Networking Academy

Christian Dunn 06/19/2023 CST 329 03A Code: 773777

Packet Tracer – Subnet an IPv4 Network

Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
CustomerRouter	G0/0	192.168.0.1	255.255.255.192	N/A
	G0/1	192.168.0.65	255.255.255.192	
	S0/1/0	209.165.201.2	255.255.255.252	
LAN-A Switch	VLAN1	192.168.0.2	255.255.255.192	192.168.0.1
LAN-B Switch	VLAN1	192.168.0.66	255.255.255.192	192.168.0.65
PC-A	NIC	192.168.0.62	255.255.255.192	192.168.0.1
PC-B	NIC	192.168.0.126	255.255.255.192	192.168.0.65
ISPRouter	G0/0	209.165.200.225	255.255.255.224	N/A
	S0/1/0	209.165.201.1	255.255.255.252	
ISPSwitch	VLAN1	209.165.200.226	255.255.255.224	209.165.200.225
ISP Workstation	NIC	209.165.200.235	255.255.255.224	209.165.200.225
ISP Server	NIC	209.165.200.240	255.255.255.224	209.165.200.225

Objectives

Part 1: Design an IPv4 Network Subnetting Scheme

Part 2: Configure the Devices

Part 3: Test and Troubleshoot the Network

Background / Scenario

In this activity, you will subnet the Customer network into multiple subnets. The subnet scheme should be based on the number of host computers required in each subnet, as well as other network considerations, like future network host expansion.

After you have created a subnetting scheme and completed the table by filling in the missing host and interface IP addresses, you will configure the host PCs, switches and router interfaces.

After the network devices and host PCs have been configured, you will use the **ping** command to test for network connectivity.

Instructions

Part 1: Subnet the Assigned Network

Step 1: Create a subnetting scheme that meets the required number of subnets and required number of host addresses.

In this scenario, you are a network technician assigned to install a new network for a customer. You must create multiple subnets out of the 192.168.0.0/24 network address space to meet the following requirements:

a. The first subnet is the LAN-A network. You need a minimum of 50 host IP addresses.

b. The second subnet is the LAN-B network. You need a minimum of 40 host IP addresses.

c. You also need at least two additional unused subnets for future network expansion.

Note: Variable length subnet masks will not be used. All of the device subnet masks should be the same length.

d. Answer the following questions to help create a subnetting scheme that meets the stated network requirements:

How many host addresses are needed in the largest required subnet?

50 host addresses are needed in the largest required subnet.

What is the minimum number of subnets required?

The minimum number of subnets required is 4.

The network that you are tasked to subnet is 192.168.0.0/24. What is the /24 subnet mask in binary?

The /24 subnet mask is 255.255.255.0 and it is 11111111.11111111.11111111.00000000 when converted to binary.

e. The subnet mask is made up of two portions, the network portion, and the host portion. This is represented in the binary by the ones and the zeros in the subnet mask.

In the network mask, what do the ones represent?

In the network mask, the ones represent the network part of the address.

In the network mask, what do the zeros represent?

In the network mask, the zeros represent the host's part of the address.

f. To subnet a network, bits from the host portion of the original network mask are changed into subnet bits. The number of subnet bits defines the number of subnets.

Given each of the possible subnet masks depicted in the following binary format, how many subnets and how many hosts are created in each example?

Hint: Remember that the number of host bits (to the power of 2) defines the number of hosts per subnet (minus 2), and the number of subnet bits (to the power of two) defines the number of subnets. The subnet

bits (shown in bold) are the bits that have been borrowed beyond the original network mask of /24. The /24 is the prefix notation and corresponds to a dotted decimal mask of 255.255.255.0.

1) (/25) 11111111.11111111.11111111.**1**0000000

Dotted decimal subnet mask equivalent:

The dotted decimal subnet mask equivalent is 255.255.255.128.

Number of subnets?

2 subnets

Number of hosts?

126 hosts

2) (/26) 11111111.11111111.11111111.**11**000000

Dotted decimal subnet mask equivalent:

The dotted decimal subnet mask equivalent is 255.255.255.192.

Number of subnets?

4 subnets

Number of hosts?

62 hosts

3) (/27) 11111111.11111111.11111111.**111**00000

Dotted decimal subnet mask equivalent:

The dotted decimal subnet mask equivalent is 255.255.255.224.

Number of subnets?

8 subnets

Number of hosts?

30 hosts

4) (/28) 11111111.11111111.11111111.**1111**0000

Dotted decimal subnet mask equivalent:

The dotted decimal subnet mask equivalent is 255.255.255.240.

Number of subnets?

16 subnets

Number of hosts?

14 hosts

5) (/29) 11111111.11111111.11111111.**11111**000

Dotted decimal subnet mask equivalent:

The dotted decimal subnet mask equivalent is 255.255.255.248.

Number of subnets?

32 subnets

Number of hosts?

6 hosts

6) (/30) 11111111.11111111.11111111.**111111**00

Dotted decimal subnet mask equivalent:

The dotted decimal subnet mask equivalent is 255.255.255.252.

Number of subnets?

64 subnets

Number of hosts?

2 hosts

Considering your answers above, which subnet masks meet the required number of minimum host addresses?

Subnet masks /25 & /26 meet the required number of minimum host addresses.

Considering your answers above, which subnet masks meets the minimum number of subnets required?

Subnet masks /27, /28, /29, & /30 meet the required number of minimum subnets.

Considering your answers above, which subnet mask meets both the required minimum number of hosts and the minimum number of subnets required?

Subnet masks /26 is the only subnet mask that meets both the required number of minimum host addresses and the minimum number of subnets.

When you have determined which subnet mask meets all of the stated network requirements, derive each of the subnets. List the subnets from first to last in the table. Remember that the first subnet is 192.168.0.0 with the chosen subnet mask.

Subnet Address	Prefix	Subnet Mask
192.168.0.0	/26	255.255.255.192
192.168.0.64	/26	255.255.255.192
192.168.0.128	/26	255.255.255.192
192.168.0.192	/26	255.255.255.192

Step 2: Fill in the missing IP addresses in the Addressing Table

Assign IP addresses based on the following criteria: Use the ISP Network settings as an example.

a. Assign the first subnet to LAN-A.

1) Use the first host address for the CustomerRouter interface connected to LAN-A switch.

2) Use the second host address for the LAN-A switch. Make sure to assign a default gateway address for the switch.

3) Use the last host address for PC-A. Make sure to assign a default gateway address for the PC.

b. Assign the second subnet to LAN-B.

1) Use the first host address for the CustomerRouter interface connected to LAN-B switch.

2) Use the second host address for the LAN-B switch. Make sure to assign a default gateway address for the switch.

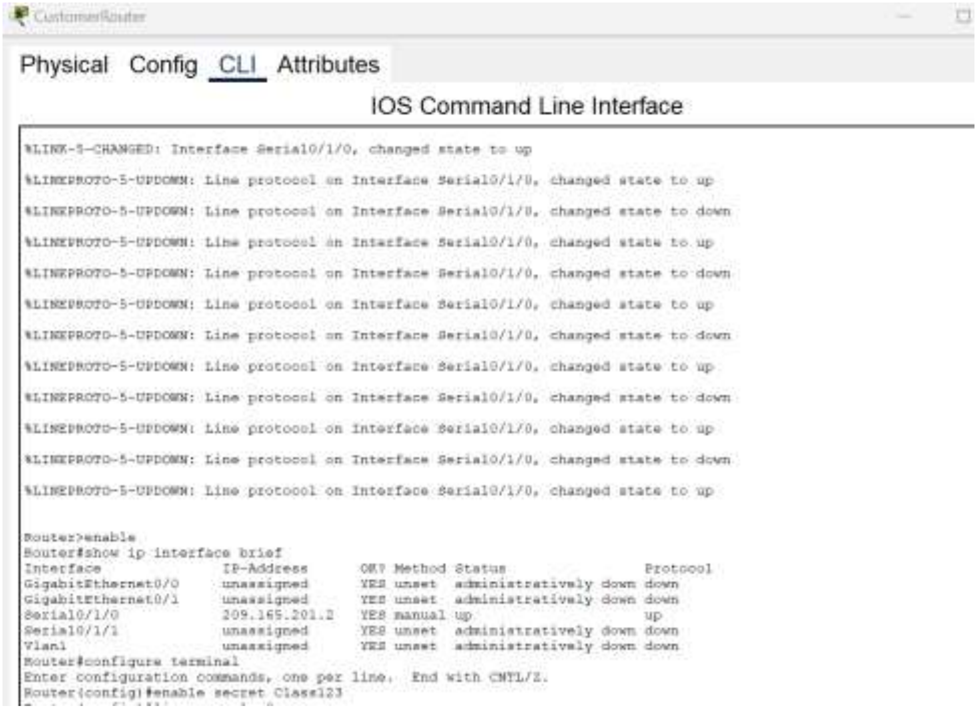
3) Use the last host address for PC-B. Make sure to assign a default gateway address for the PC.

Part 2: Configure the Devices

Configure basic settings on the PCs, switches, and router. Refer to the Addressing Table for device names and address information.

Step 1: Configure CustomerRouter.

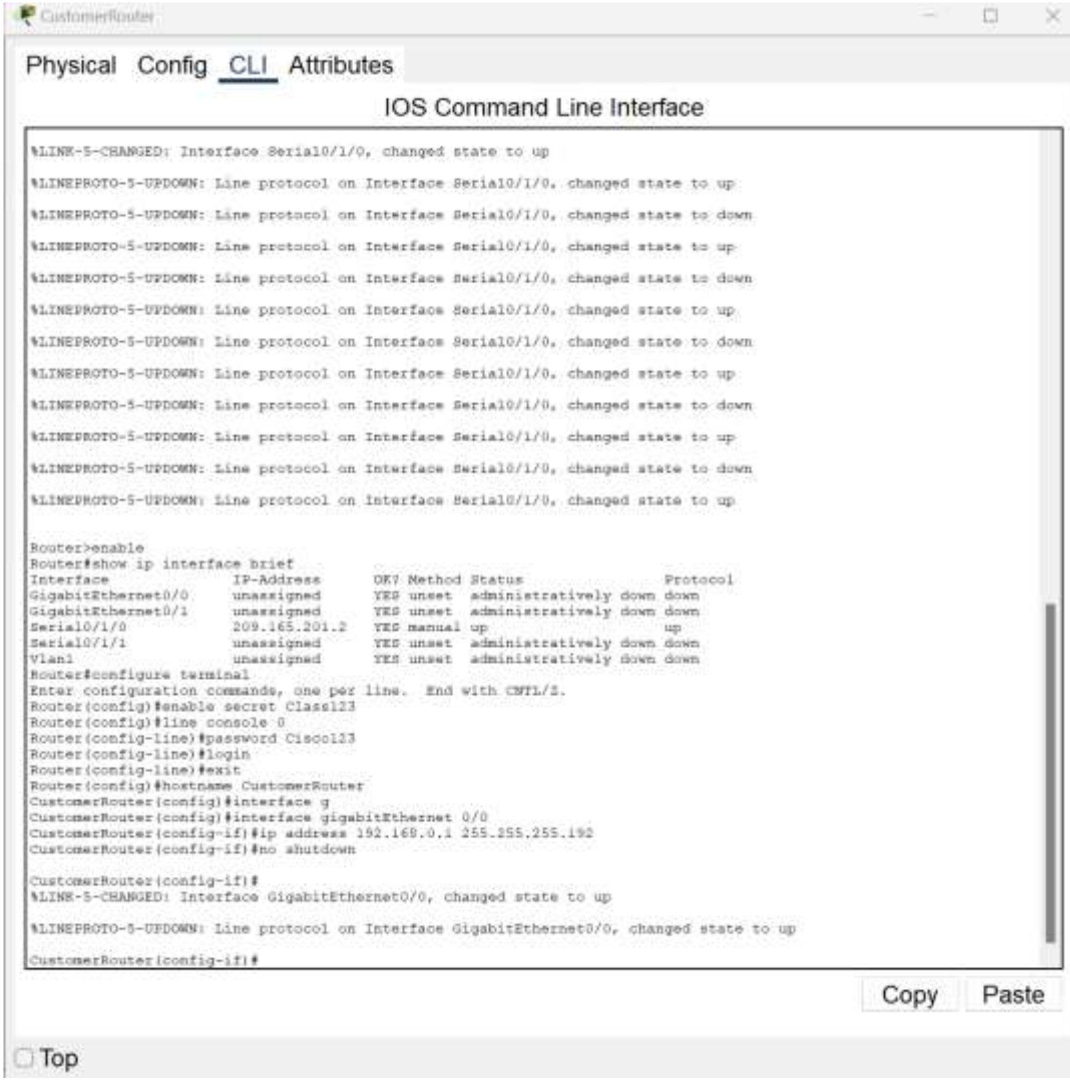
a. Set the enable secret password on CustomerRouter to **Class123**

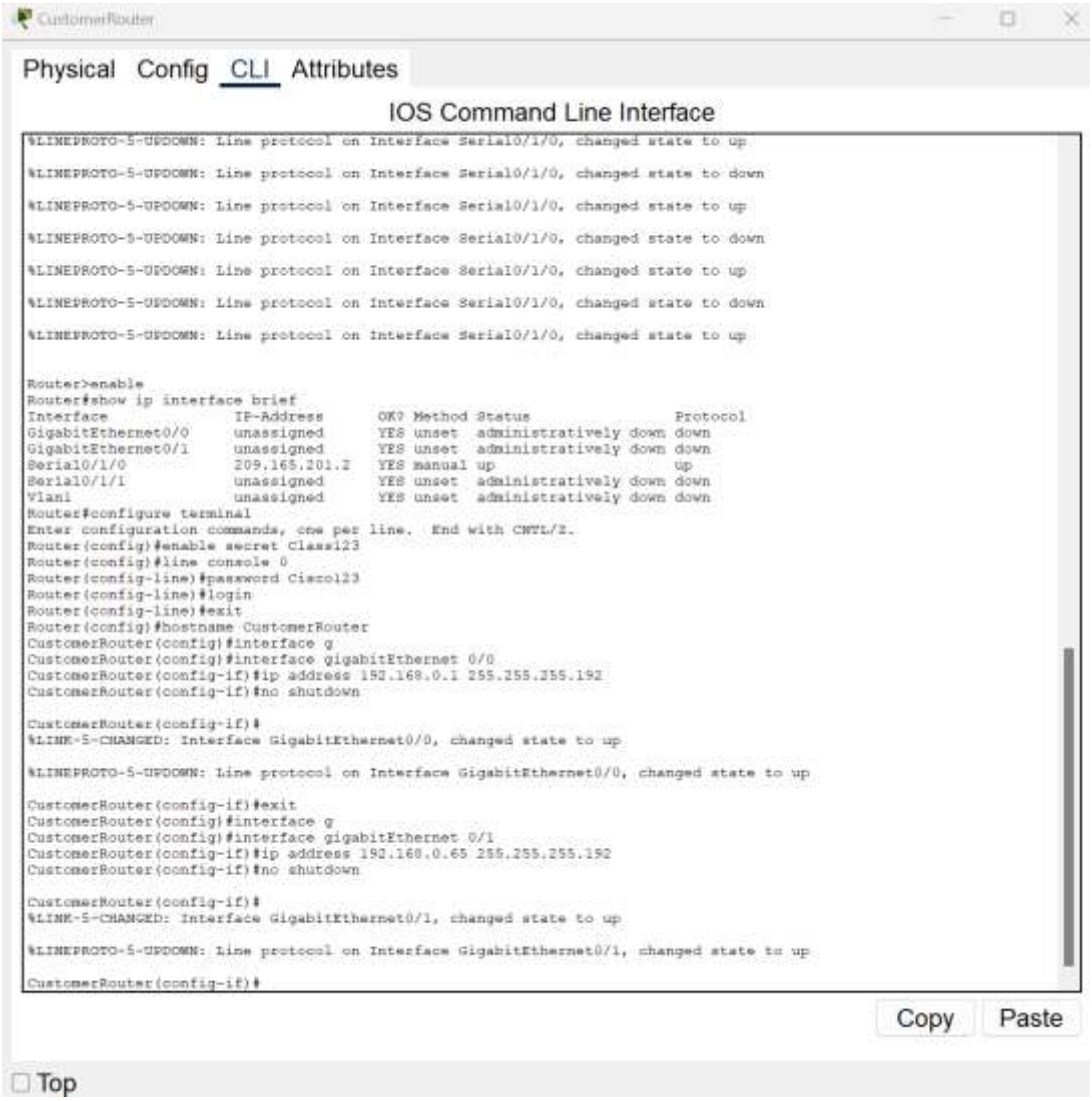


b. Set the console login password to **Cisco123**.

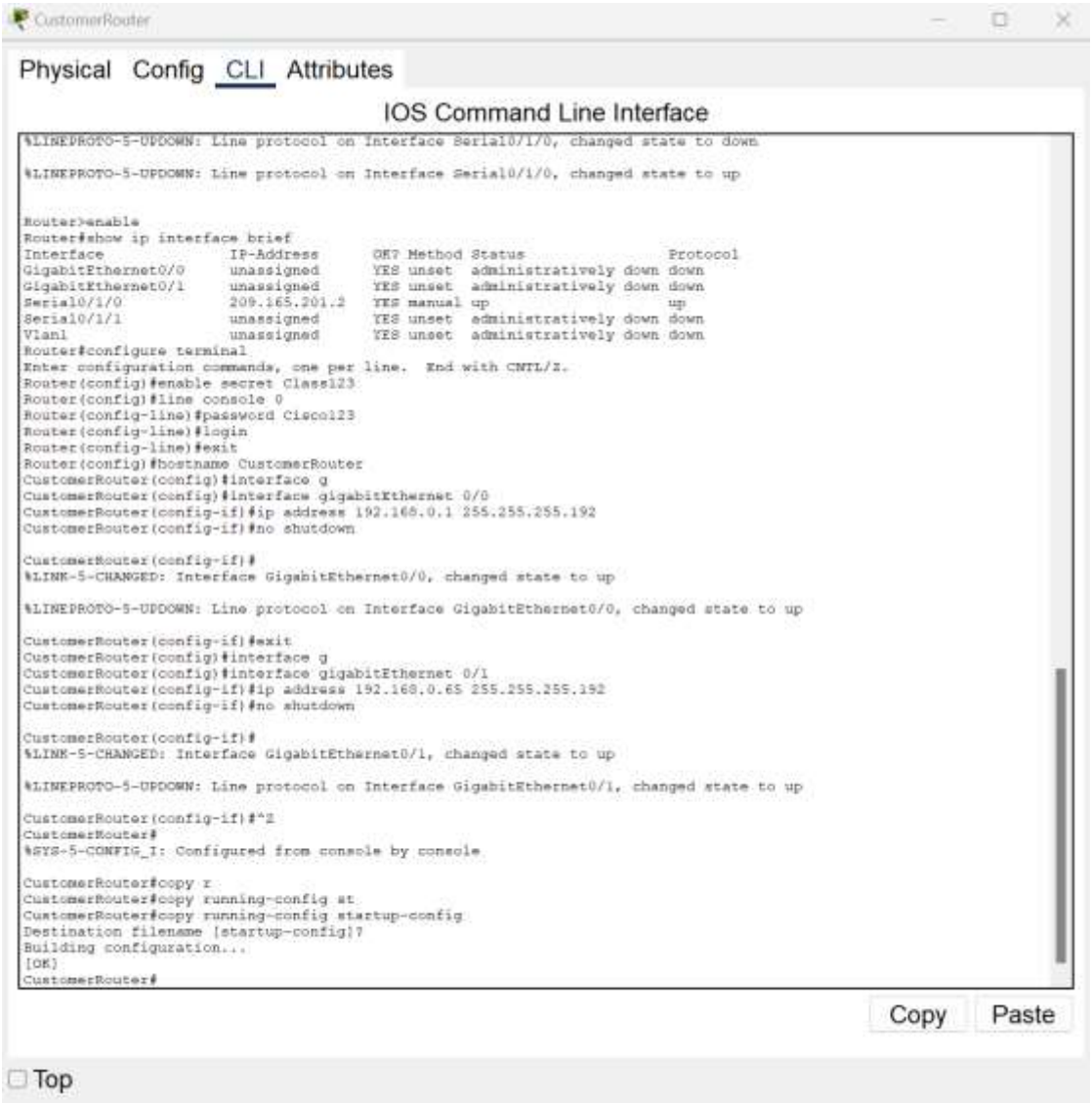
c. Configure **CustomerRouter** as the hostname for the router.

d. Configure the G0/0 and G0/1 interfaces with IP addresses and subnet masks, and then enable them.



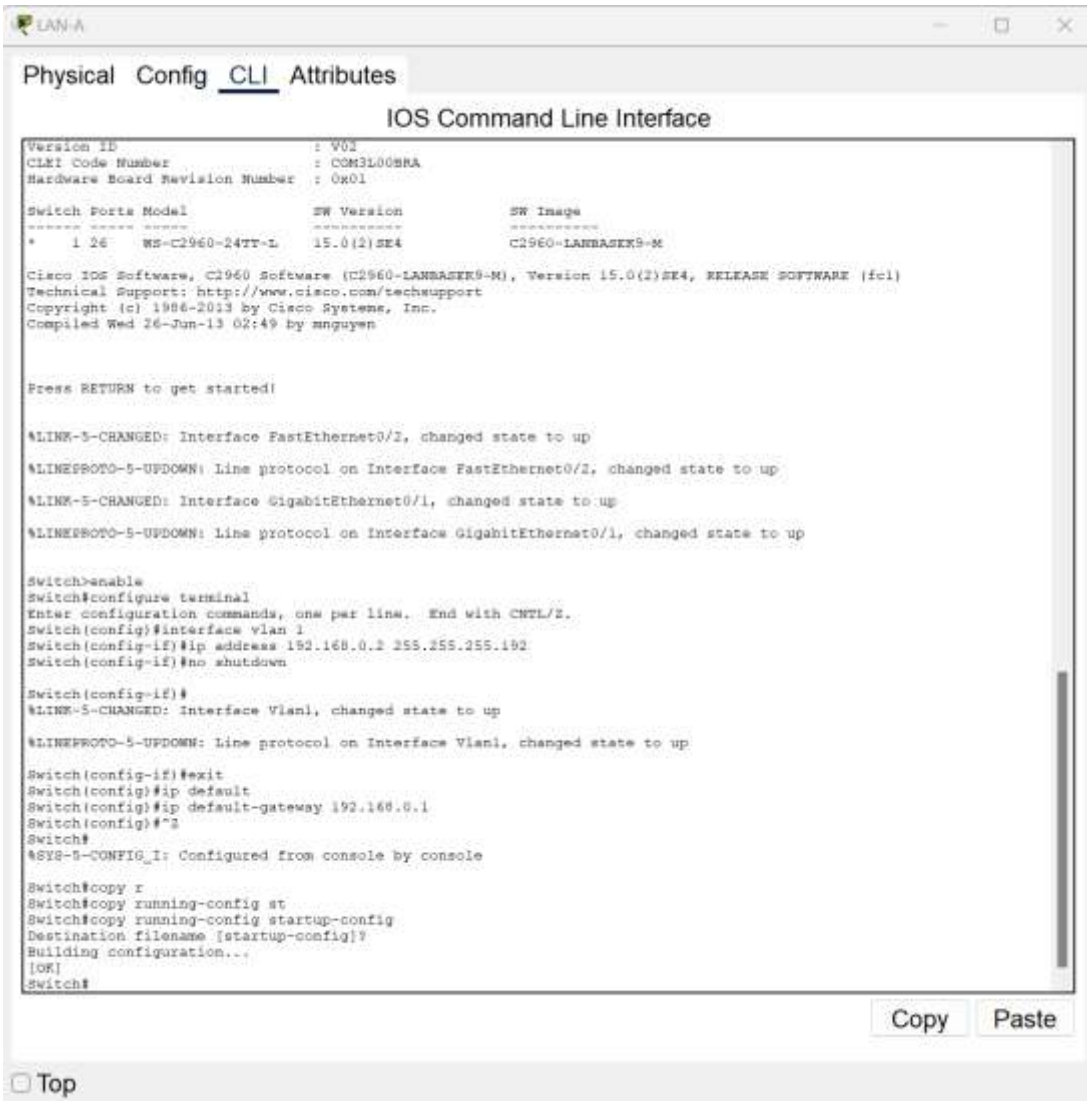


e. Save the running configuration to the startup configuration file.



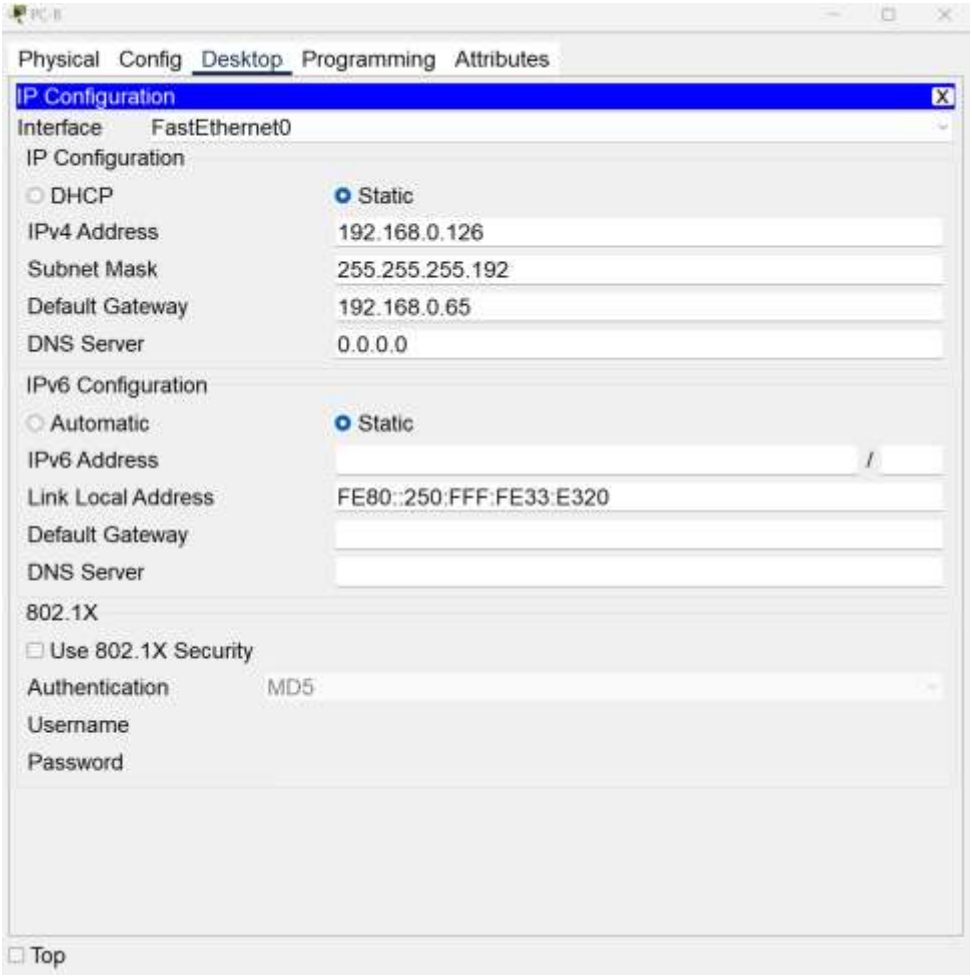
Step 2: Configure the two customer LAN switches.

Configure the IP addresses on interface VLAN 1 on the two customer LAN switches. Make sure to configure the correct default gateway on each switch.



Step 3: Configure the PC interfaces.

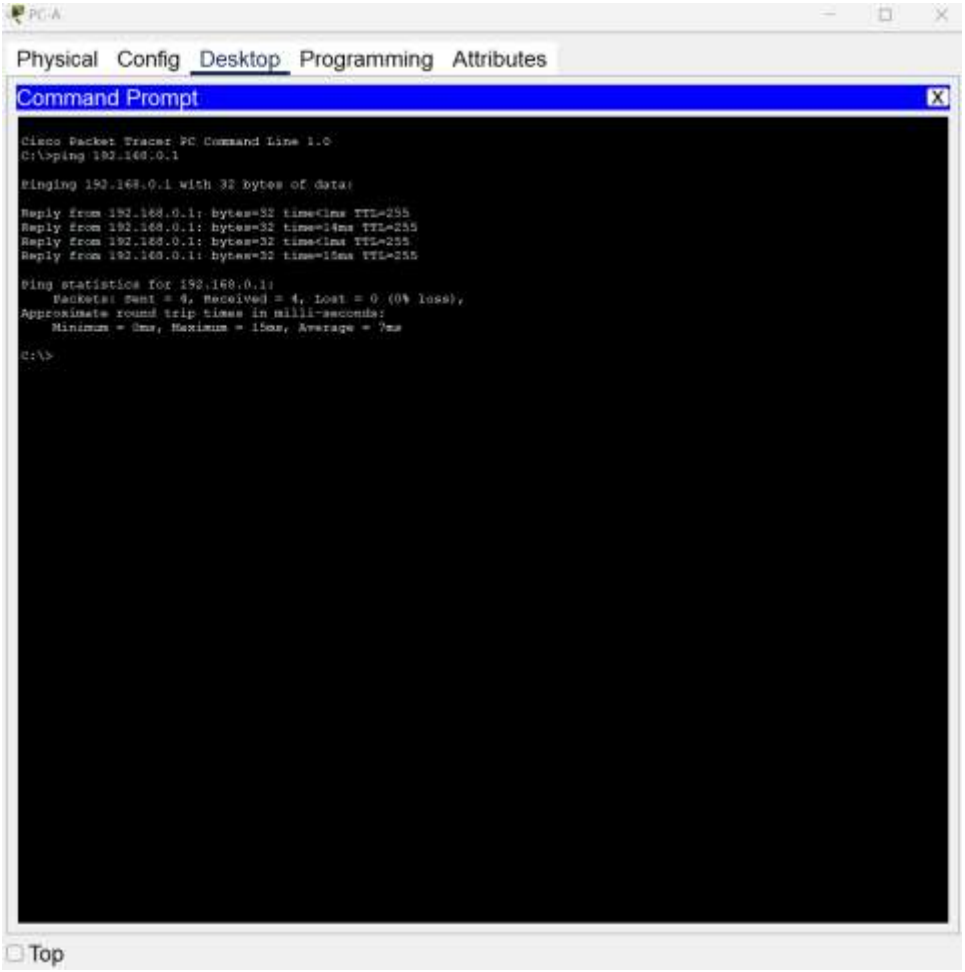
Configure the IP address, subnet mask, and default gateway settings on **PC-A** and **PC-B**.



Part 3: Test and Troubleshoot the Network

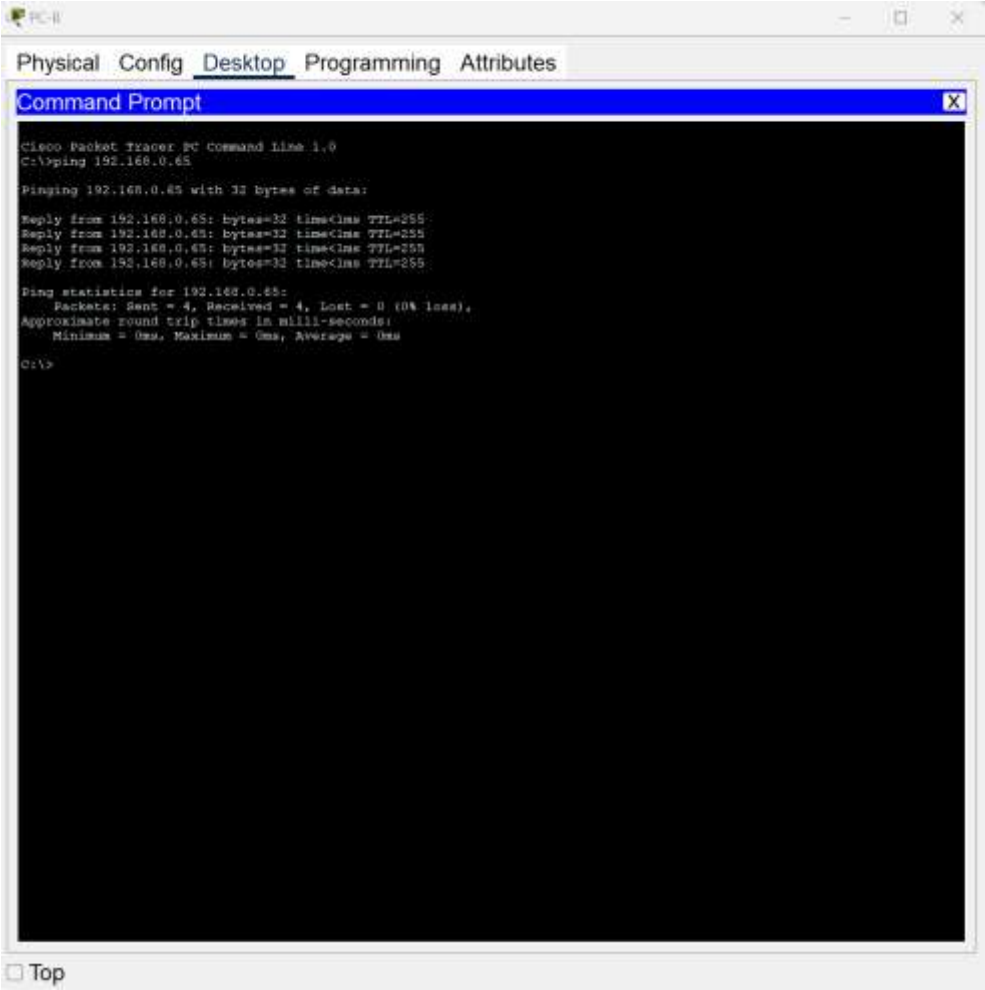
In Part 3, you will use the **ping** command to test network connectivity.

a. Determine if PC-A can communicate with its default gateway. Do you get a reply?



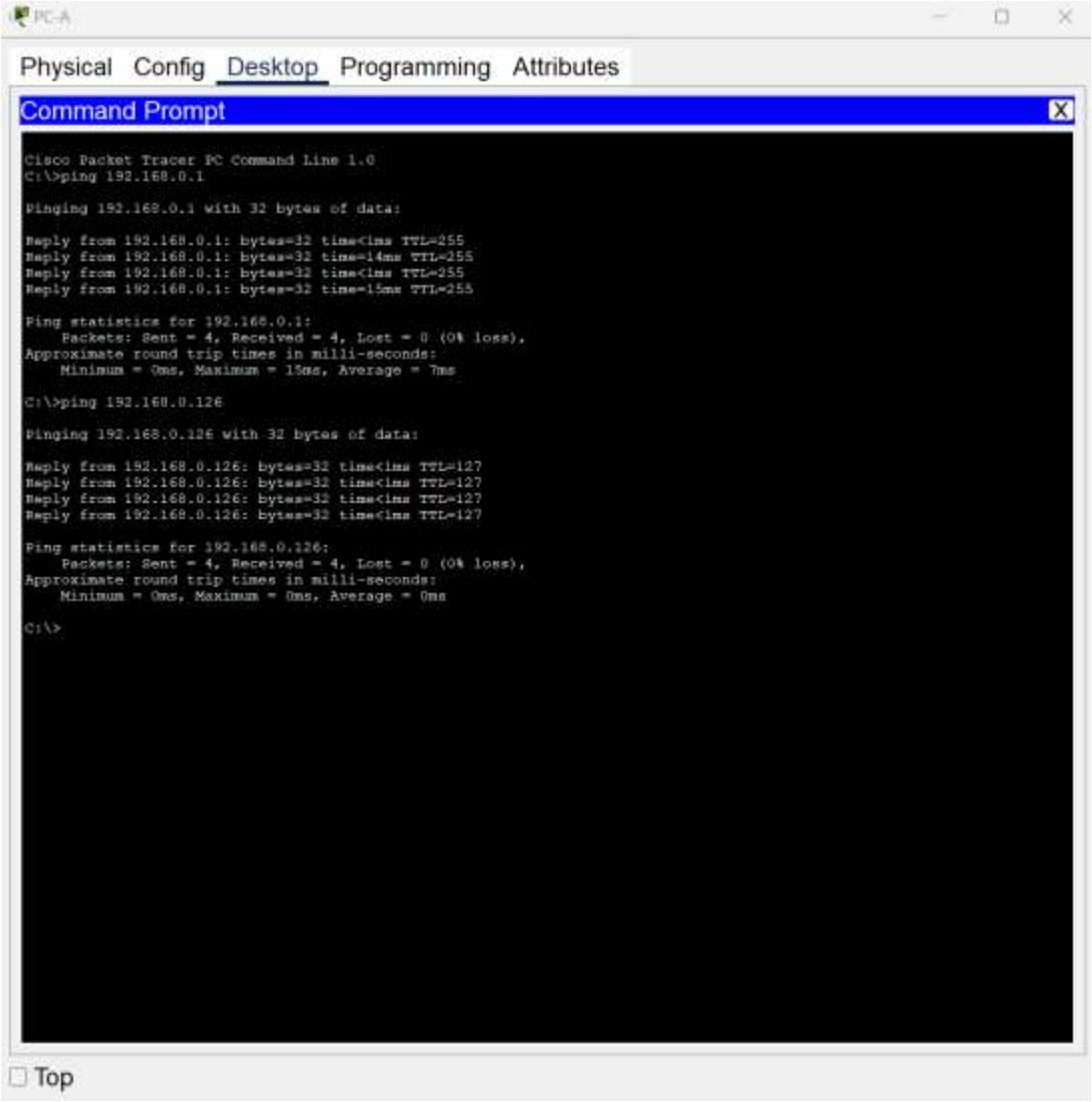
Yes, I was able to receive a response.

b. Determine if PC-B can communicate with its default gateway. Do you get a reply?



Yes, I was able to receive a response.

c. Determine if PC-A can communicate with PC-B. Do you get a reply?



Yes, I was able to receive a response.

If you answered “no” to any of the preceding questions, then you should go back and check your IP address and subnet mask configurations, and ensure that the default gateways have been correctly configured on PC-A and PC-B.