
2. To create a basic network topology
3. To configure IP addressing on network devices
4. To test and verify network connectivity

Lab – Build a Switch and Router Network

Topology



Here I verified the SDM using dual-ipv4-and-ipv6

S1# show sdm prefer

I used the command to assign the dual-ipv4-and-ipv6 template

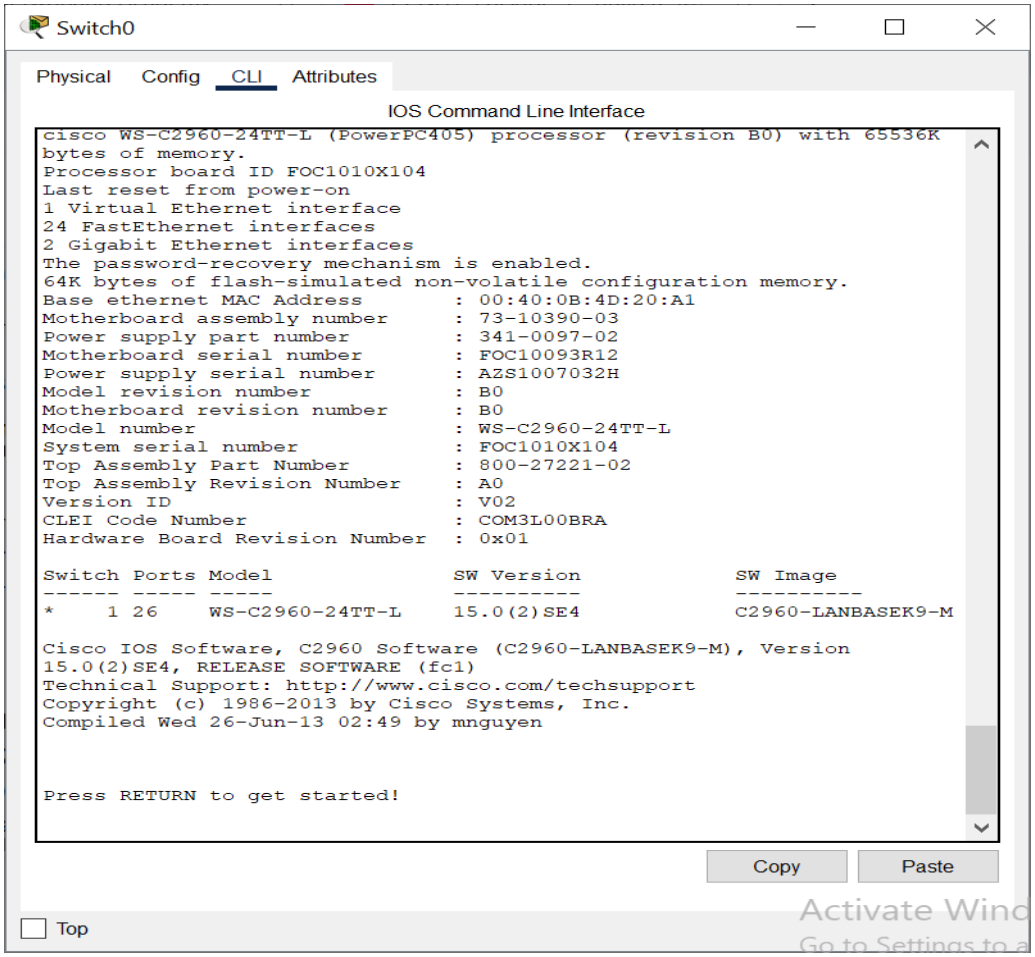
Default SDM template. S1# config terminal

S1 (config) # sdm prefer dual-ipv4-and-ipv6 default

S1 (config) # end

S1# reload

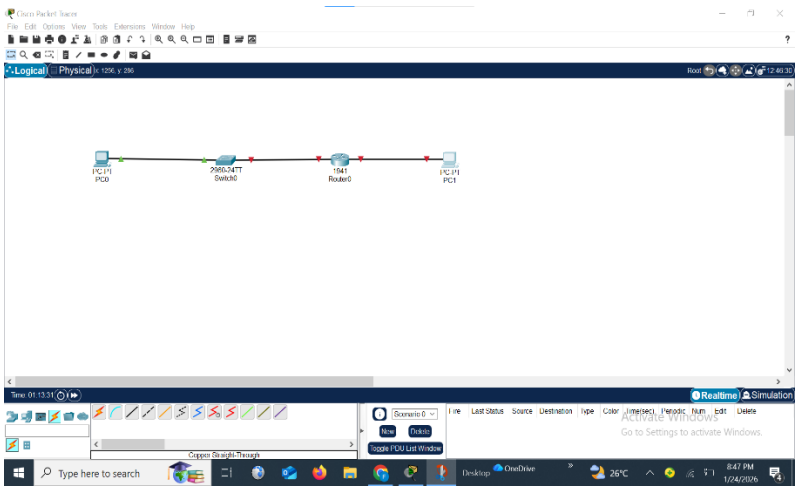
It is as shown below



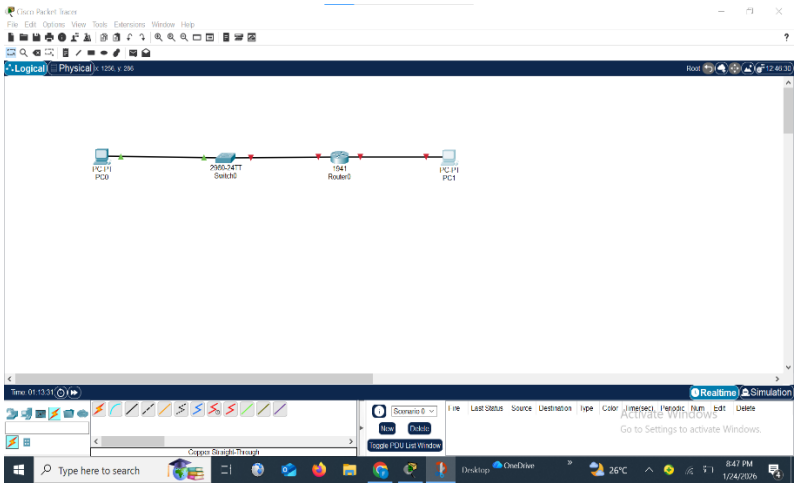
Part 1: Set up Topology and Initialize Devices

Step1: Cable the network as shown in the topology

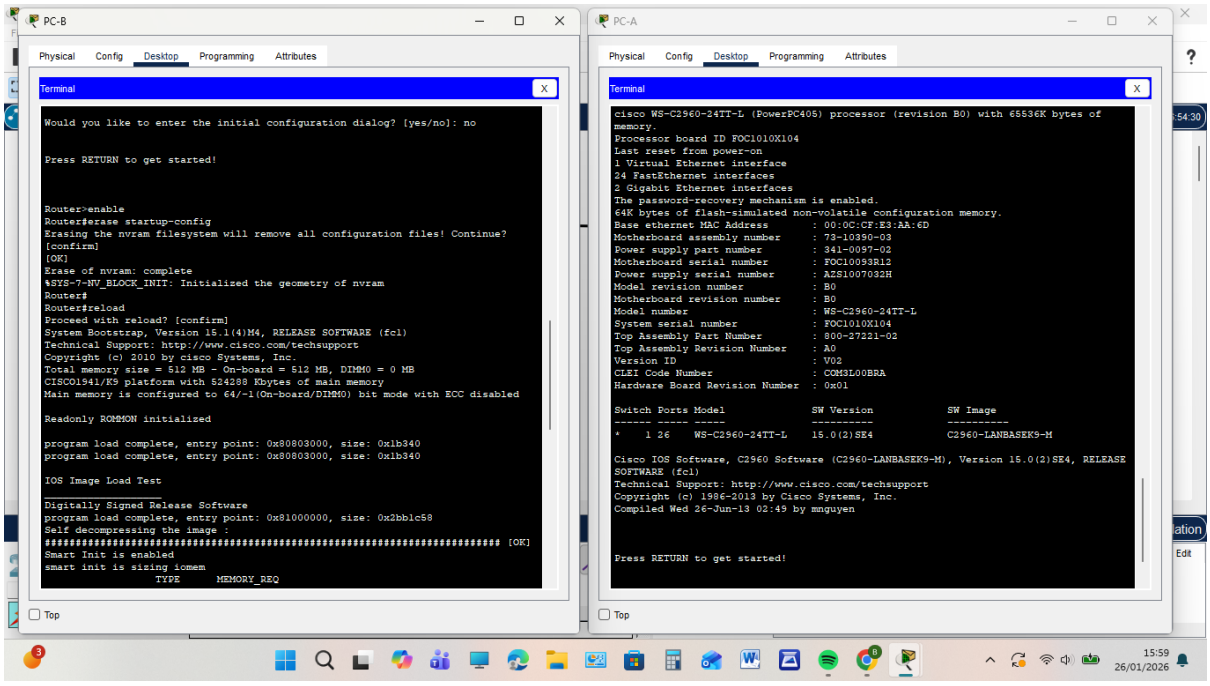
(a) This is the devices shown in the topology diagram with the cable



(b) After powering all the devices in the topology this is how the results I get



Step 2: Initialize and reload the router & switch

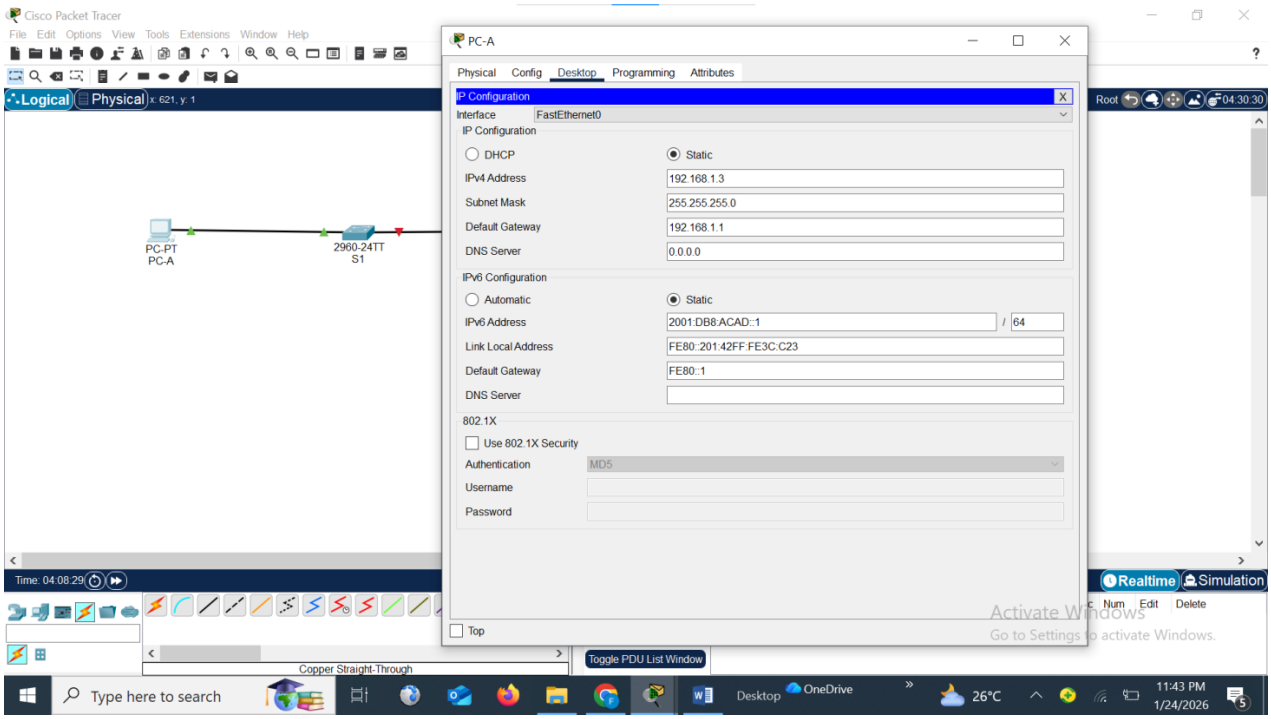


- Technically these are the pulling of the technical box brand new so it doesn't matter if this was to be done in the lab environment while changing the configurations , then when the reload take place the final results would be that switch and router is blank with no static configuration

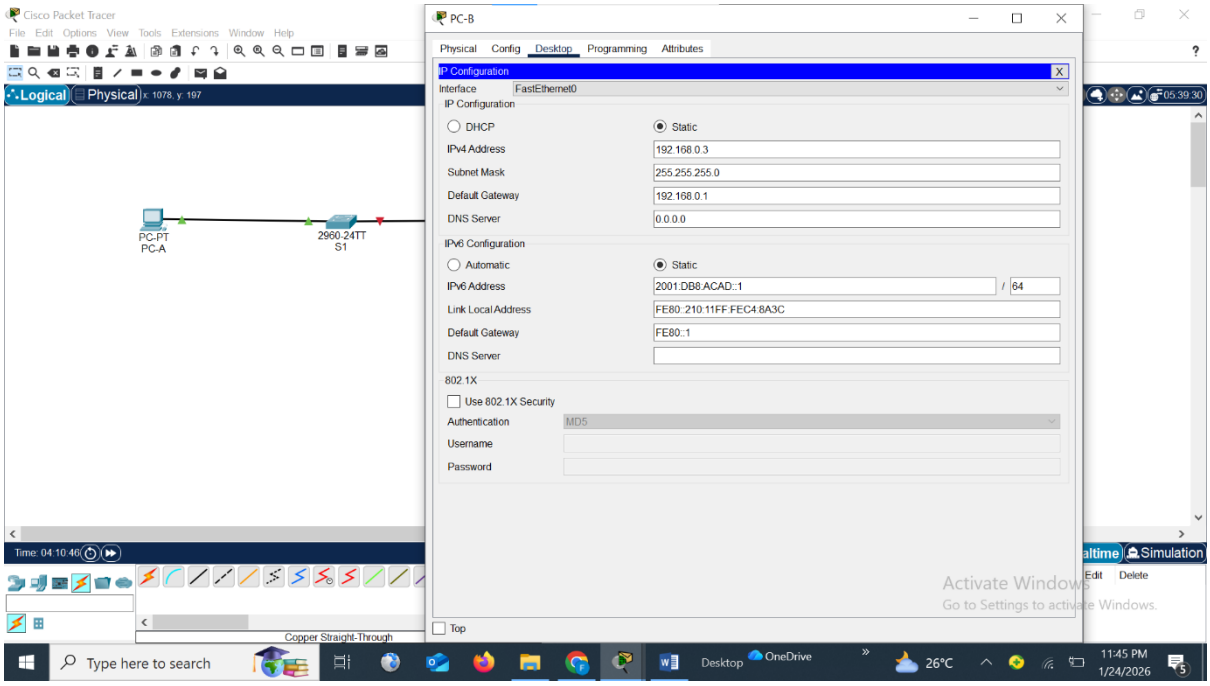
Part 2: Configure Devices and verify Connectivity

Step1: Assign static IP information to the PC interfaces

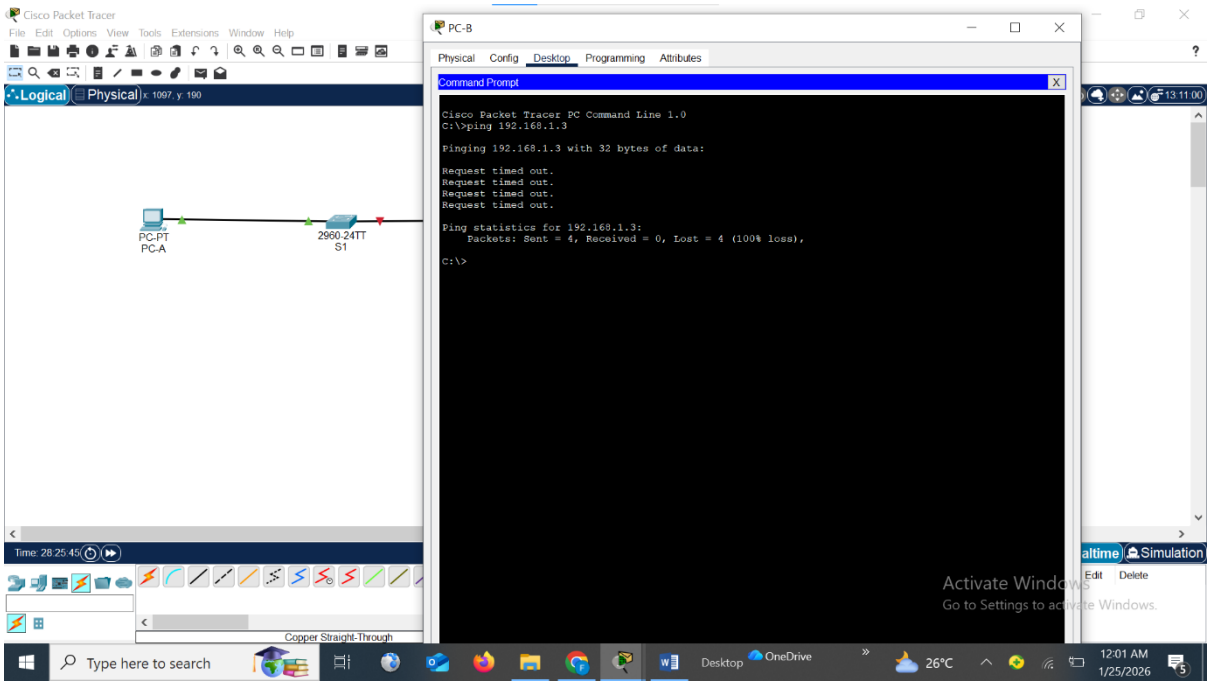
(a) I configured the IP address, subnet mask and the default gateway setting on PC-A as shown below



(b) I configured the IP address, subnet mask and the default gateway setting on PC-B as shown below



(c) I ping PC-B from a command prompt window on PC-A, the results were as follow



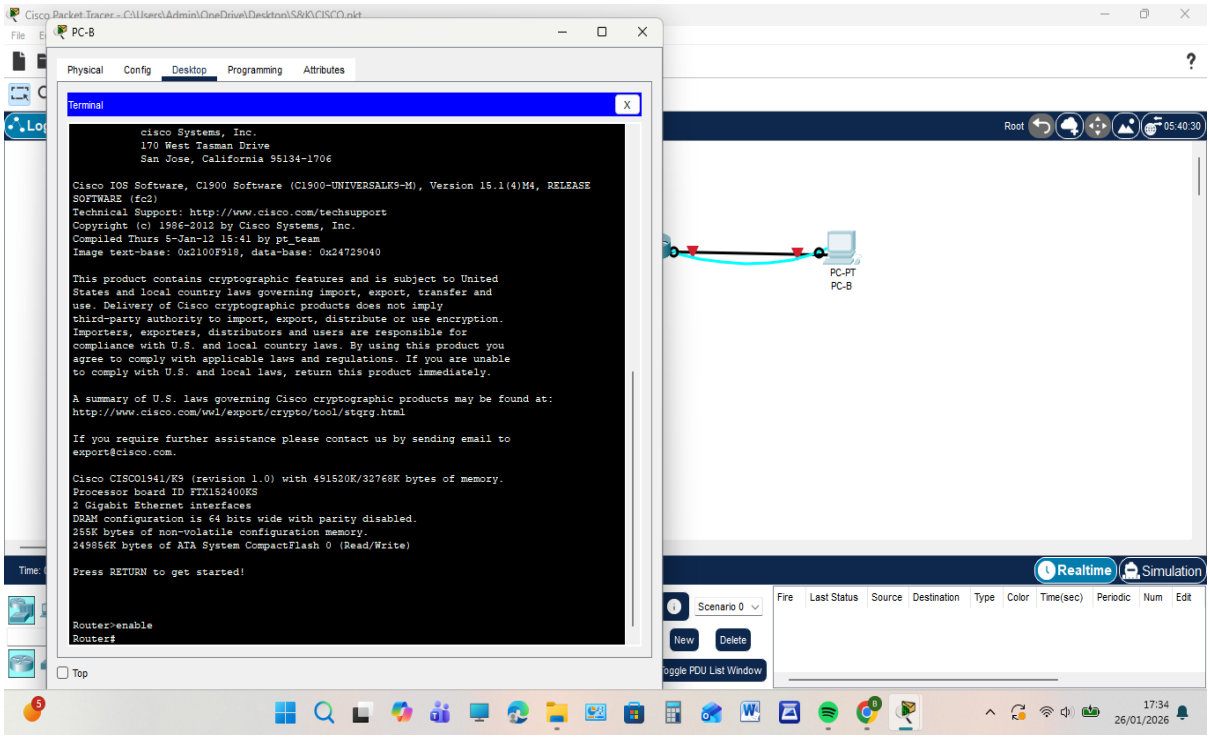
- The ping was not successful therefore I turned off the window firewall

- The ping was not successful because the Router interfaces the gateway has not been integrated so the layer 3 traffic has not been granted to the subnet

Step 2: configure the router

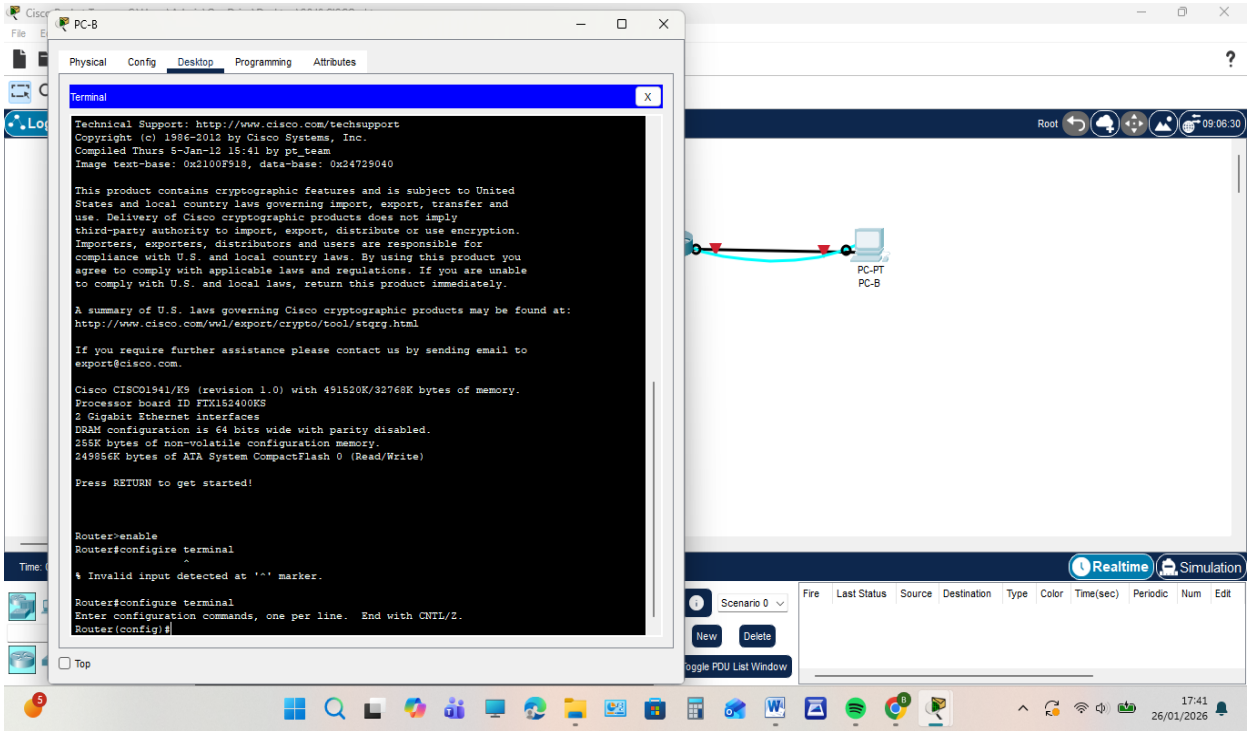
(a) The router was console and enabled privileged EXEC mode

Router> enable



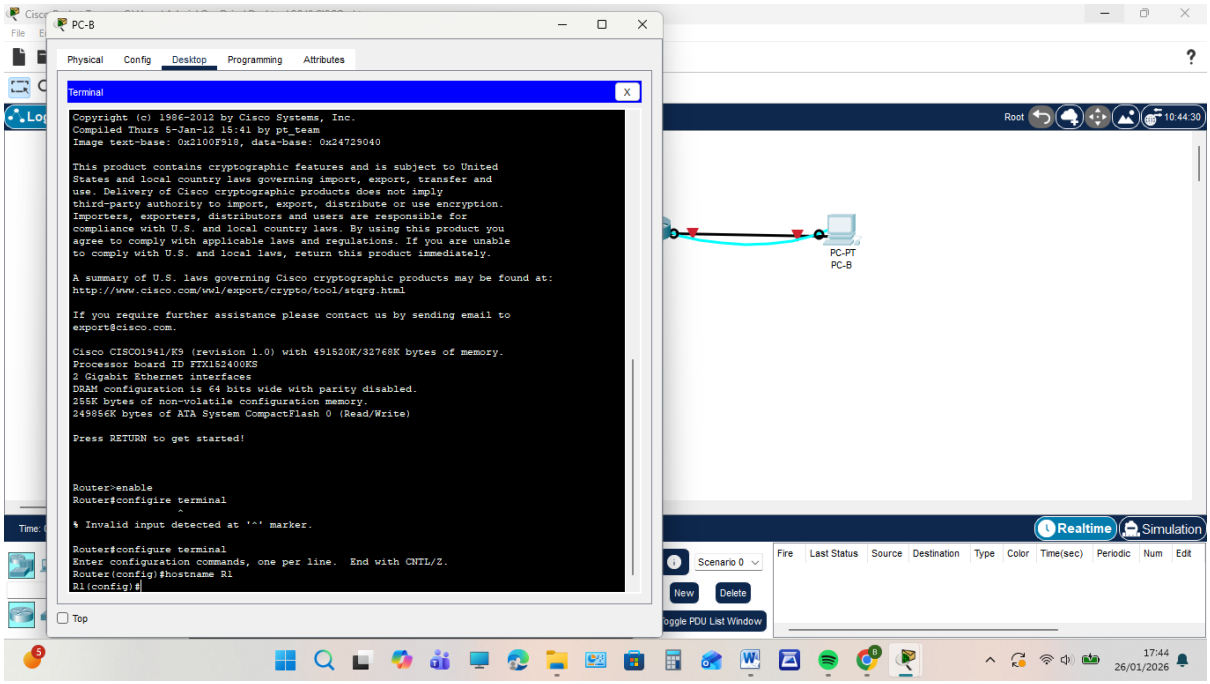
(b) The configuration mode was entered

Router# configure terminal

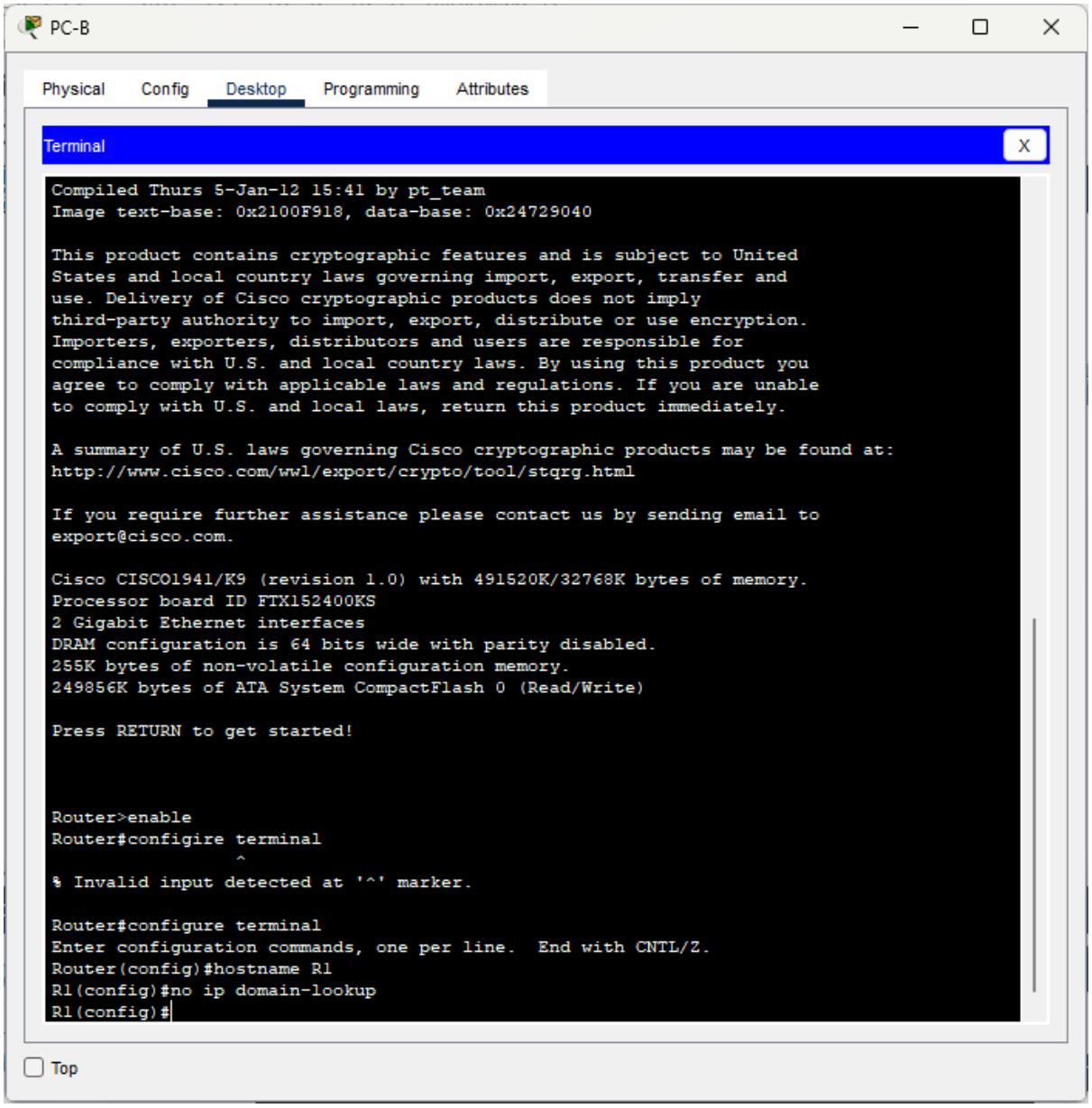


(c) The router was assigned a device name

Router (config) # hostname R1

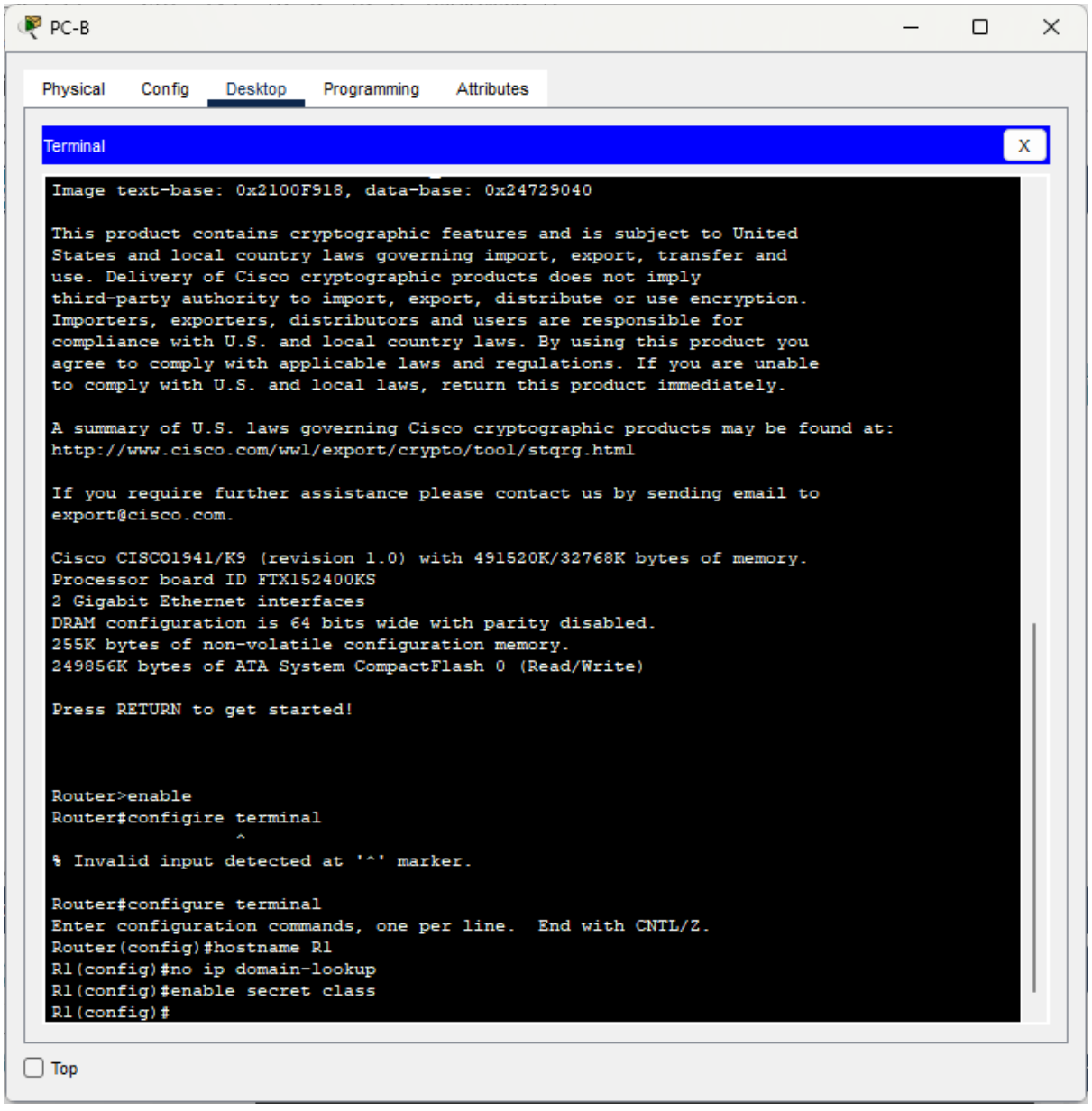


(d) R1 (config) # no IP domain lookup



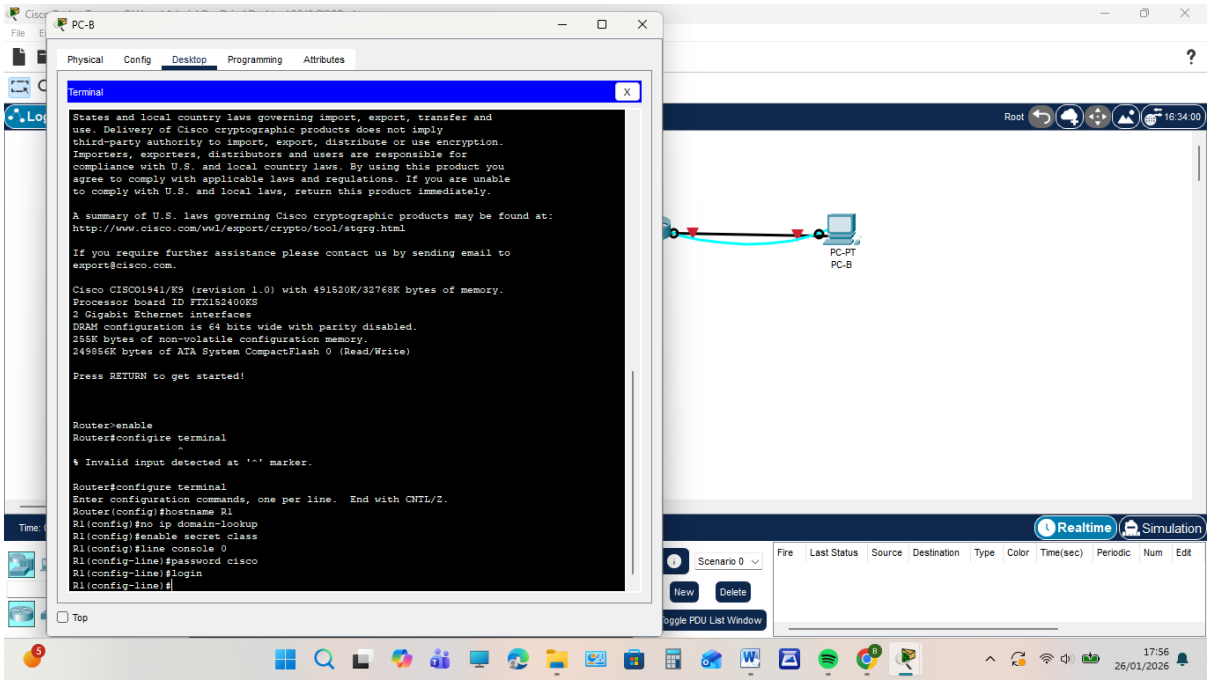
(e) Assign class as the privileged EXEC encrypted password

R1 (config) # enable secret class

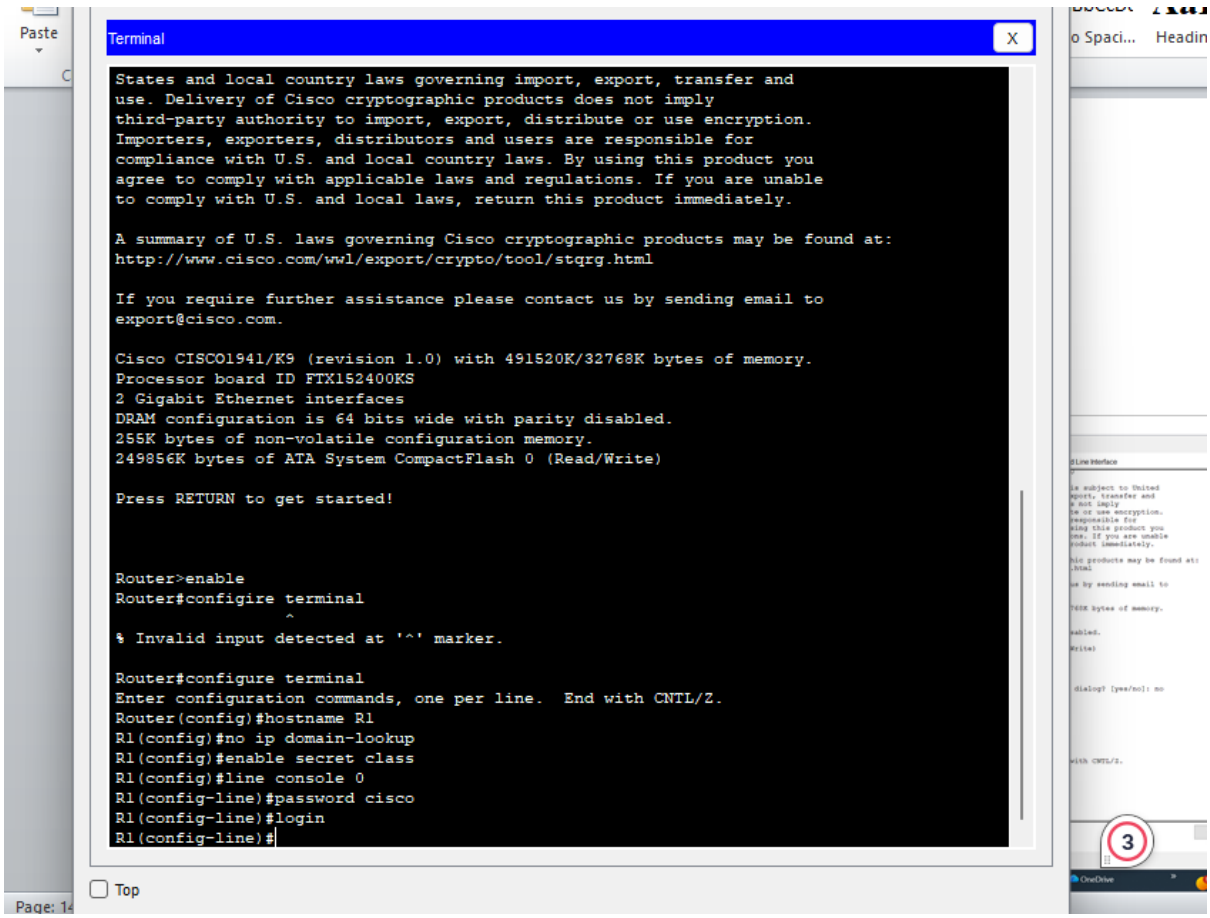


(f) Assign cisco as the console password and enable login

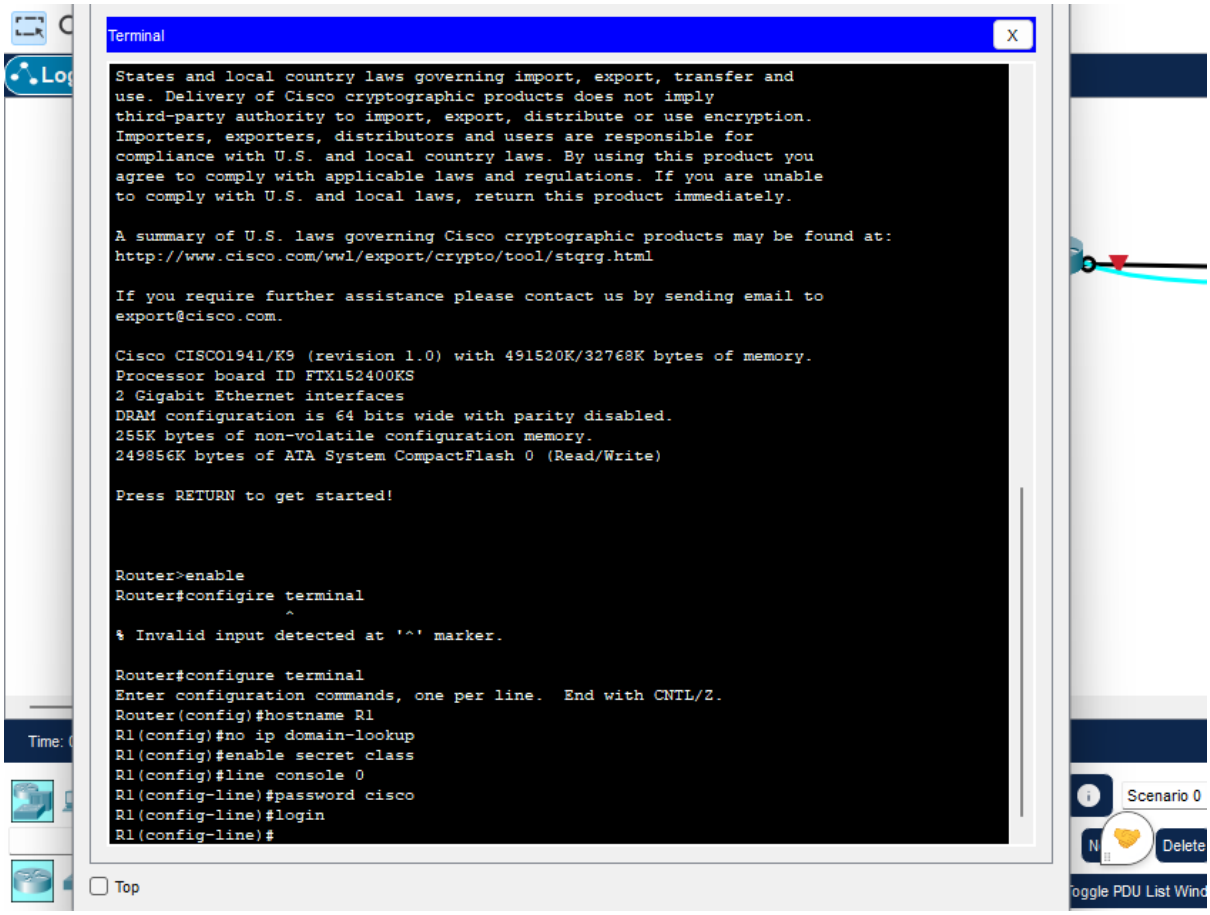
R1 (config) # line console 0



R2 (config-line) # password cisco

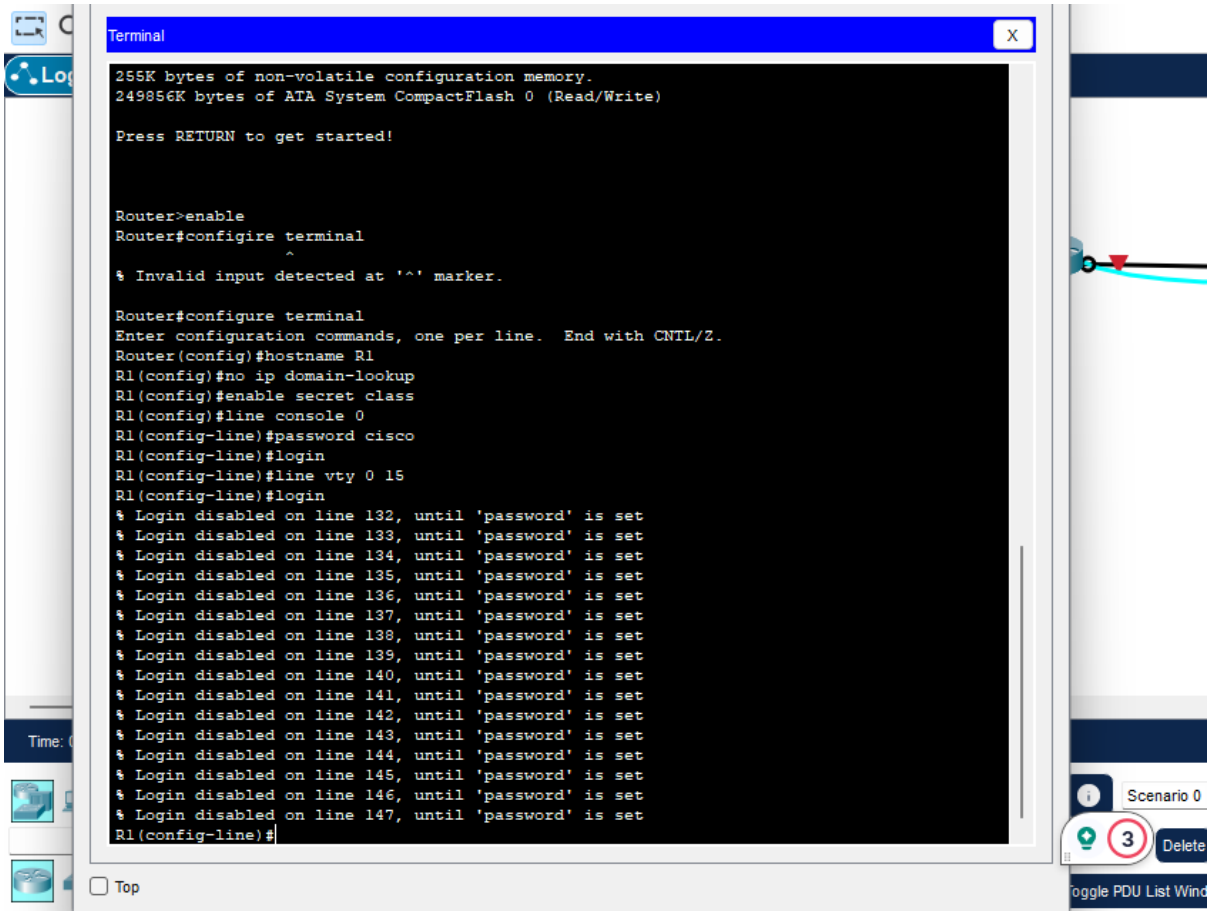


R1 (config-line) # login

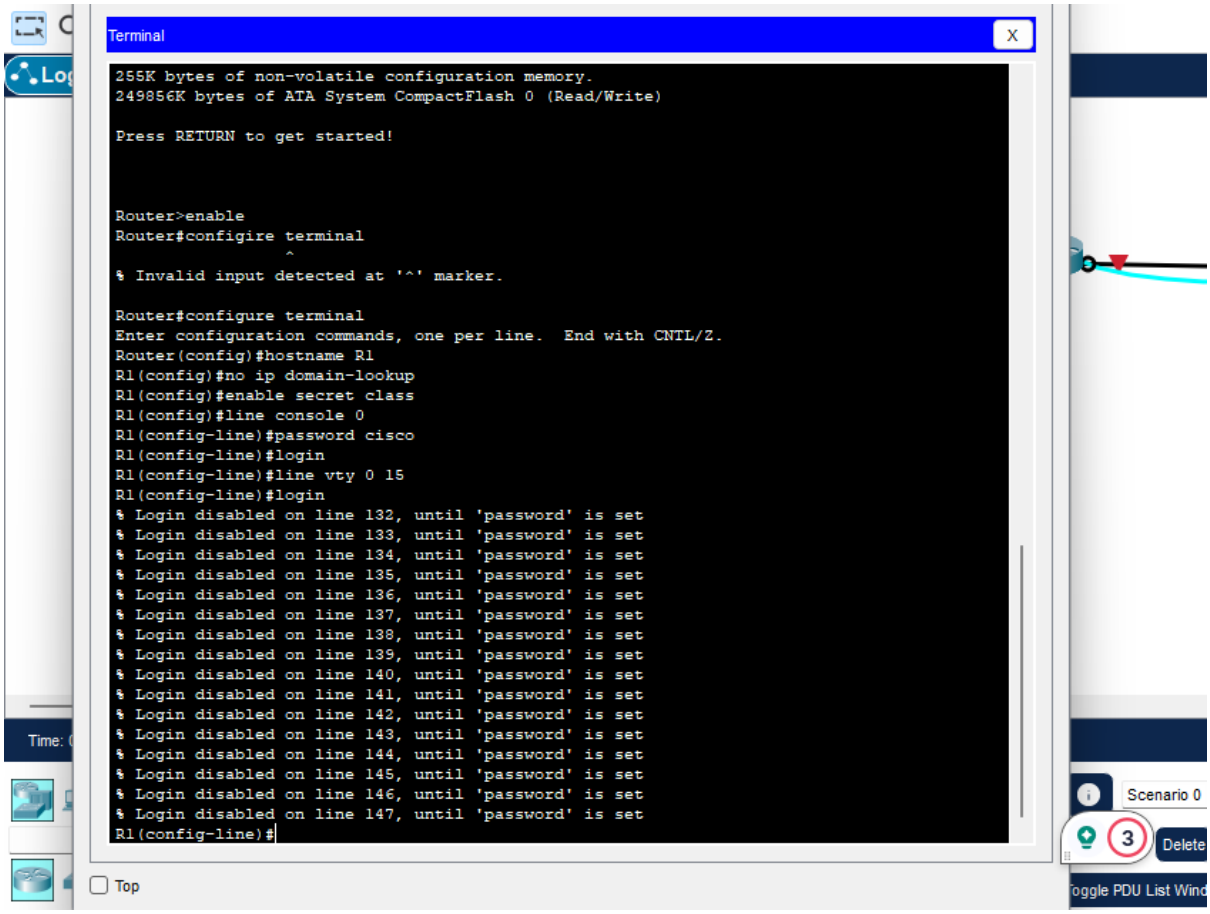


(g) Assign cisco as the VTY password & enable login

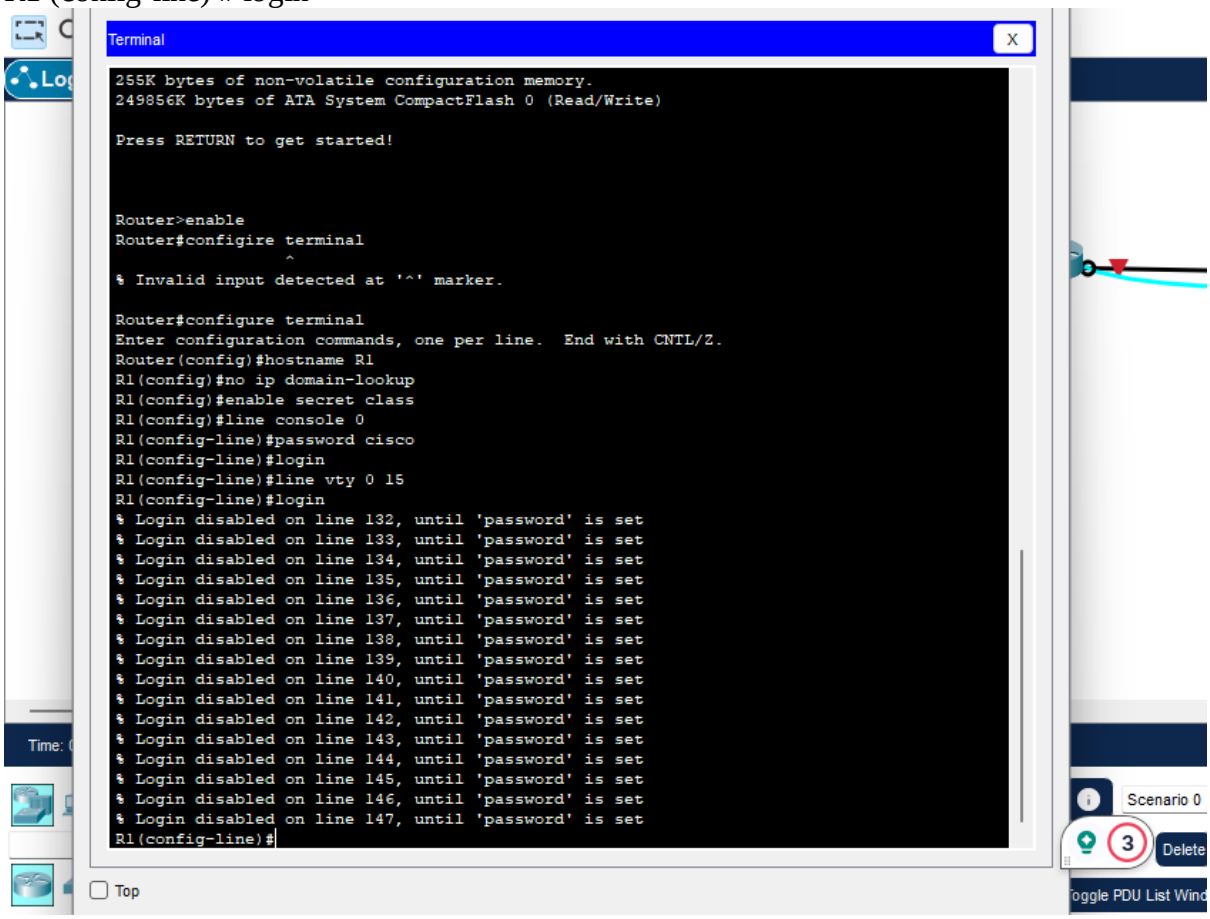
R1 (config) # line vty 0 4



R1 (config-line) # password cisco

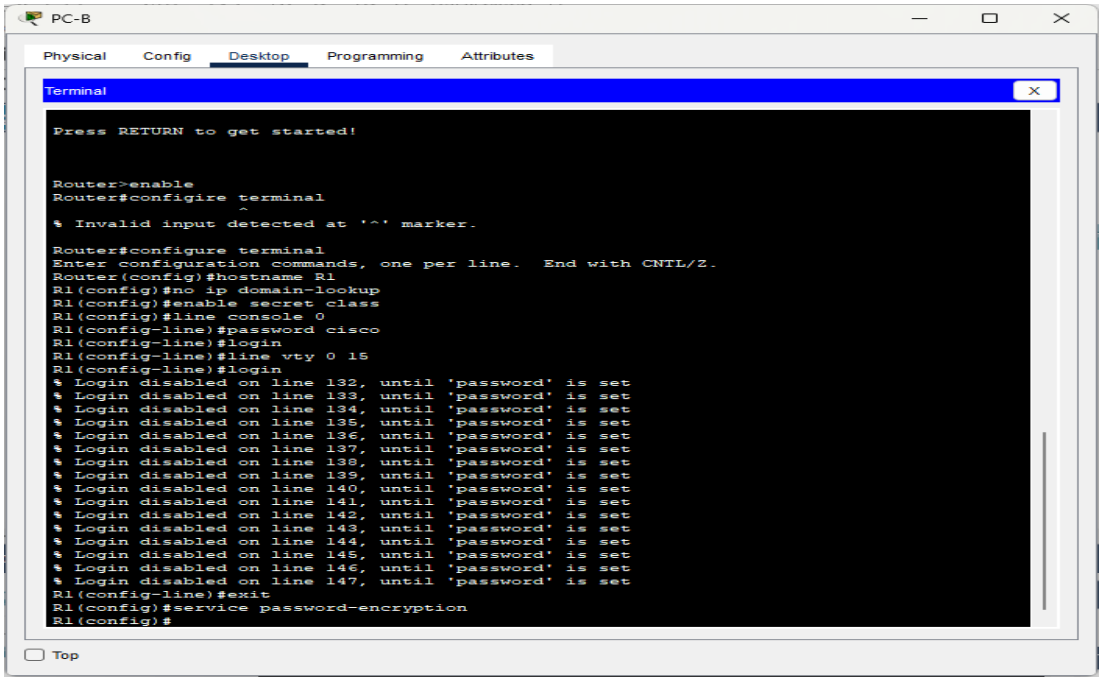


R1 (config-line) # login



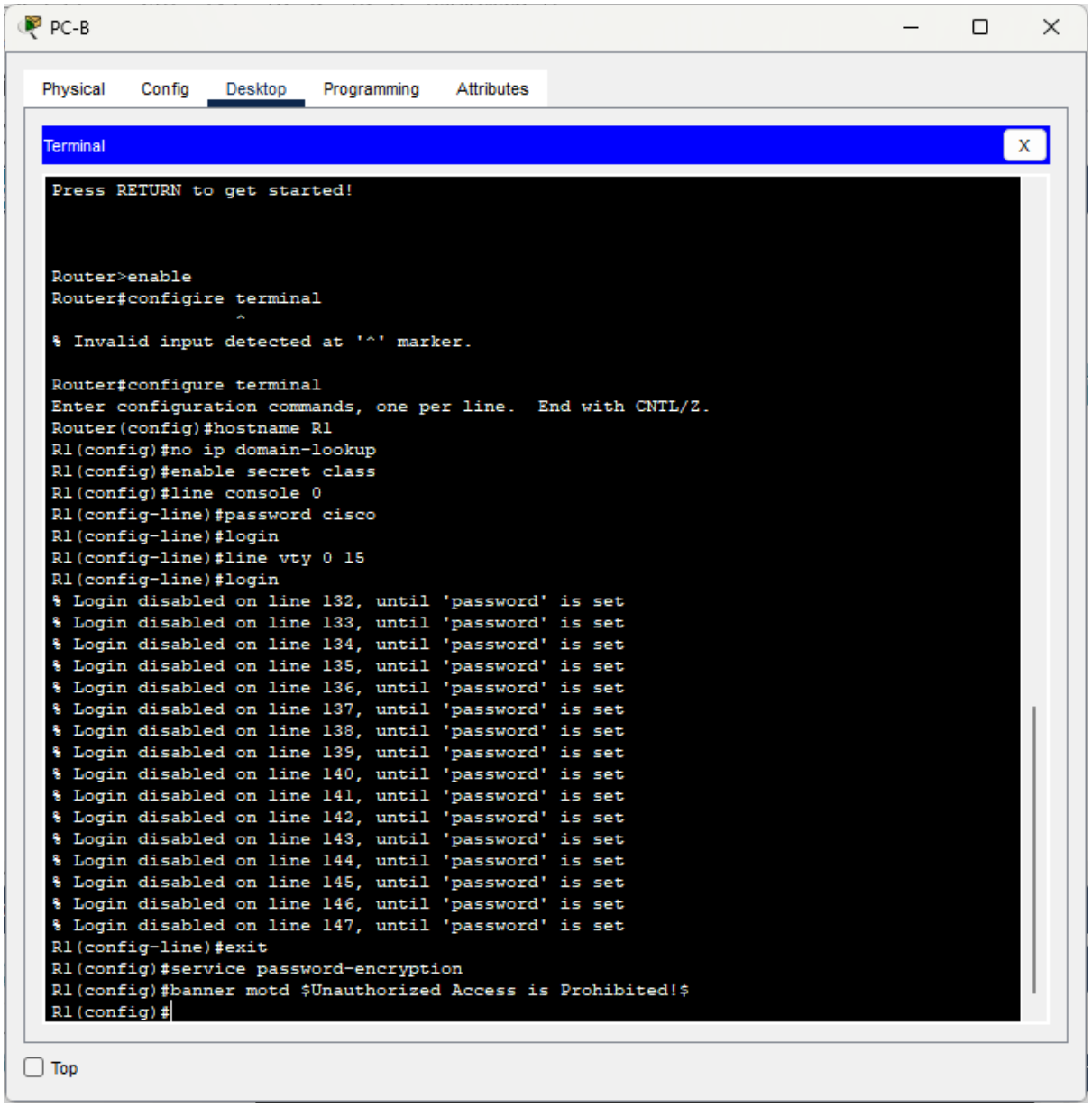
(h) Encrypt the plaintext passwords

R1 (config) # service password-encryption



(i) Create a banner that warns anyone accessing the device that unauthorized access is prohibited

R1 (config) # banner motd $Authorized Users Only! $



(j) Configure & activate both interfaces on the router

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

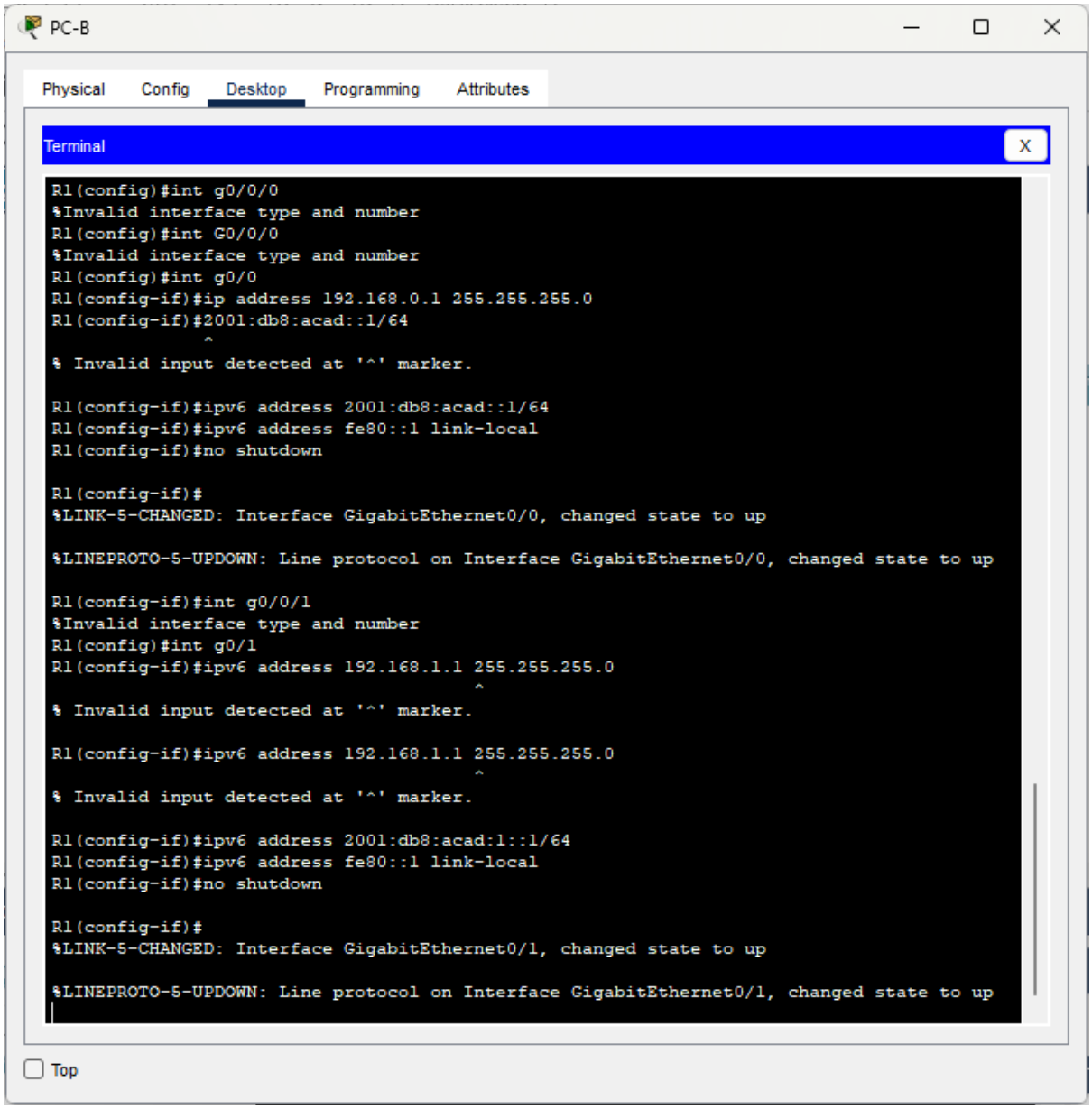
R1 (config-if) # exit

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



Lab –Build a Switch and Router Network

R1 (config-if) # no shutdown

R1 (Config-if) # exit

(k) R1 (config) # interface g0/0/1

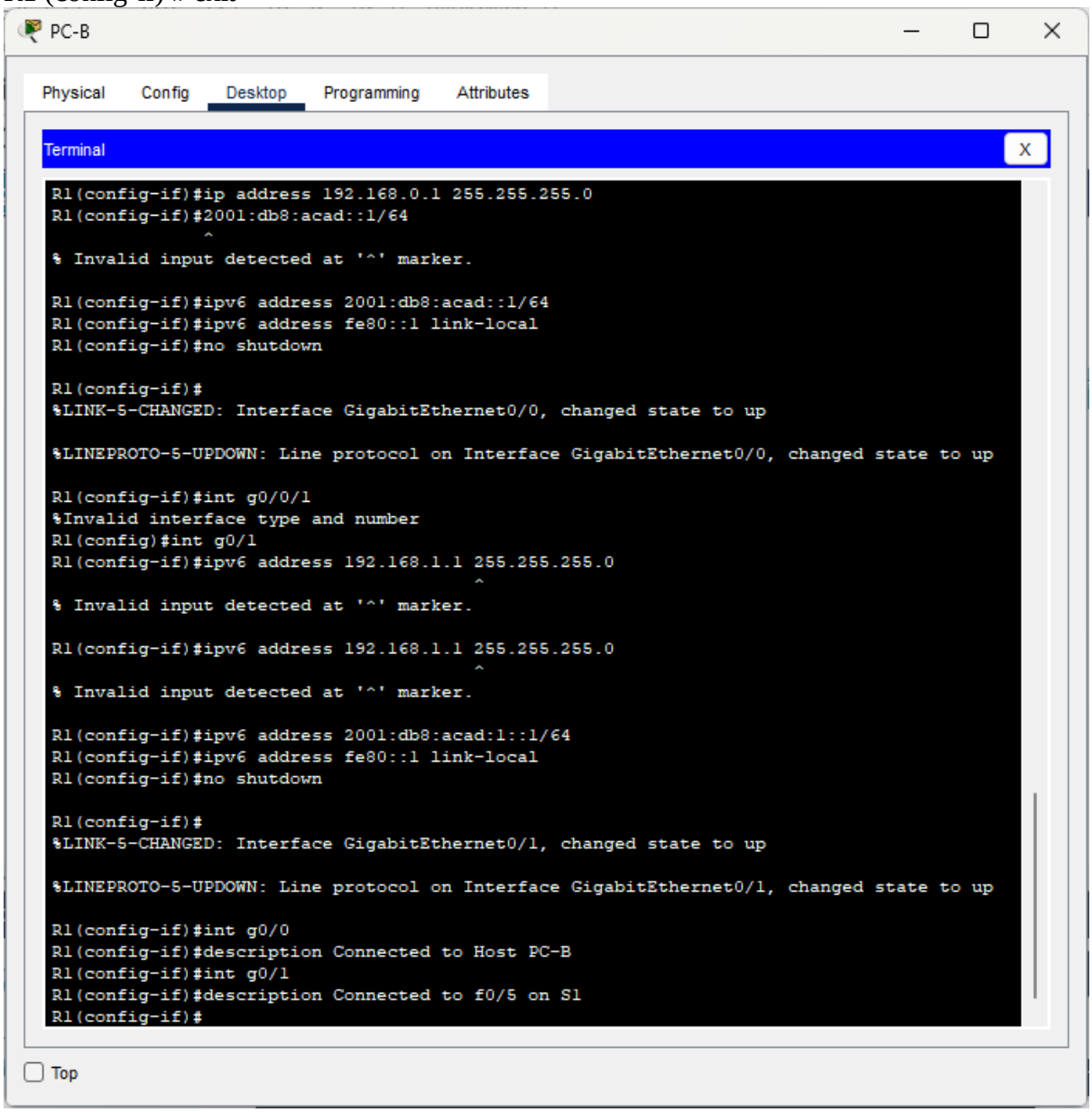
R1 (config-if) description Connected to F0/5 on S1

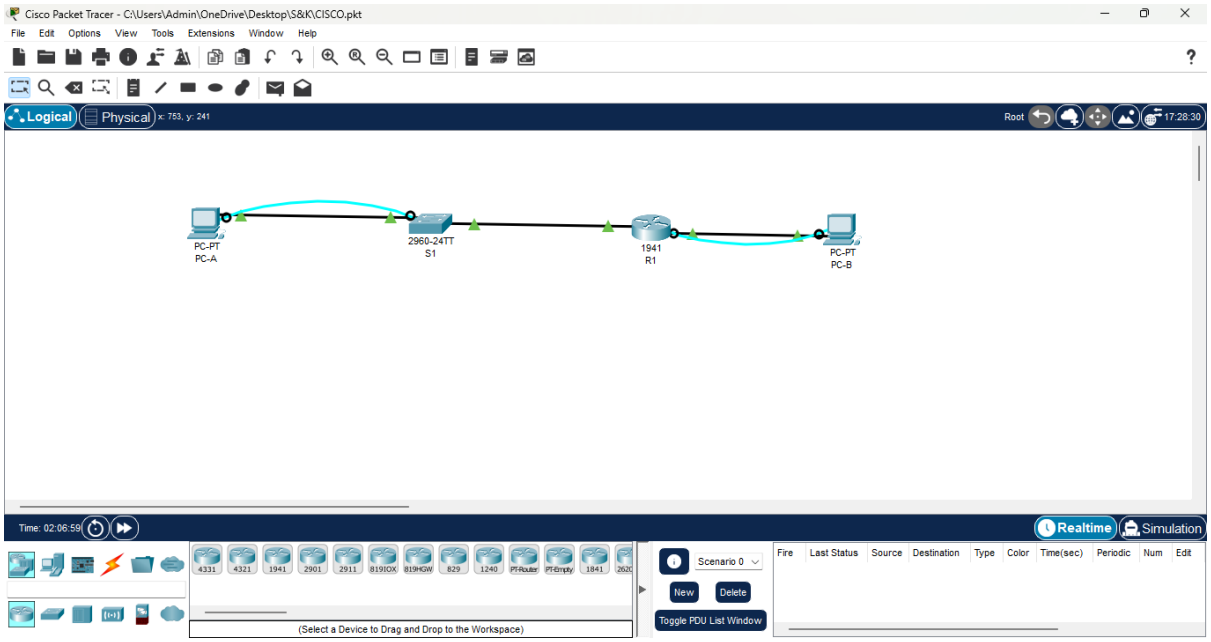
R1 (config-if) # exit

R1 (config) # interface g0/0/0

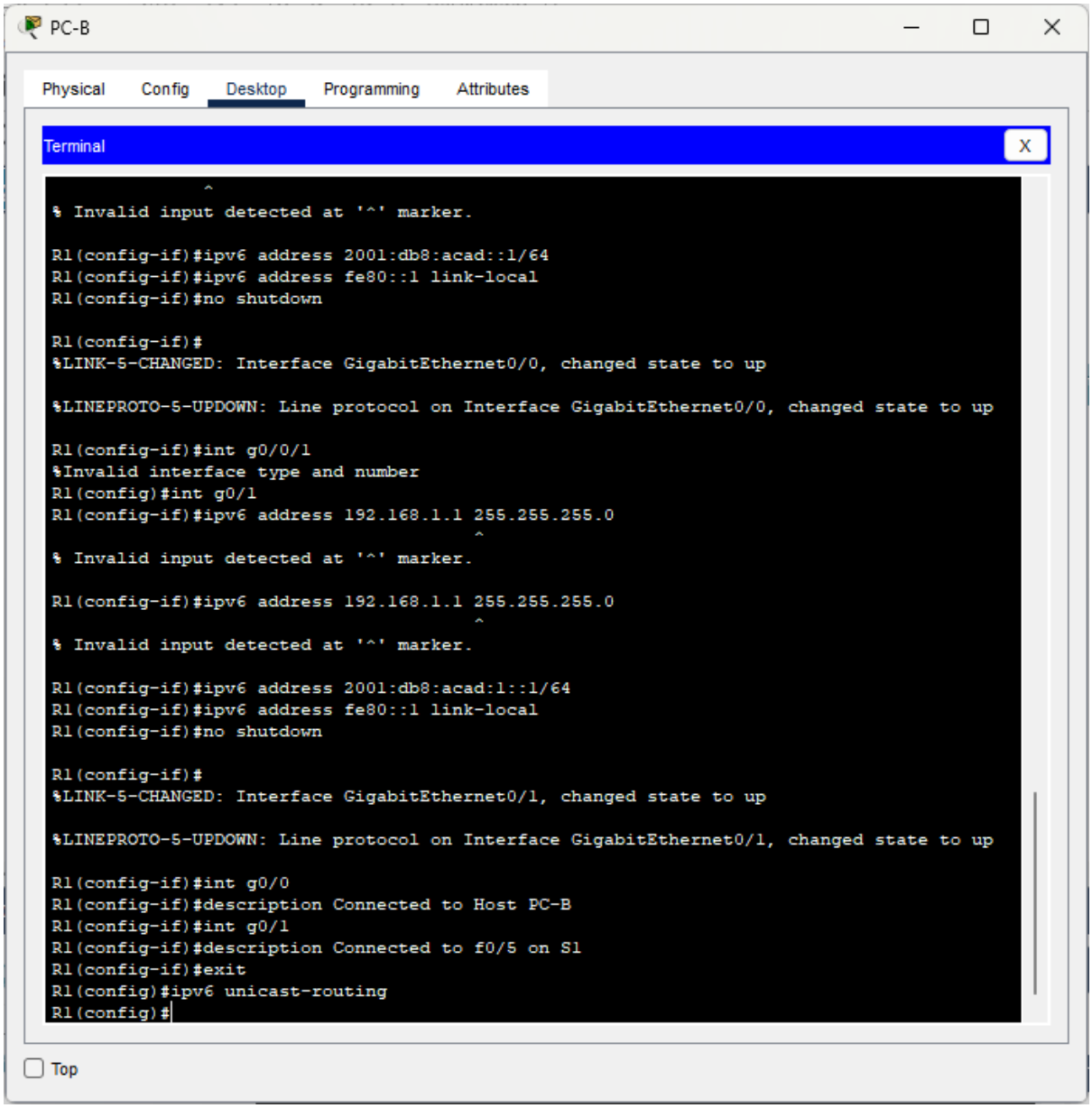
R1 (config-if) # description Connected to the Host PC-B

R1 (config-if) # exit



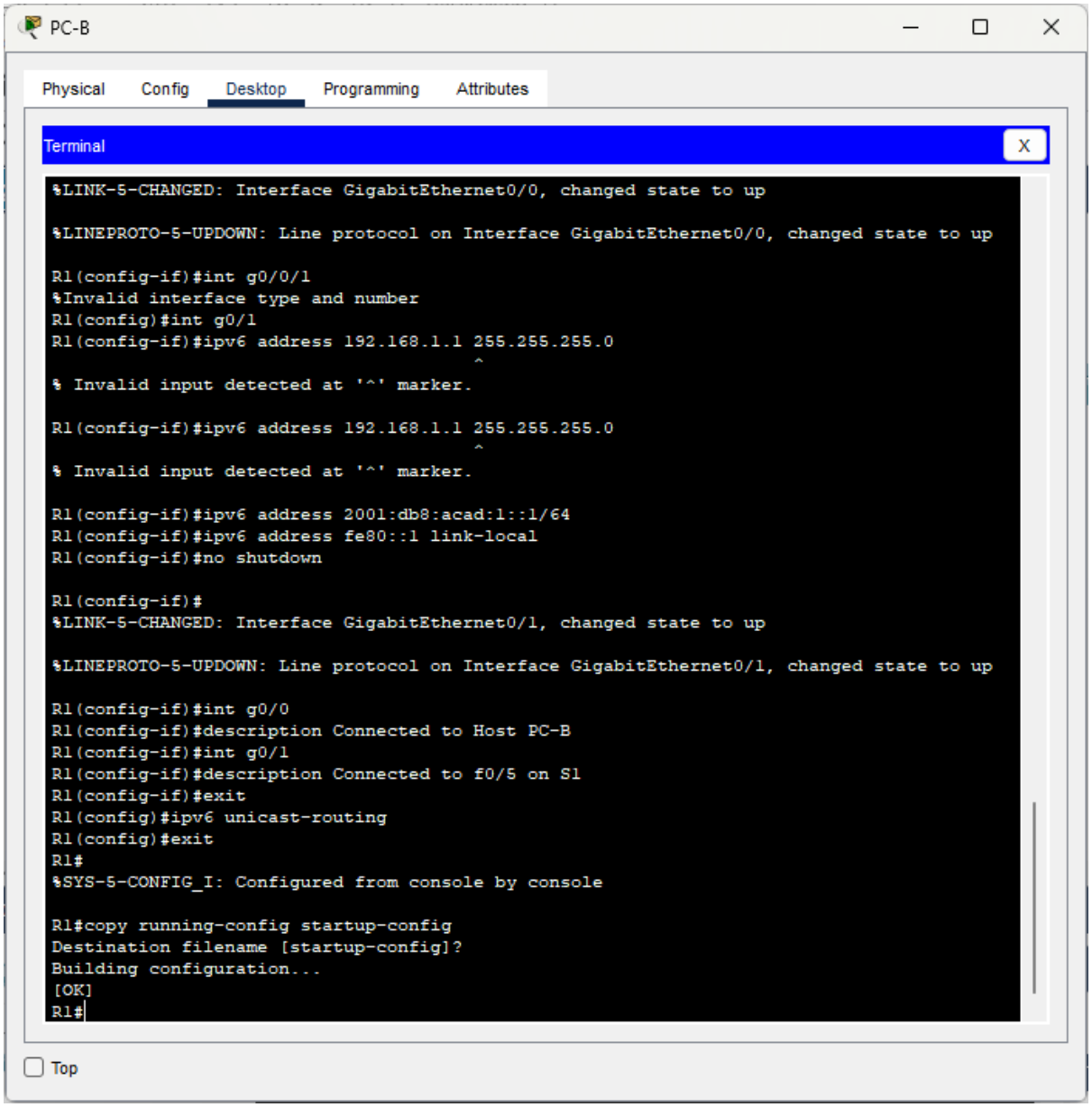

Cisco Packet Tracer - C:\Users\Admin\OneDrive\Desktop\S&K\CISCO.pkt
File Edit Options View Tools Extensions Window Help
Logical
Physical
x: 753, y: 241
Root
17:28:30
PC-PT
PC-A
2960-24TT
S1
1941
R1
PC-PT
PC-B
Time: 02:06:59
Realtime
Simulation
4331
4321
1941
2901
2911
819IOX
819HGW
829
1240
PT-Router
PT-Empty
1841
Scenario 0
New
Delete
Toggle PDU List Window
Fire
Last Status
Source
Destination
Type
Color
Time(sec)
Periodic
Num
Edit
(Select a Device to Drag and Drop to the Workspace)

(l) R1 (config) # ipv6 unicast-routing

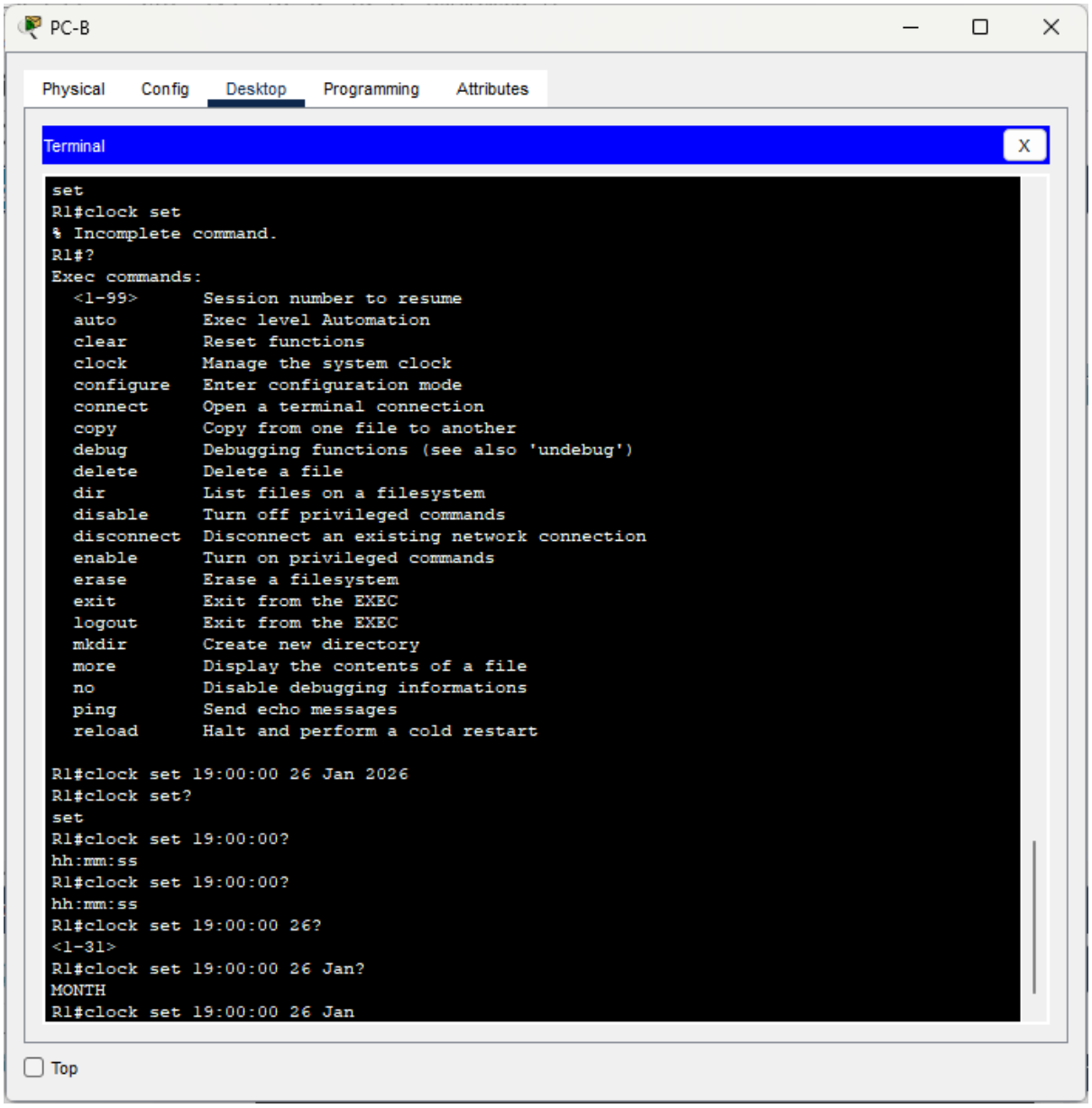


(m) R1 (config) # exit

R1# copy running-config startup-config



(n) R1# clock set where I set the clock



(o) Ping PC-B from CMD window on PC-A

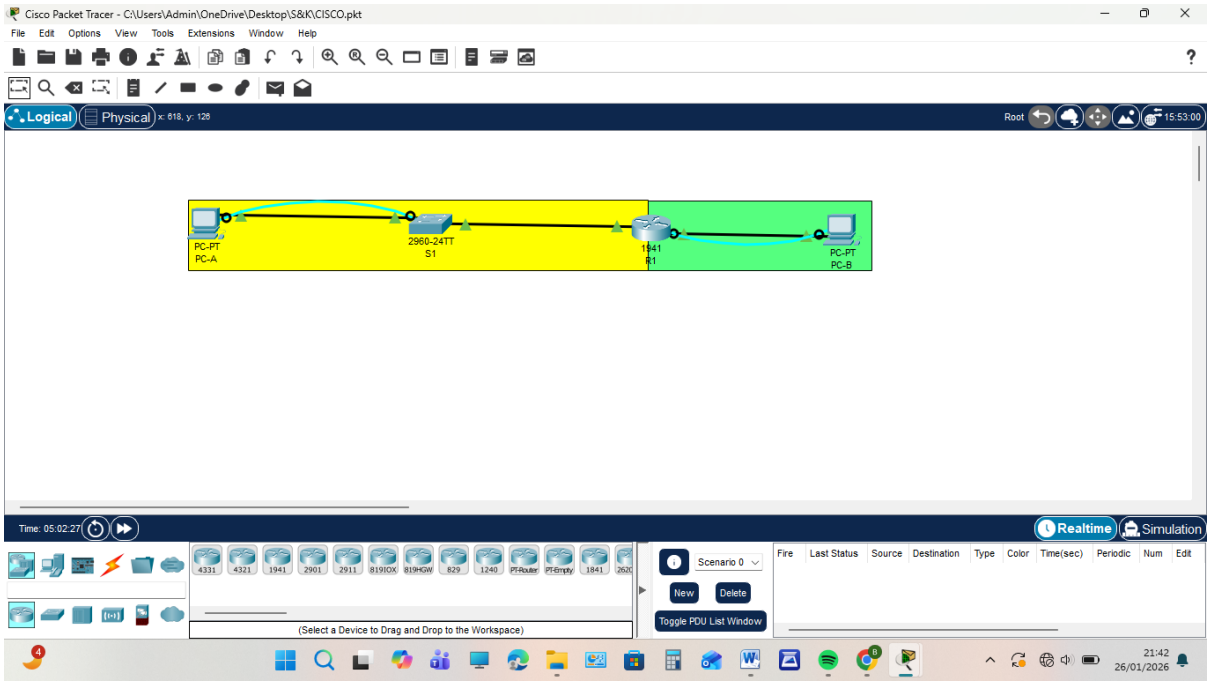
```
C:\>ping 192.168.1.3

Pinging 192.168.1.3 with 32 bytes of data:

Reply from 192.168.1.3: bytes=32 time=9ms TTL=128
Reply from 192.168.1.3: bytes=32 time<1ms TTL=128
Reply from 192.168.1.3: bytes=32 time=3ms TTL=128
Reply from 192.168.1.3: bytes=32 time=4ms TTL=128

Ping statistics for 192.168.1.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 9ms, Average = 4ms

C:\>
```

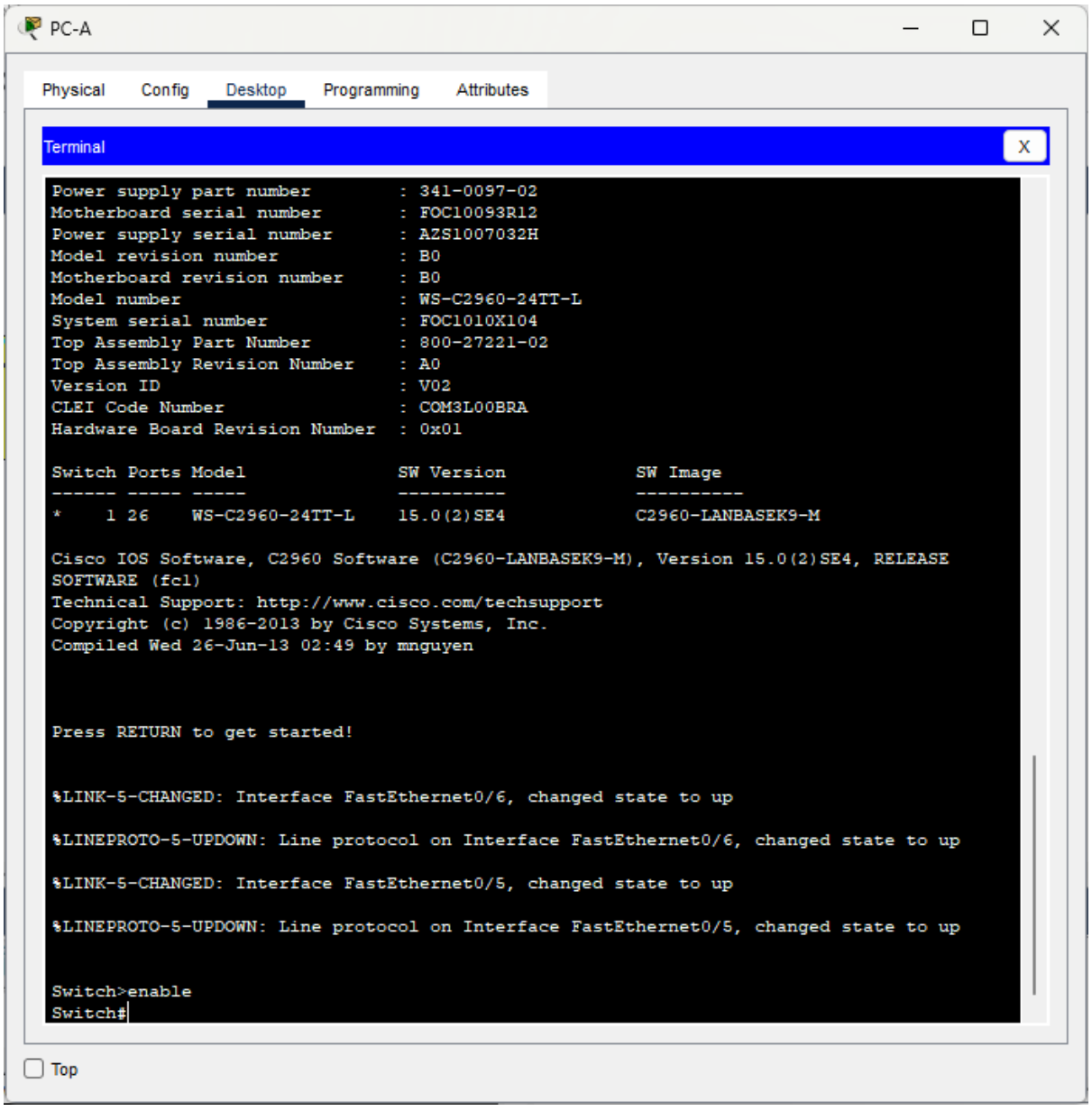


The router is being in traffic across the two subnets, the yellow part is the first and the green part is the second subnet each which will turn off the interfaces which are connected through the basis

Step3: Configure the switch

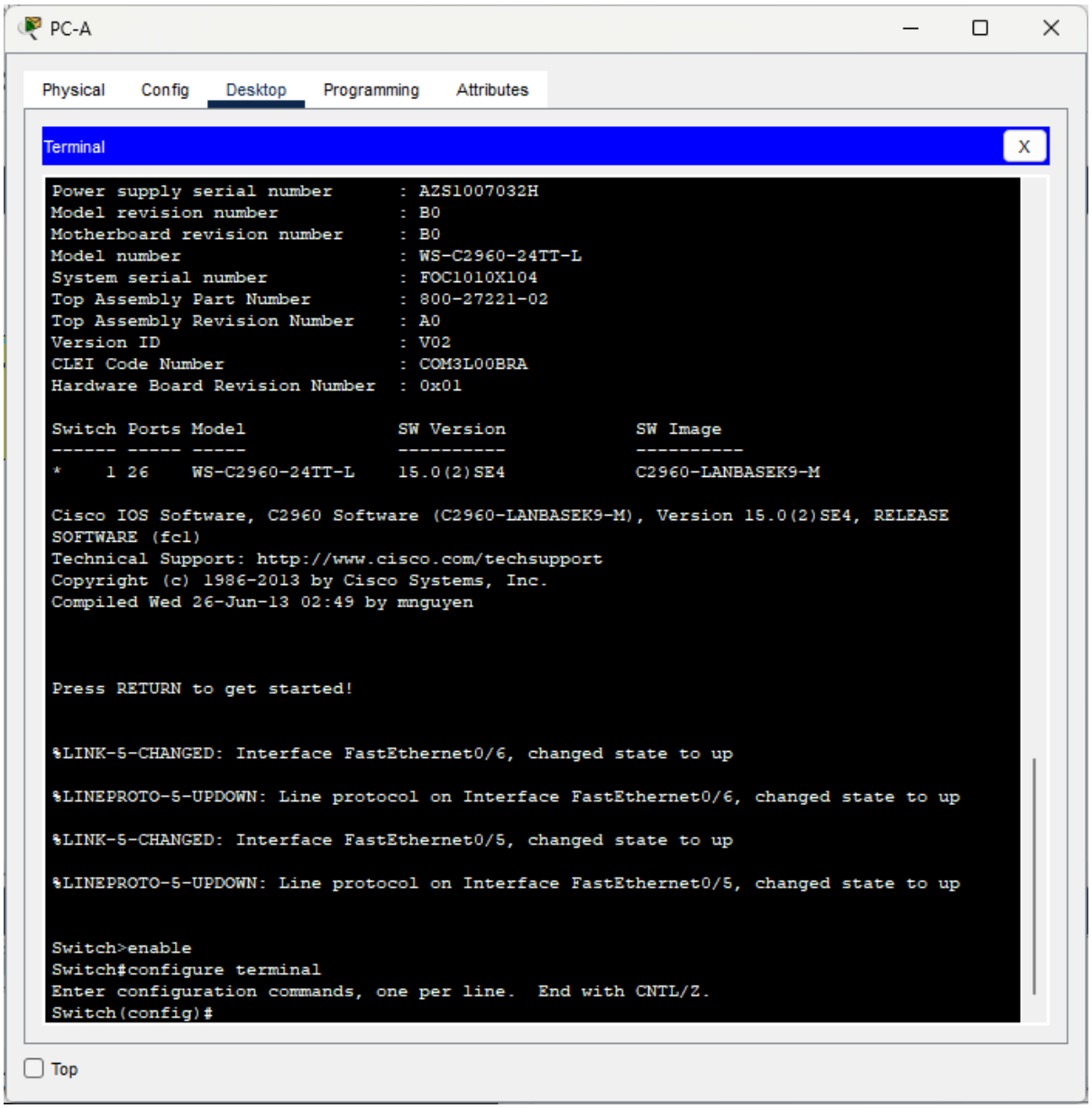
(a) Console into the switch and enable privileged EXEC mode

Here I console the switch



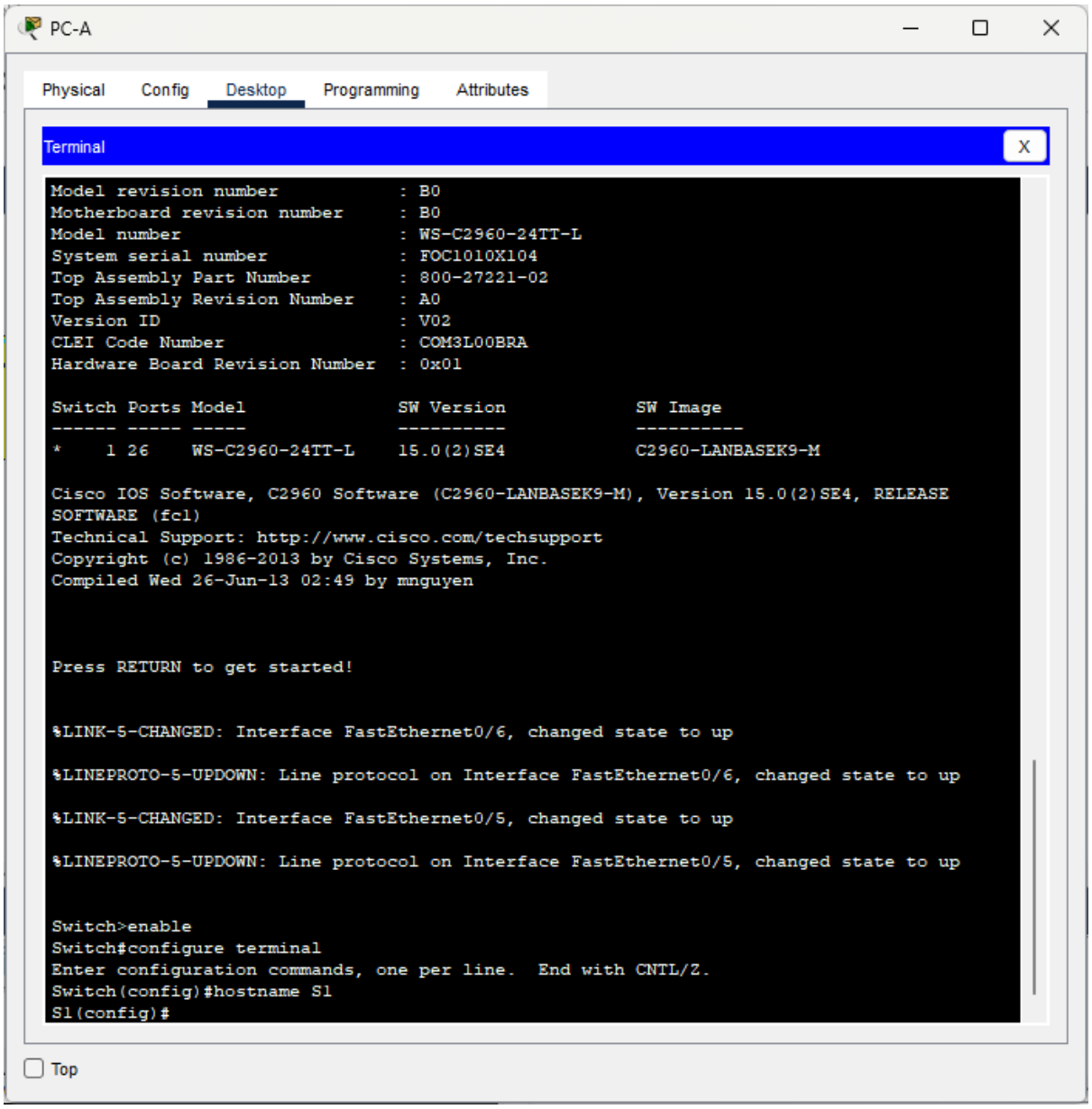
(b) Enter configuration mode

It’s in a configuration mode

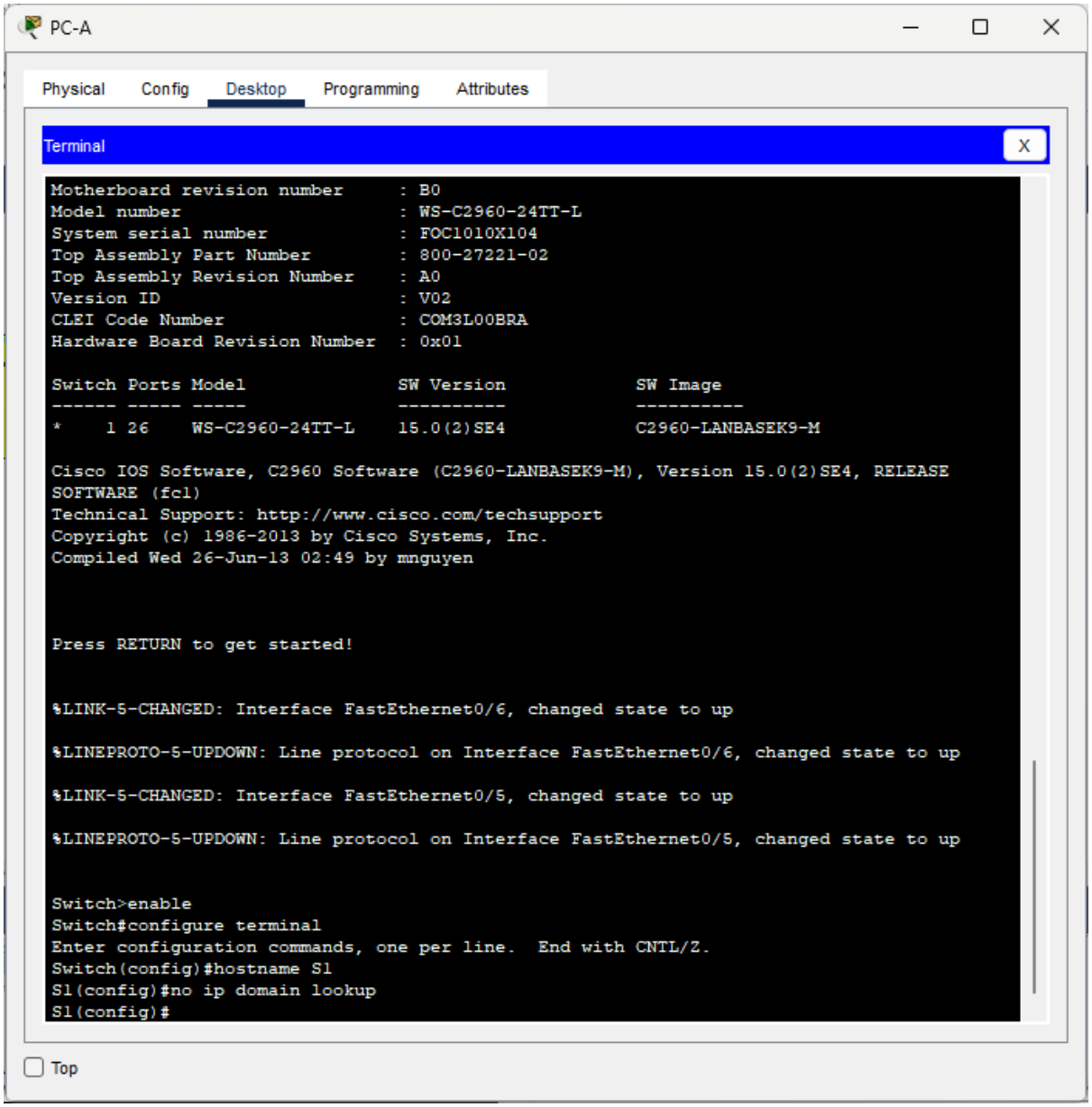


(c) Assign a device name to the switch

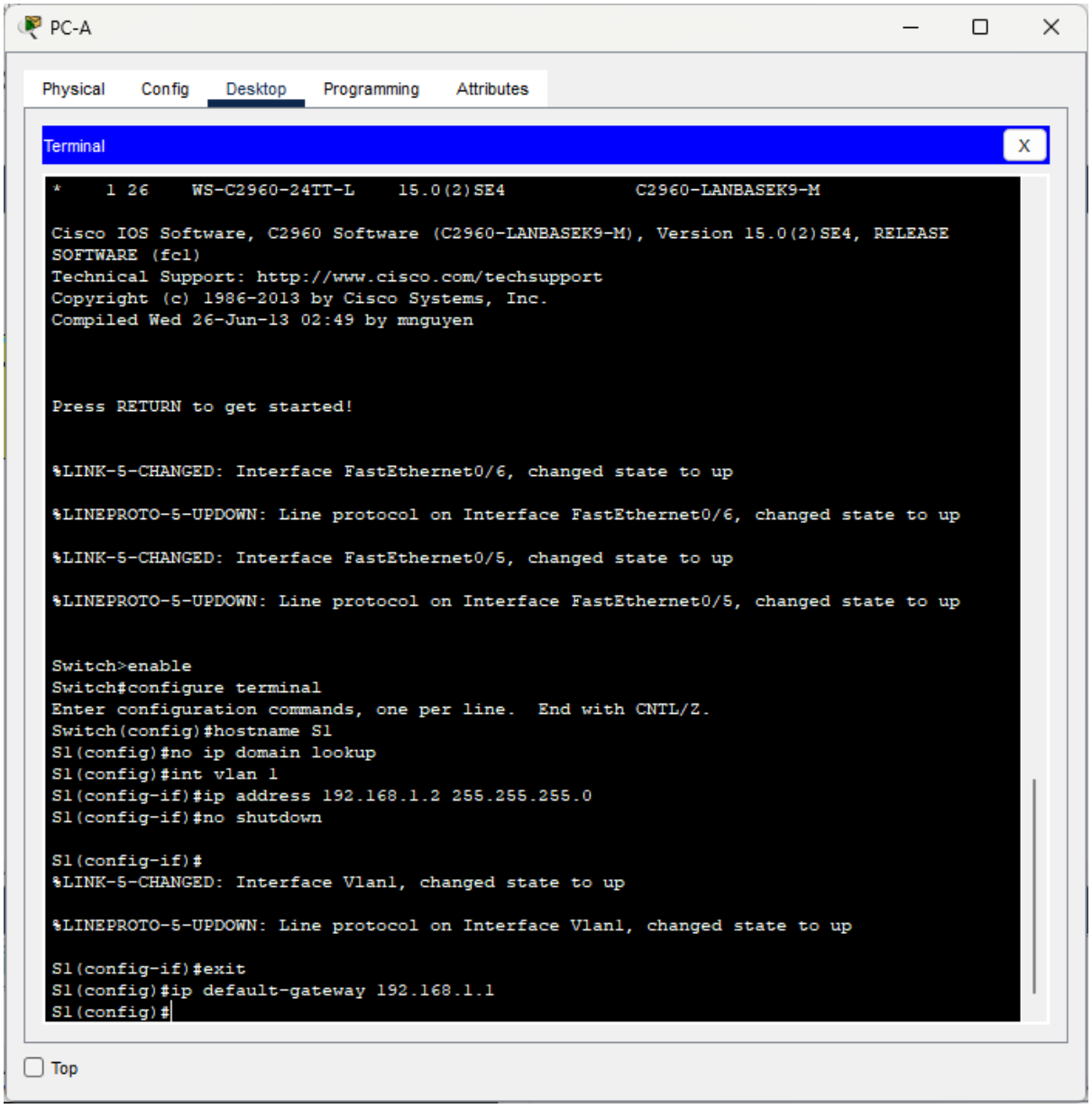
I assigned it a device name, enable



(d) Disable DNS lookup



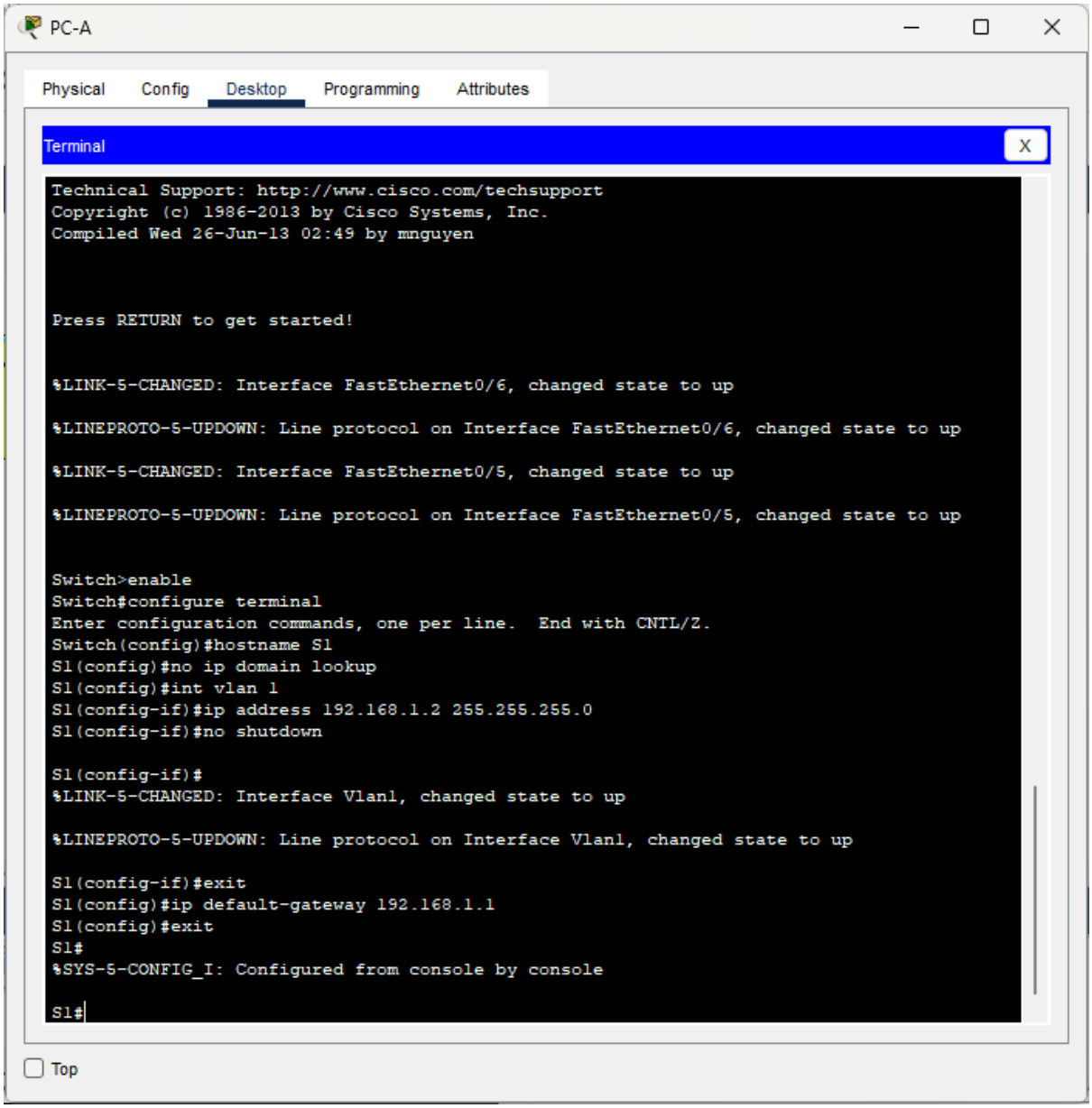
(e) Configure and activate the VLAN interface on the switch S1



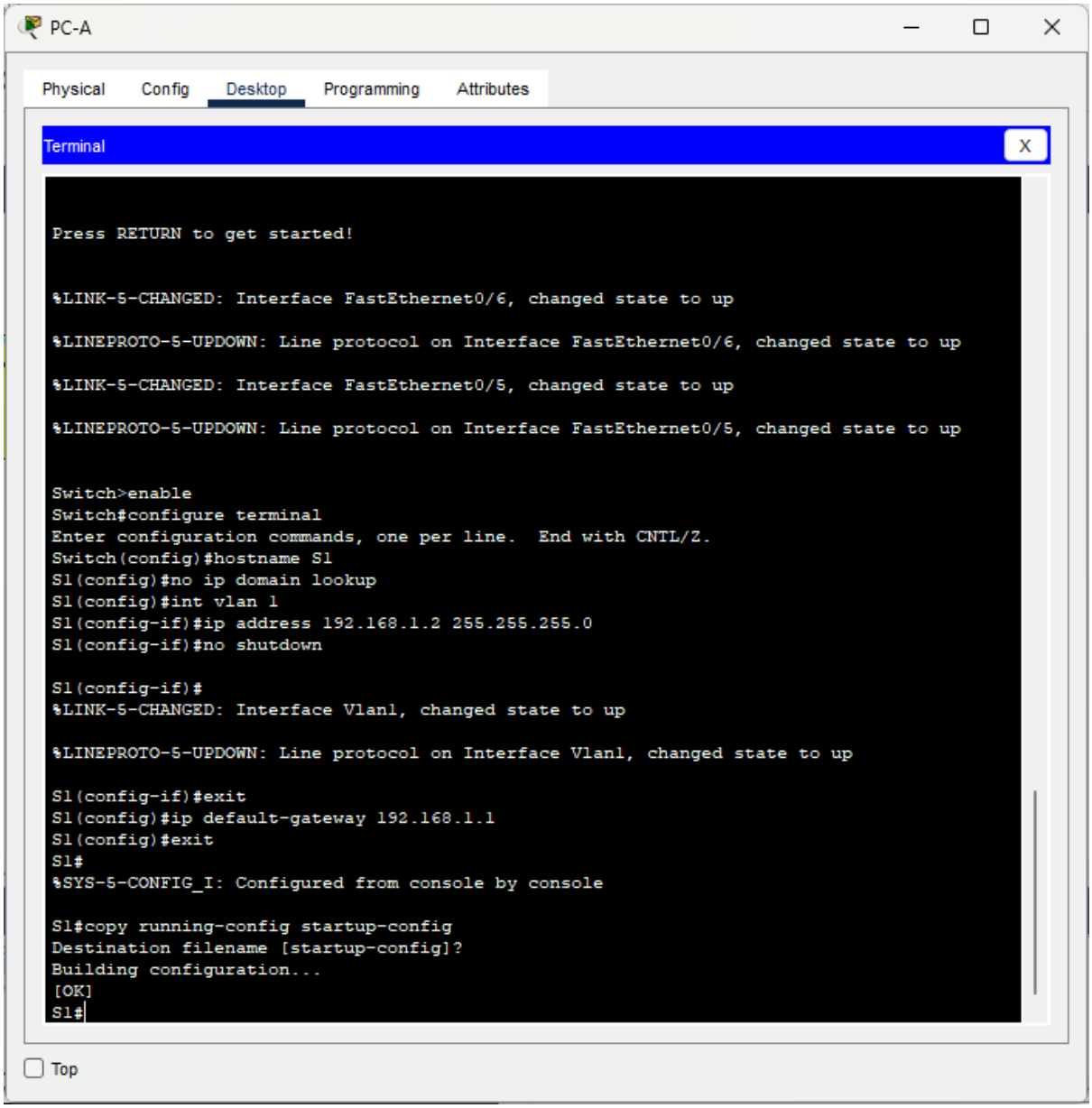
(f) Configure the default gateway for the switch S1

S1(config) # ip default-gateway 192.168.1.1

S1(config-if) # exit



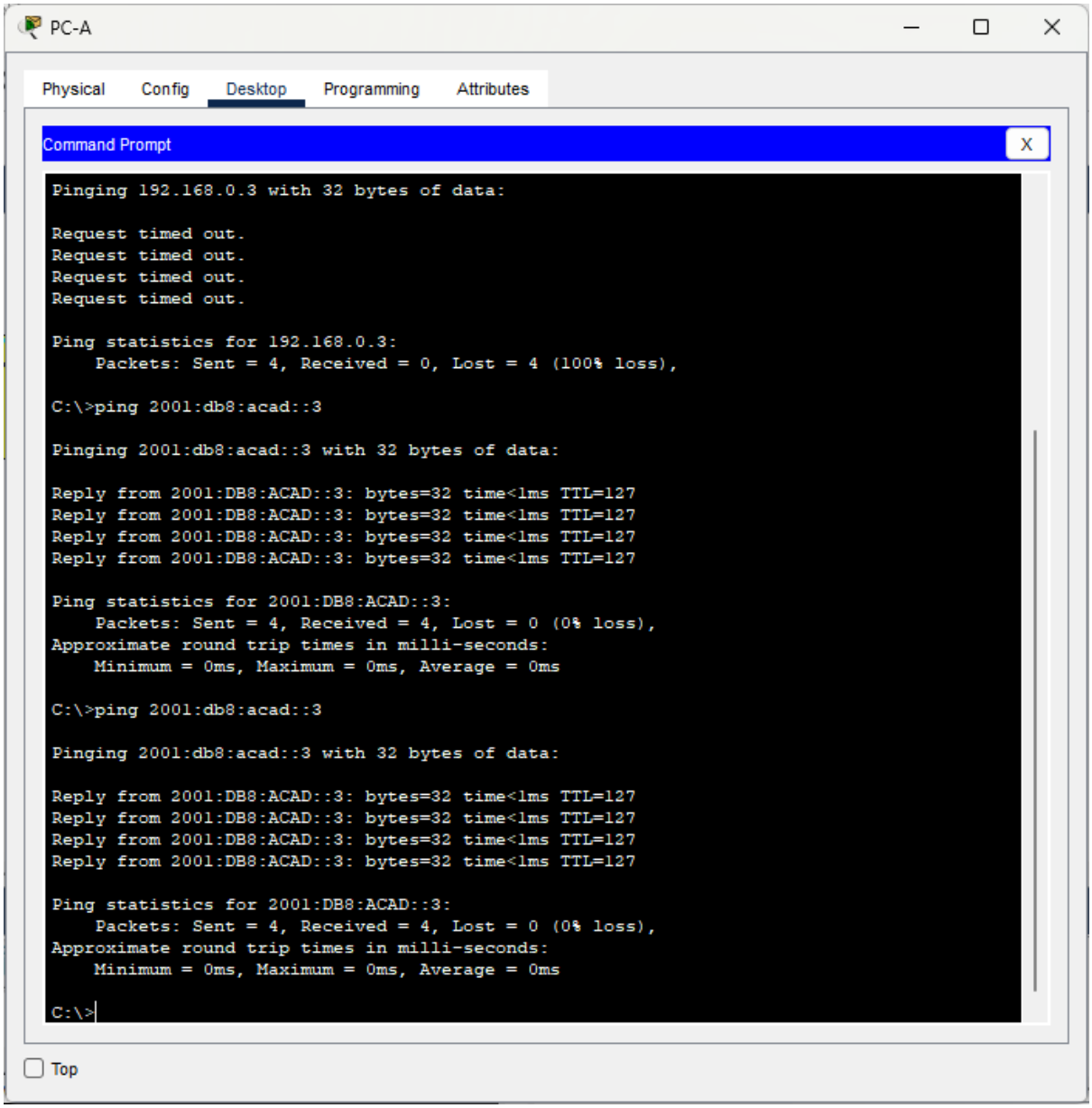
(g) Save the running configuration to the startup configuration file



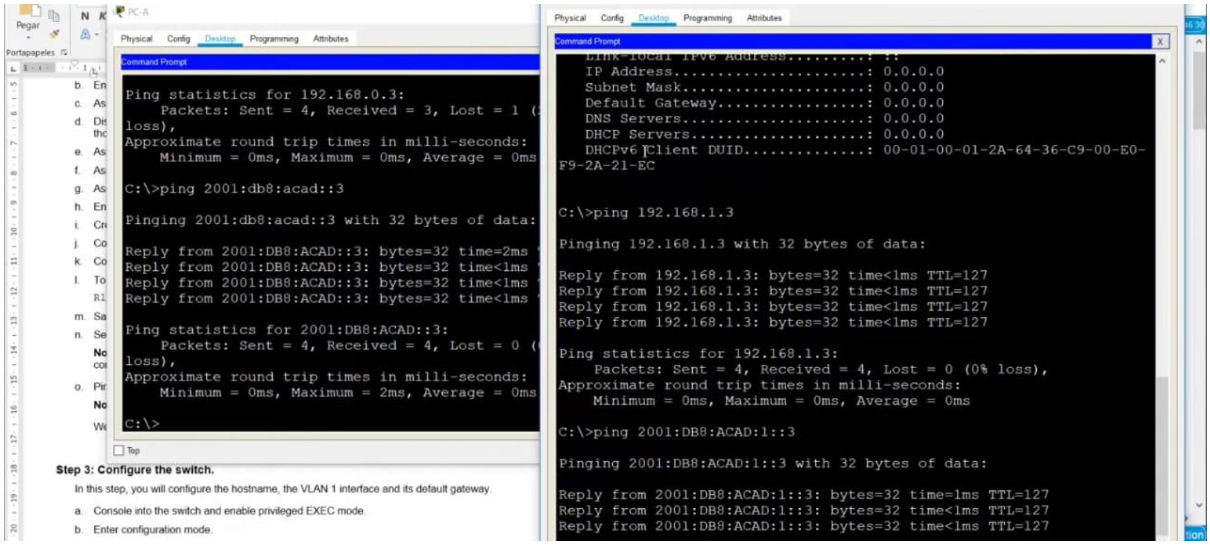
Step4: Verify connectivity end-to-end connectivity

(a) From PC-A, ping PC-B

The pinging was successful as shown below



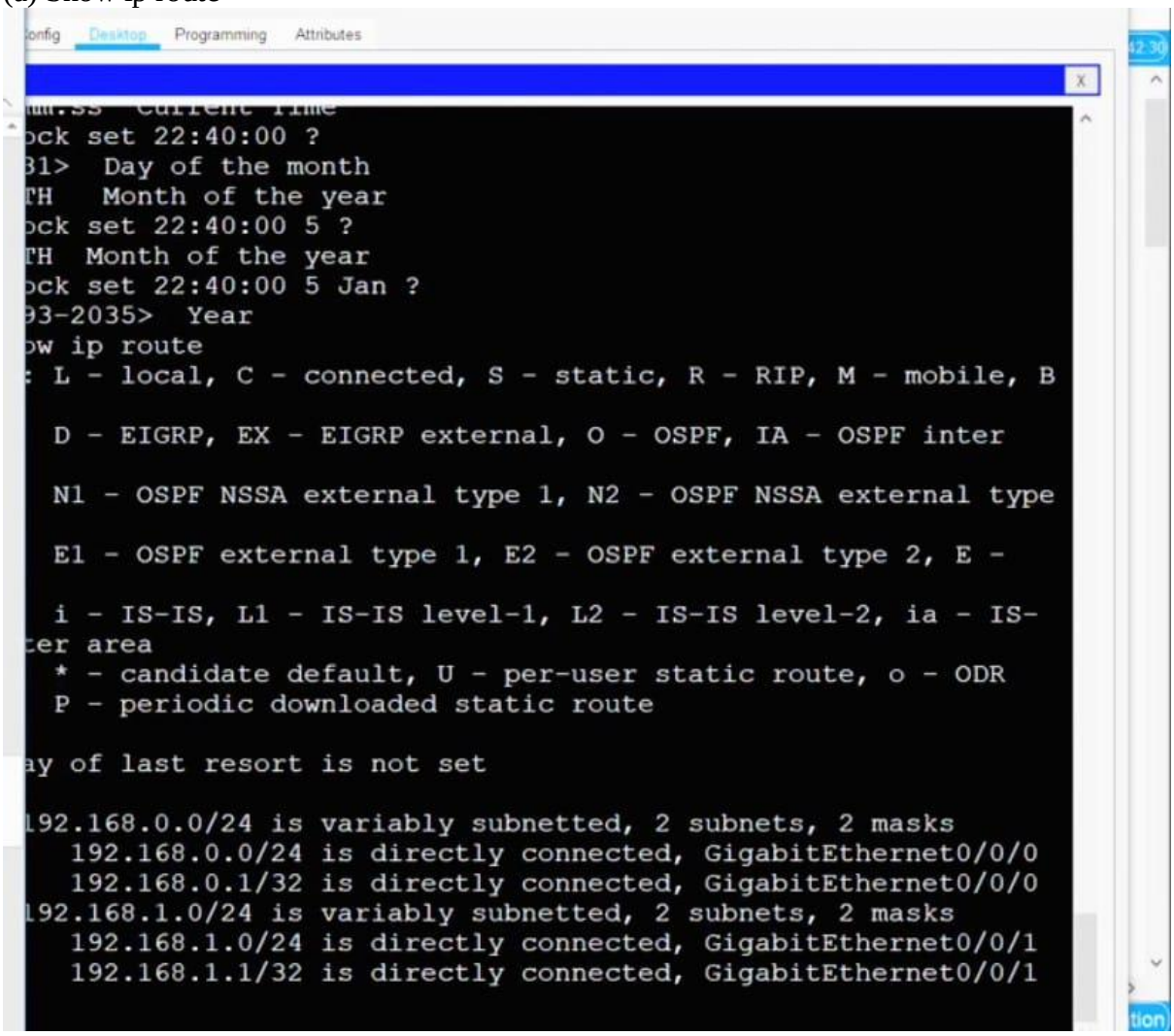
(b) From S1, ping PC-B-all the ping were successfully



Part 3: Display Device Information

Step1: Display the routing table on the router

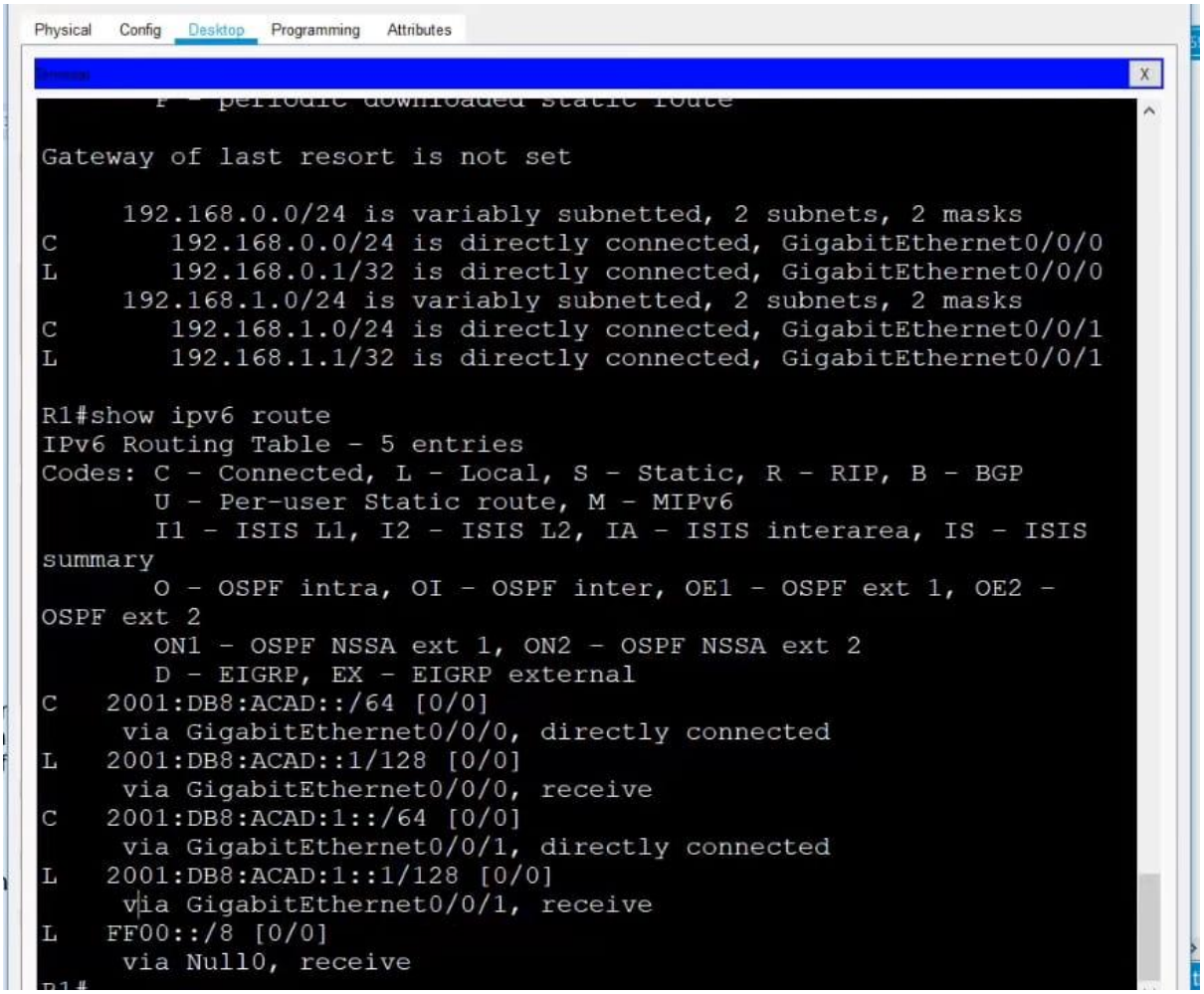
(a) Show ip route



- C are used to connect subnet while L are locally the face
    - ❖ Two are connected networks

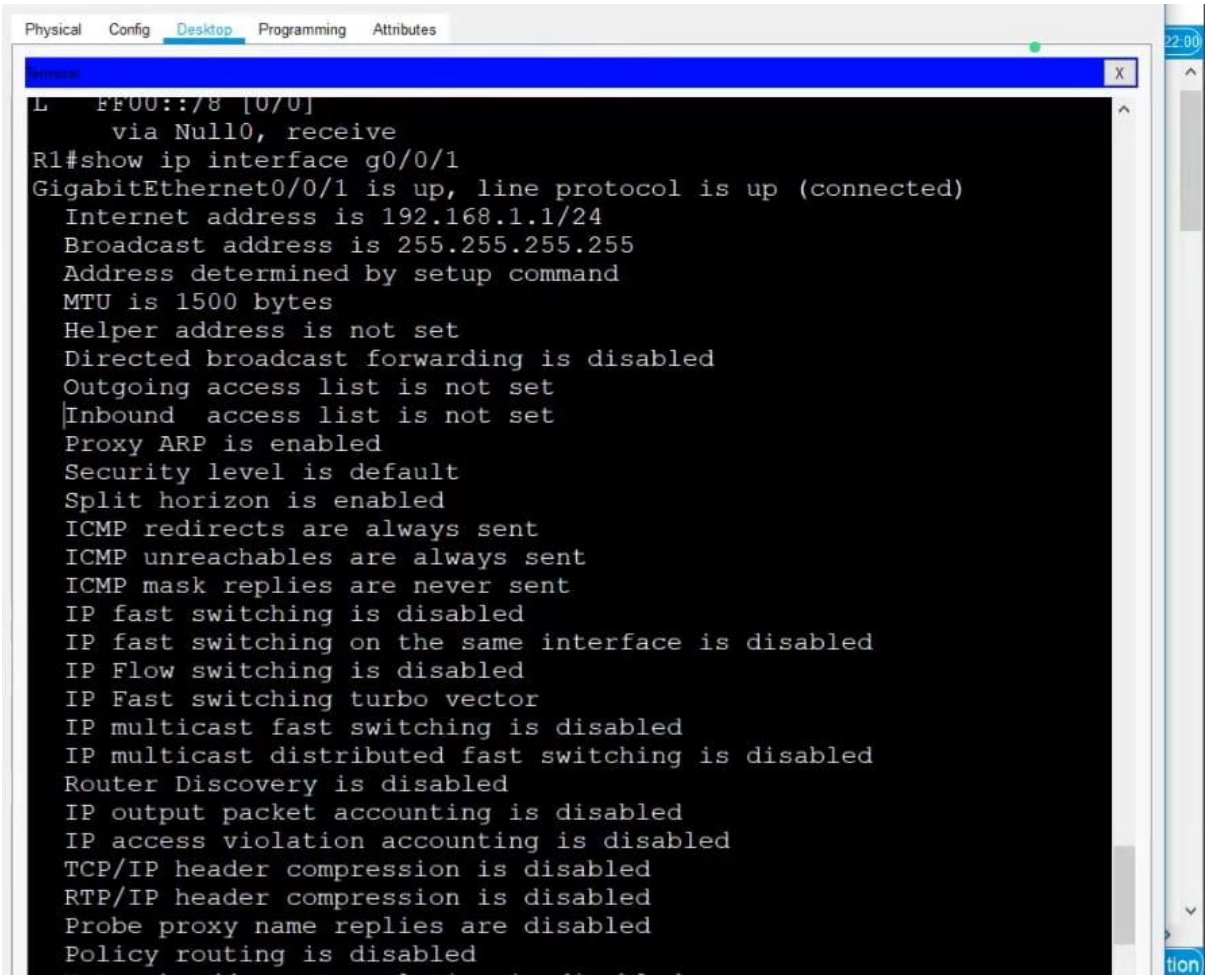
- ➢ 192.168.0.0 Gigabit Ethernet 0/0/0
- ➢ 192.168.1.0 Gigabit Ethernet 0/0/0

(b) Show ipv6 route

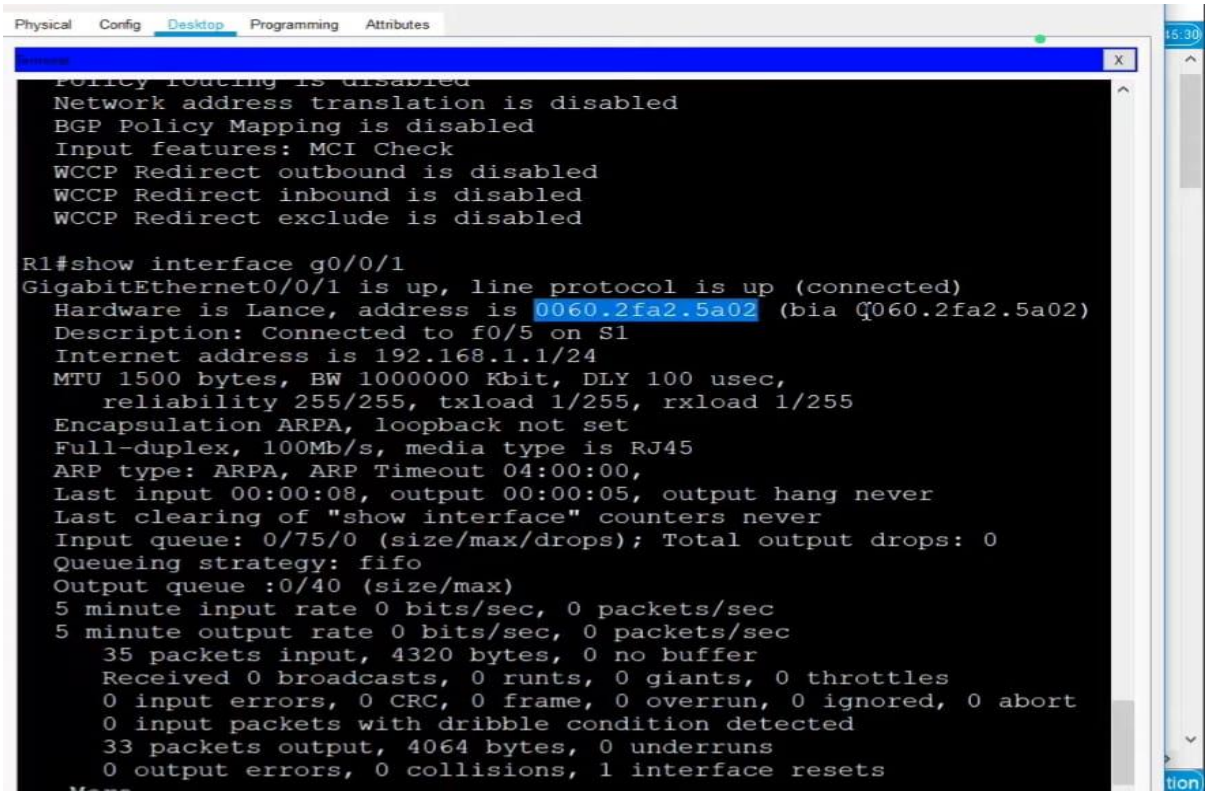


Step2: Display interface information on the router R1

(a) Show ip interface g0/0/1

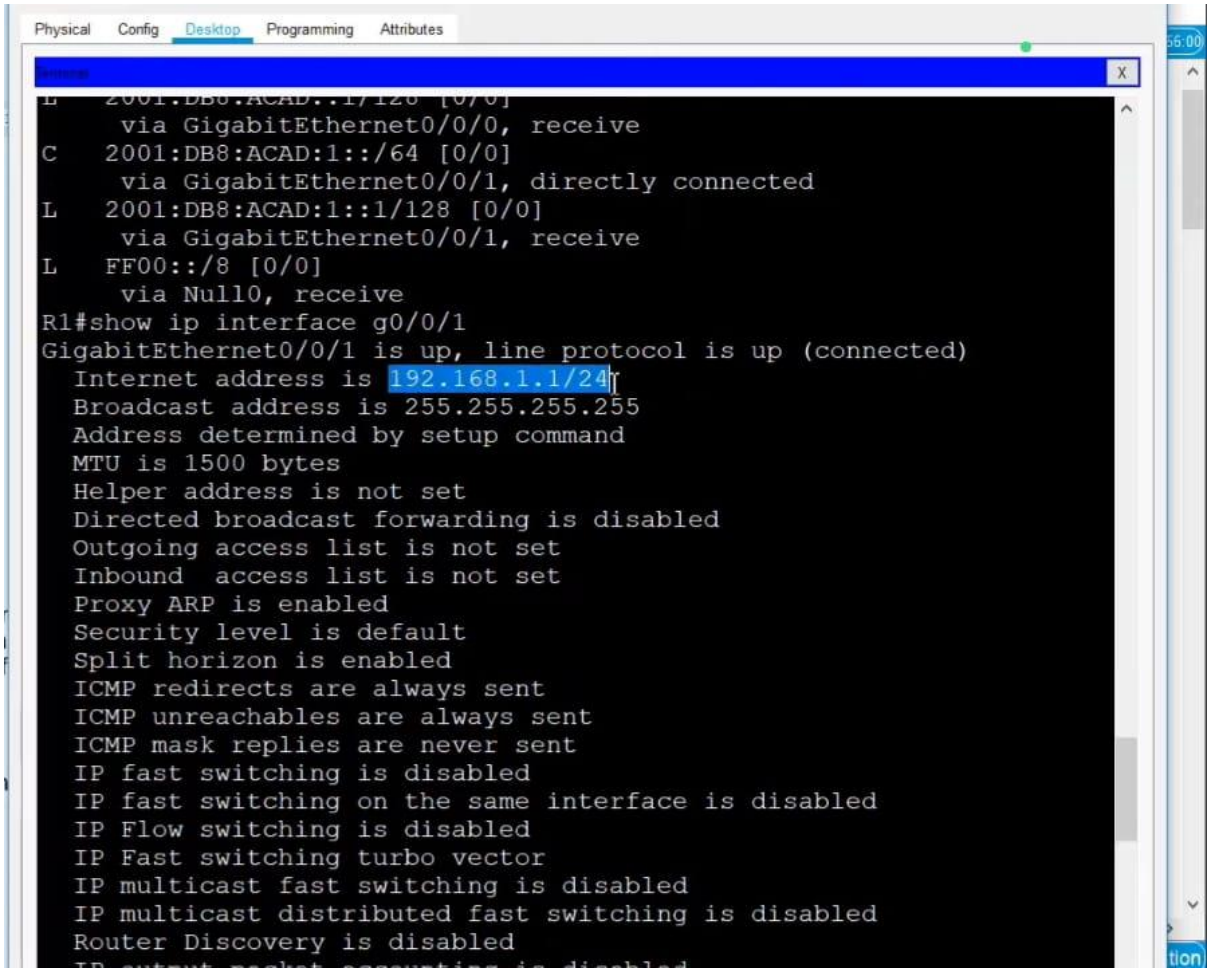


The Media Access Control (MAC) address of the G0/1 interface 0060.2fa2.5a02

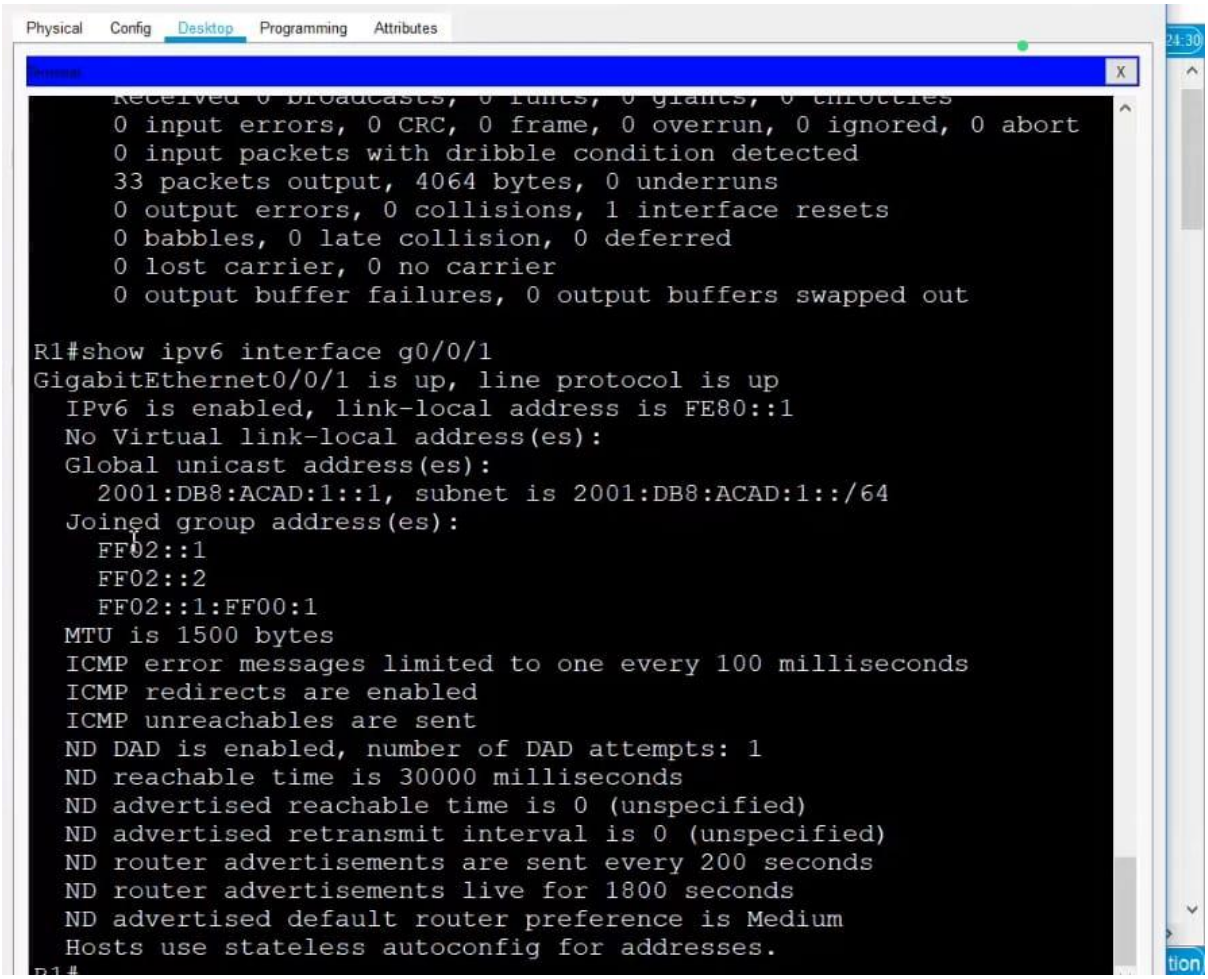


The internet address displayed in this command

- 192.168.1.1/24



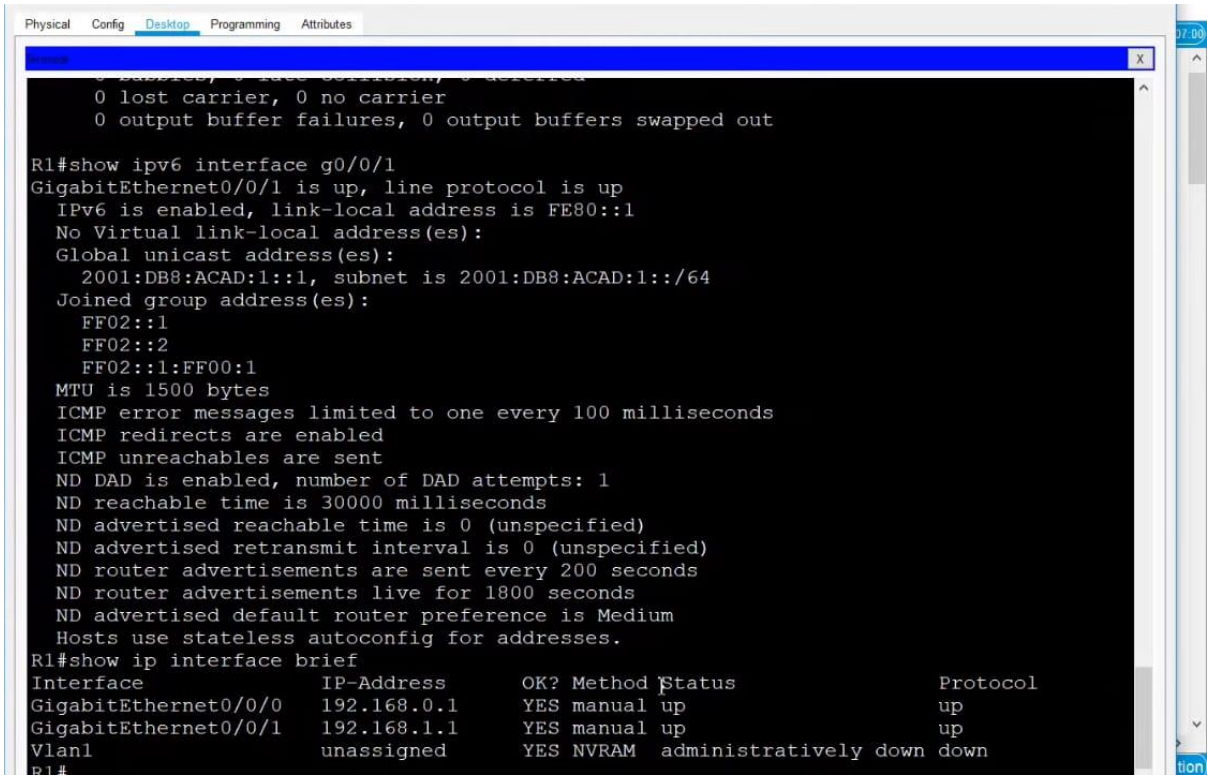
(b) Show ip interface interface command



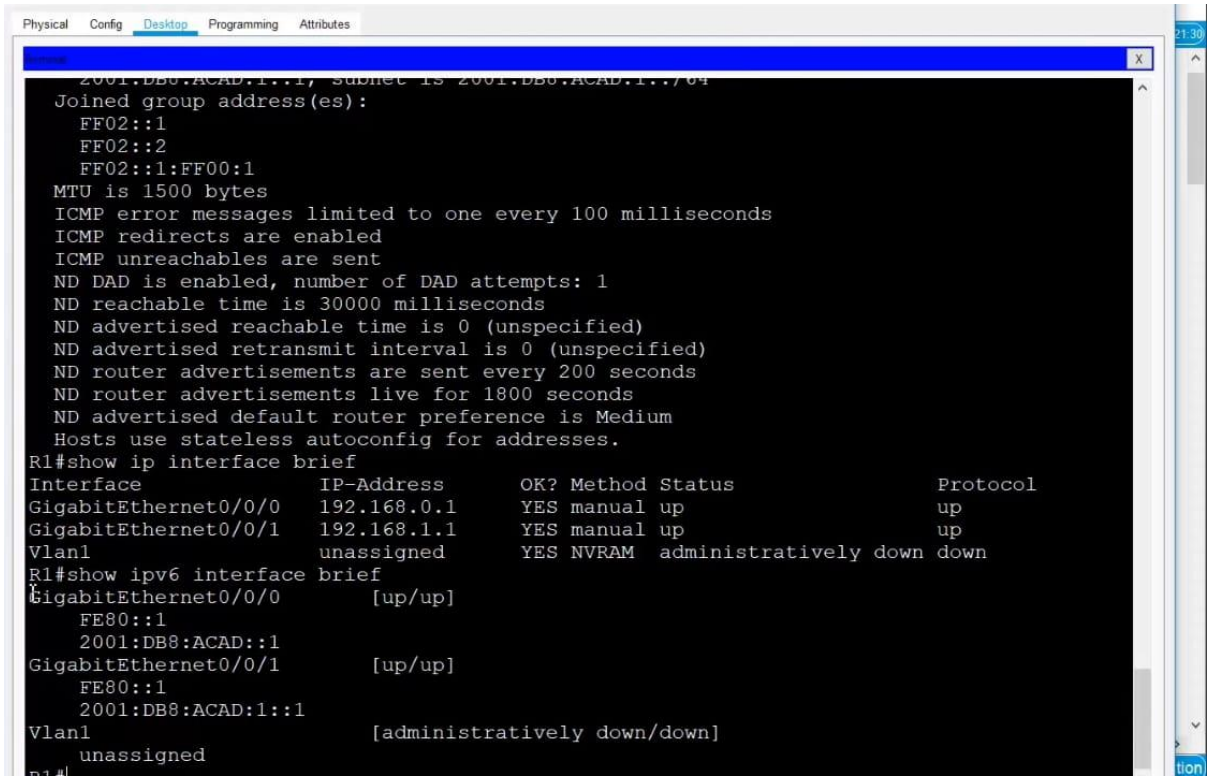
Step 3: Display a summary list of the interfaces on the router and switch

(a) Enter the show ip interface brief command on the router R1

R1# show ip interface brief

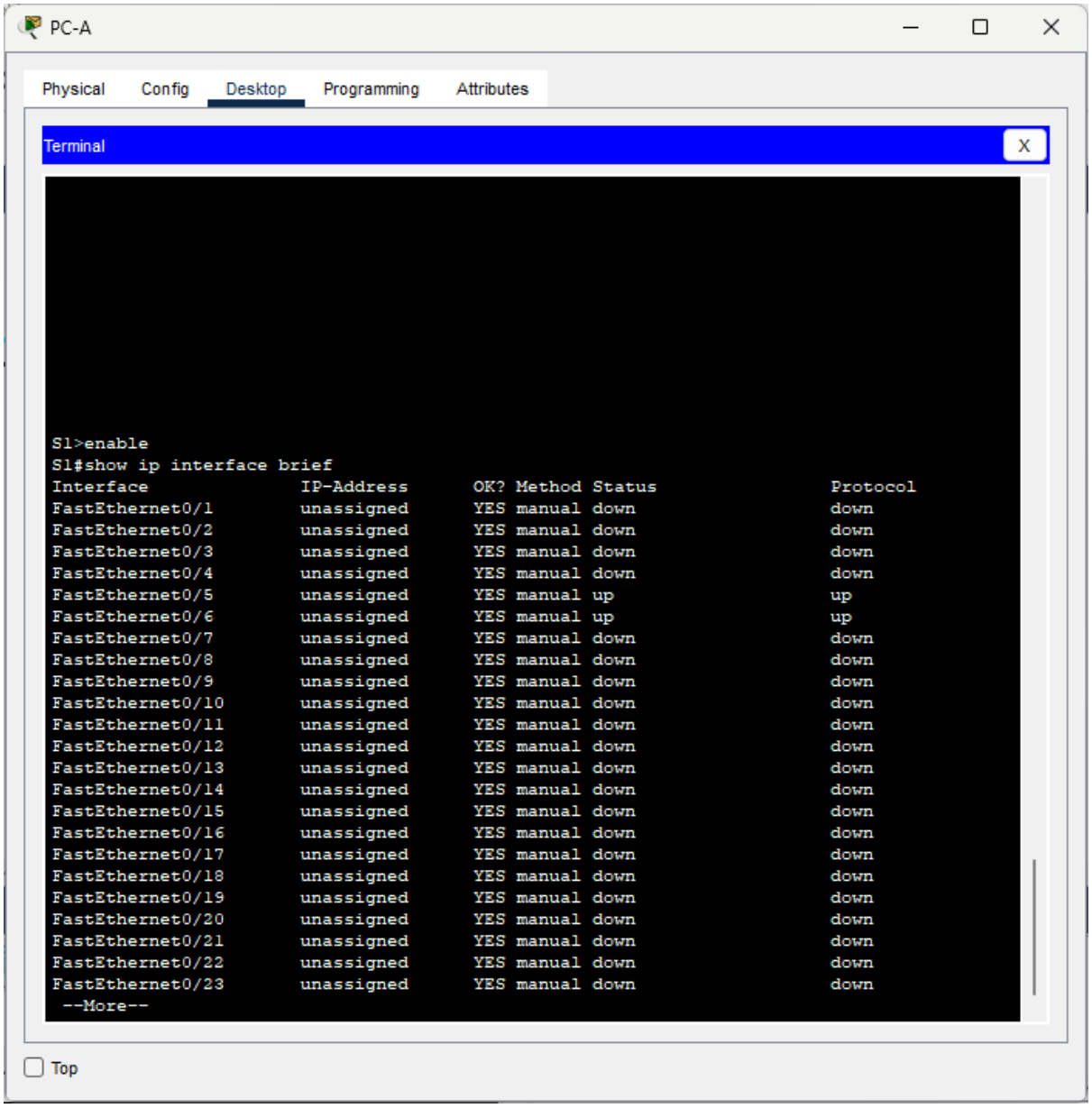


(b) To see the Ipv6 interface brief command on R1.R1# show ipv6 interface brief



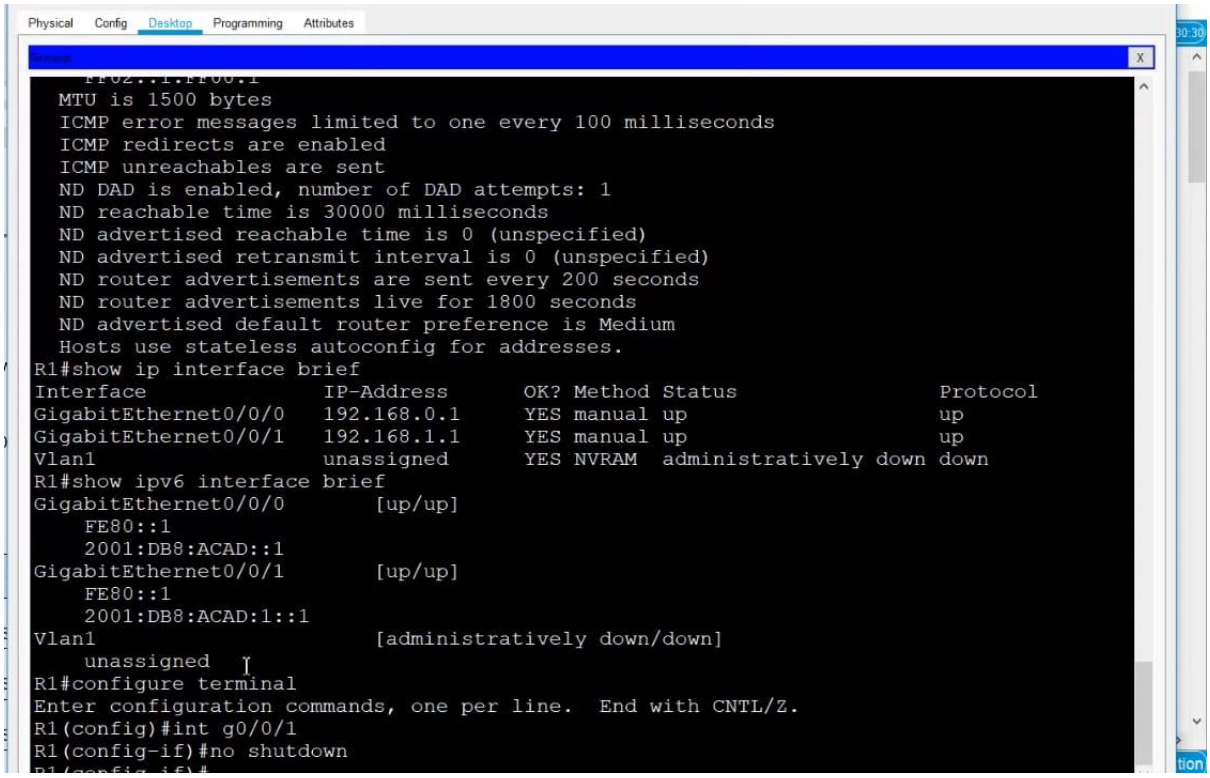
(c) Enter the show ip interface brief command on the switch S1

S1# show ip interface brief



Reflection questions

(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

- Nothing will happened the packets to be send to the default gateway network won't reach the destination

Conclusion

This assignment successfully demonstrated how a switch and a router can be used to build a simple network in Cisco Packet Tracer. By configuring the devices and assigning IP addresses, I was able to establish communication between the connected devices.

The practical exercise improved my understanding of basic networking concepts and enhanced my skills in designing, configuring and testing a network. This knowledge is important for real-word networking and system administration tasks