Department of Computer Science and Engineering
Islamic University of Technology (IUT)
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Lab Report 03

CSE 4512: Computer Networks Lab

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Section: 2(A)
Semester: 5th
Academic Year: 2023-2024

Date of Submission: 30/09/2024

Title: Understanding the basics of IP subnetting and Variable Length Subnet Mask (VLSM) and to know Secure Shell (SSH) and Telnet basics.

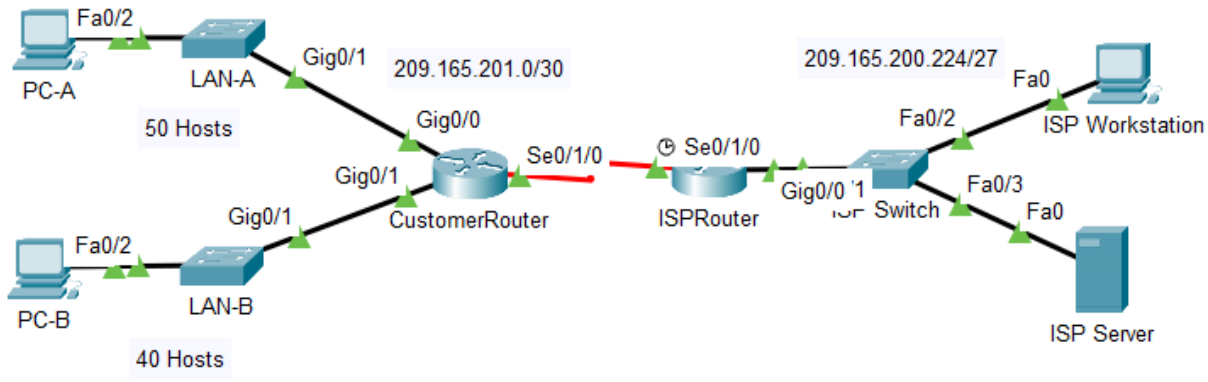
Objectives:

1. Understand the basics of IP Subnetting
2. Learn to subnet a network following given specifications
3. Understand Variable Length Subnet Mask (VLSM) addressing scheme
4. Learn to design and implement VLSM in a network

Diagram of the experiment:

(Provide screenshot of the final network topology. Make sure to label the network components.)

TASK #01:



Working Procedure:

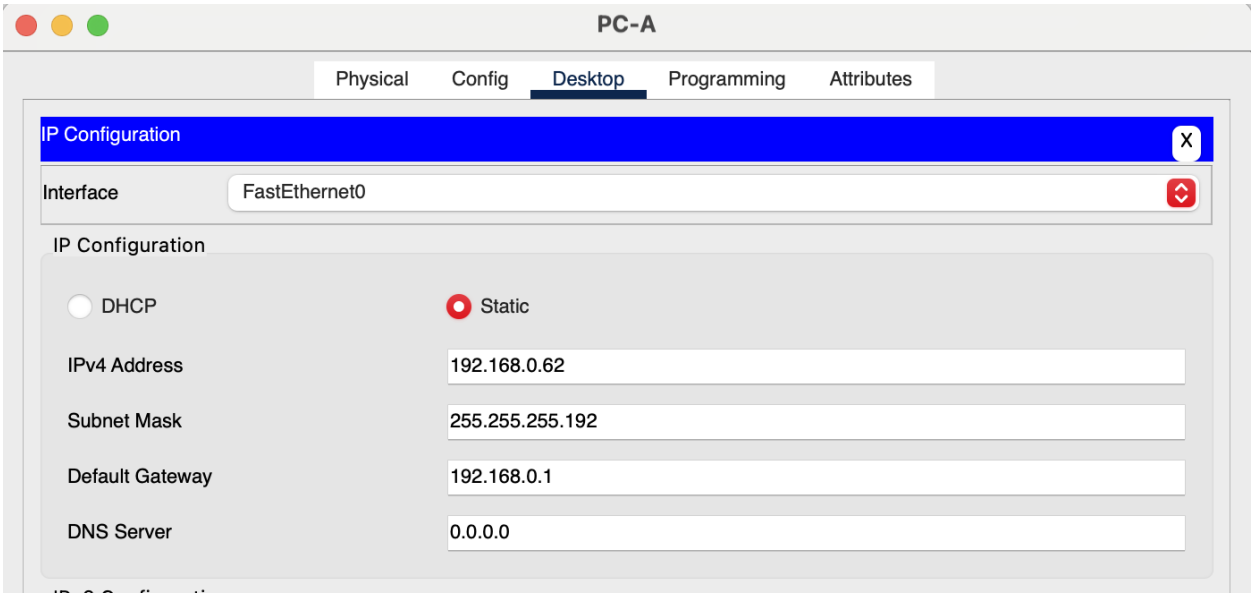
(Explain in brief how you completed the tasks. Provide necessary screenshots of used commands for each task.)

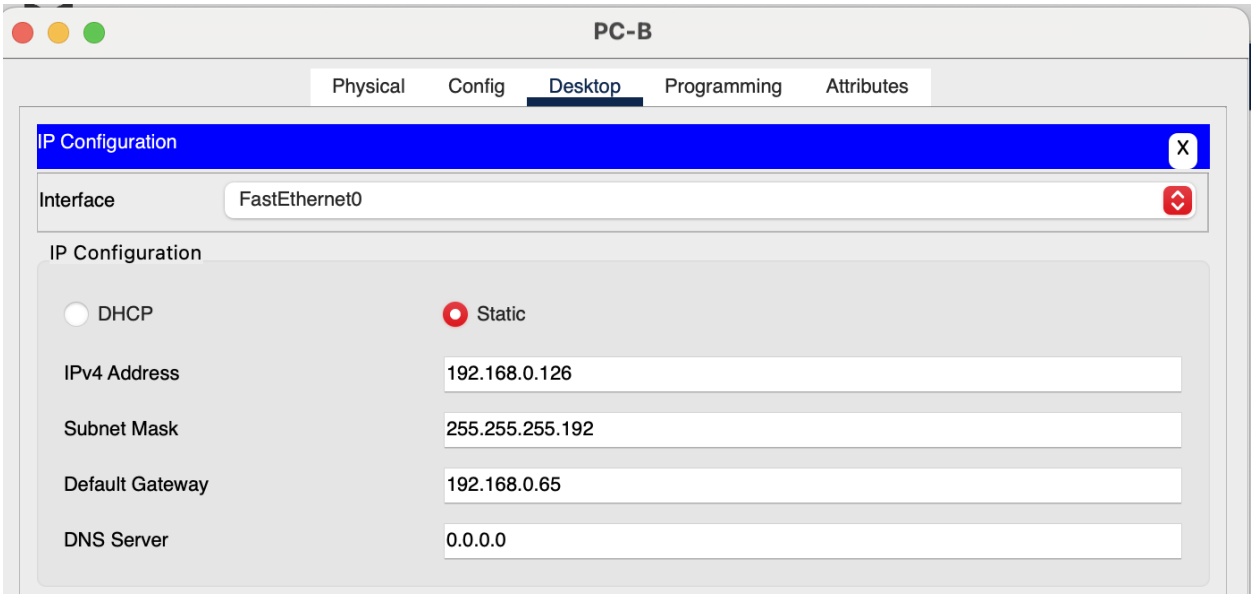
TASK #01:

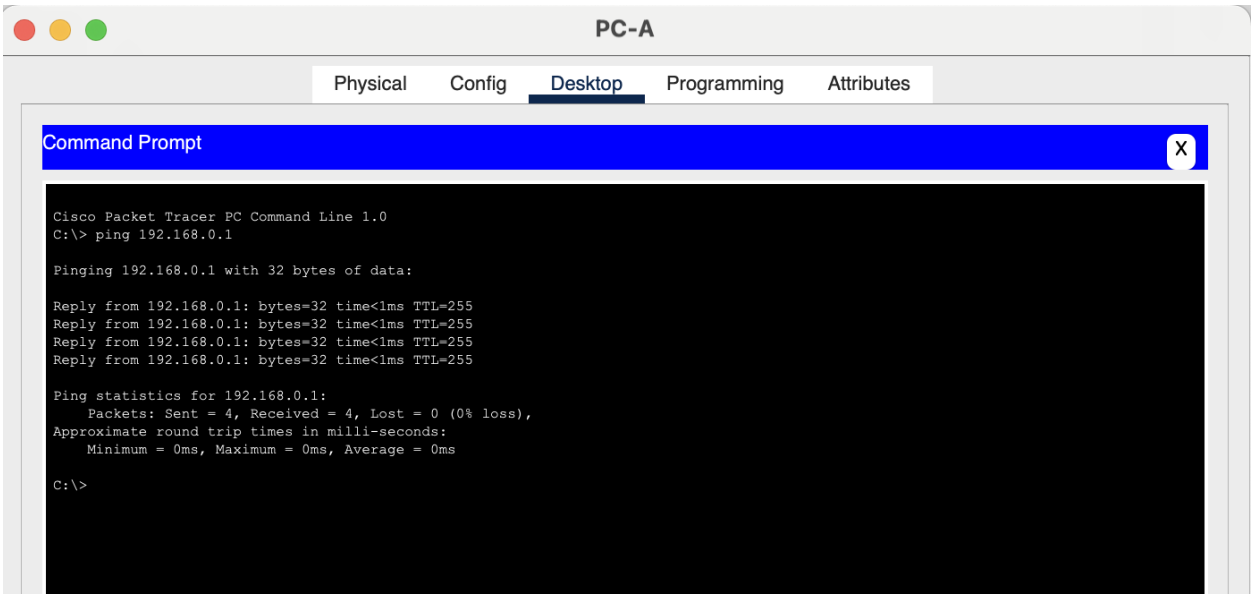
At first I configure the hostname, password, login and ip address and subnet mask of CustomerRouter. Then I Configure the two customer LAN switches and also configure the IP address, subnet mask, and default gateway settings on PC-A and PC-B. And finally I use the ping command from the command-prompt to test the network connectivity.

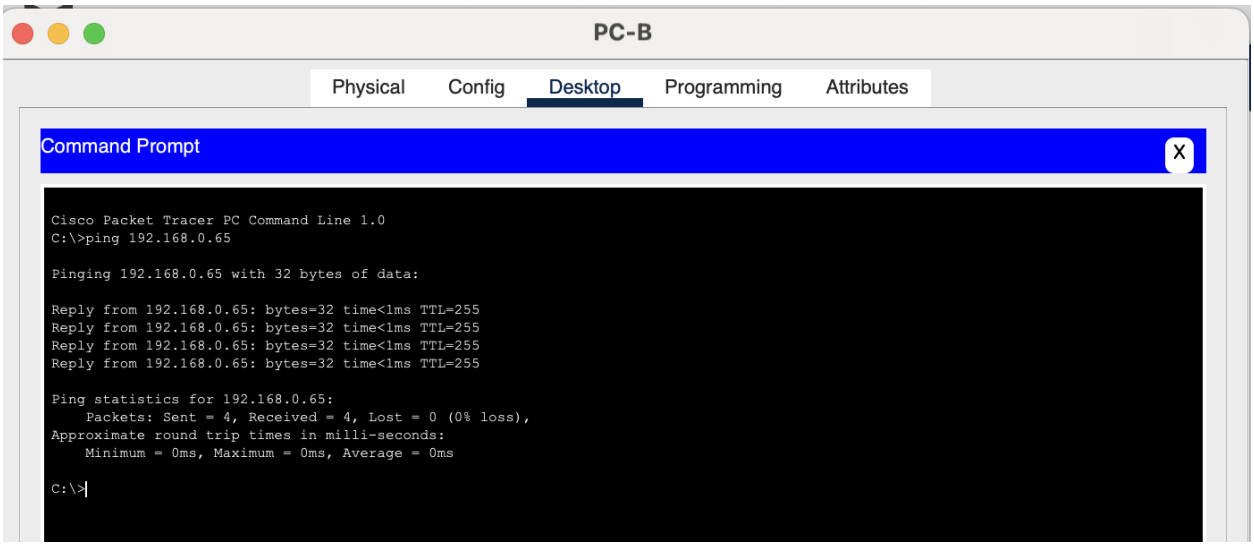
```
CustomerRouter#show ip in
CustomerRouter#show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0     192.168.0.1     YES manual up                    up
GigabitEthernet0/1     192.168.0.65    YES manual up                    up
Serial0/1/0            209.165.201.2   YES manual up                    up
Serial0/1/1            unassigned      YES unset  administratively down down
Vlan1                  unassigned      YES unset  administratively down down
CustomerRouter#
```

```
Press RETURN to get started!


%LINK-5-CHANGED: Interface FastEthernet0/2, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up

%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up


Switch>en
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#
Switch(config)#inter
Switch(config)#ip default-gateway 192.168.0.65
Switch(config)#^Z
Switch#
%SYS-5-CONFIG_I: Configured from console by console

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




PC-B
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
192.168.0.126
Subnet Mask
255.255.255.192
Default Gateway
192.168.0.65
DNS Server
0.0.0.0


PC-A
Physical
Config
Desktop
Programming
Attributes
Command Prompt
X
Cisco Packet Tracer PC Command Line 1.0
C:\> ping 192.168.0.1
Pinging 192.168.0.1 with 32 bytes of data:
Reply from 192.168.0.1: bytes=32 time<1ms TTL=255
Reply from 192.168.0.1: bytes=32 time<1ms TTL=255
Reply from 192.168.0.1: bytes=32 time<1ms TTL=255
Reply from 192.168.0.1: bytes=32 time<1ms TTL=255
Ping statistics for 192.168.0.1:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
C:\>




```
C:\>ping 192.168.0.126

Pinging 192.168.0.126 with 32 bytes of data:

Reply from 192.168.0.126: bytes=32 time<1ms TTL=127
Reply from 192.168.0.126: bytes=32 time<1ms TTL=127
Reply from 192.168.0.126: bytes=32 time<1ms TTL=127
Reply from 192.168.0.126: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.0.126:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

Fill in the missing IP address in the addressing table (Task #01):

Fill in the addressing table with missing IP Address following the steps in **Step 2 of Part 1:**

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**	**192.168.0.1**	**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**	
ISP Switch	**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**

Table: Addressing Table

Questions (Answer to the point):

TASK #01 - Part 1 – Step 1:

1. How many host addresses are needed in the largest required subnet?
   Ans: 50 hosts
2. What is the minimum number of subnets required?
   Ans:4
3. The network that you are tasked to subnet is 192.168.0.0/24. What is the /24 subnet mask in binary?
   Ans: 11111111.11111111.11111111.00000000
4. 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.
   Questions:
   In the network mask, what do the ones represent?
   Ans: The Network portion
   In the network mask, what do the zeros represent?
   Ans: The Host portion
5. 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.
   Questions:
   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?
   a. (/25) 11111111.11111111.11111111.10000000
   Dotted decimal subnet mask equivalent:
   Ans:255.255.255.128
   Number of subnets? Number of hosts?
   Ans: No of subnets=2 and No of hosts per subnet=126
   (/26) 11111111.11111111.11111111.11000000
   Dotted decimal subnet mask equivalent:
   Ans: 255.255.255.192
   Number of subnets? Number of hosts?
   Ans: No of subnets=4 and No of hosts per subnet=62
   b. (/27) 11111111.11111111.11111111.11100000
   Dotted decimal subnet mask equivalent:
   Ans:255.255.255.224
   Number of subnets? Number of hosts?
   Ans: No of subnets=8 and No of hosts per subnet=30
   c. (/28) 11111111.11111111.11111111.11110000

Dotted decimal subnet mask equivalent:
Ans:255.255.255.240
Number of subnets? Number of hosts?
Ans: No of subnets=16 and No of hosts per subnet=14

d. (/29) 11111111.11111111.11111111.11111000
Dotted decimal subnet mask equivalent:
Ans:255.255.255.248
Number of subnets? Number of hosts?
Ans: No of subnets=32 and No of hosts per subnet=6

e. (/30) 11111111.11111111.11111111.11111100
Dotted decimal subnet mask equivalent:
Ans:255.255.255.252
Number of subnets? Number of hosts?
Ans: No of subnets=64 and No of hosts per subnet=2

2. Considering your answers above, which subnet masks meet the required number of minimum host addresses?
Ans:/25 and /26

3. Considering your answers above, which subnet masks meets the minimum number of subnets required?
Ans: /26 , /27 , /28 , /29 , /30

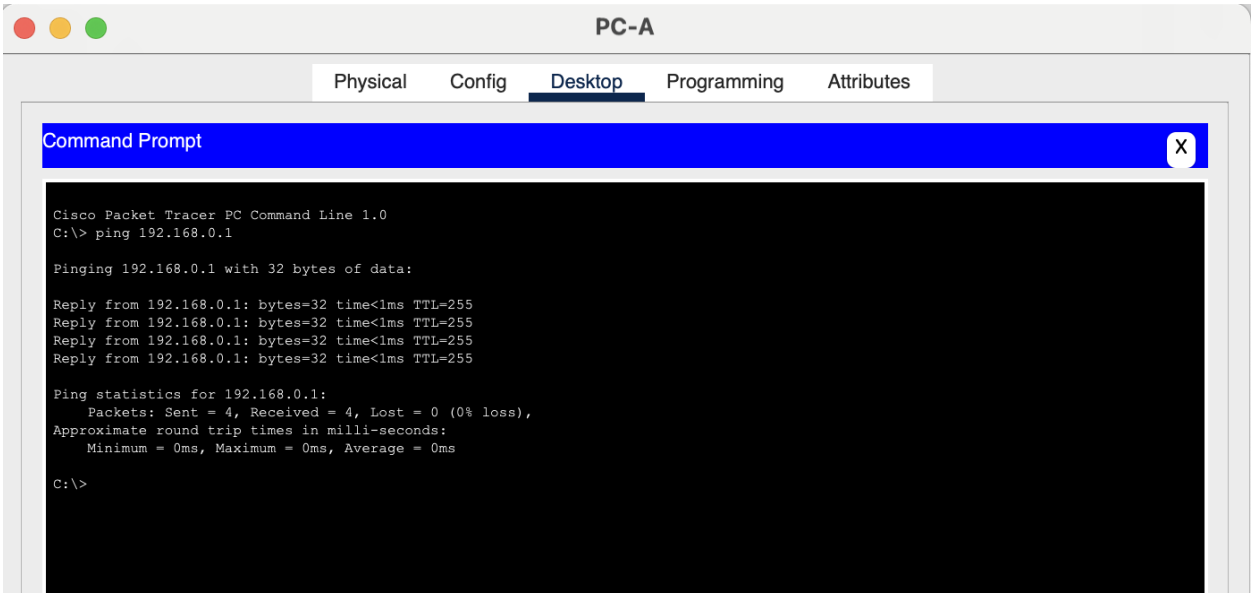
4. Considering your answers above, which subnet mask meets both the required minimum number of hosts and the minimum number of subnets required?
Ans:/26

When you have determined **(Step 1 of Part 1)** which subnet mask meets all of the stated network requirements, derive each of the subnets. List the subnets from the fast to last in the table. Remember that the first subnet is 192.168.0.0 with the chosen subnet mask.

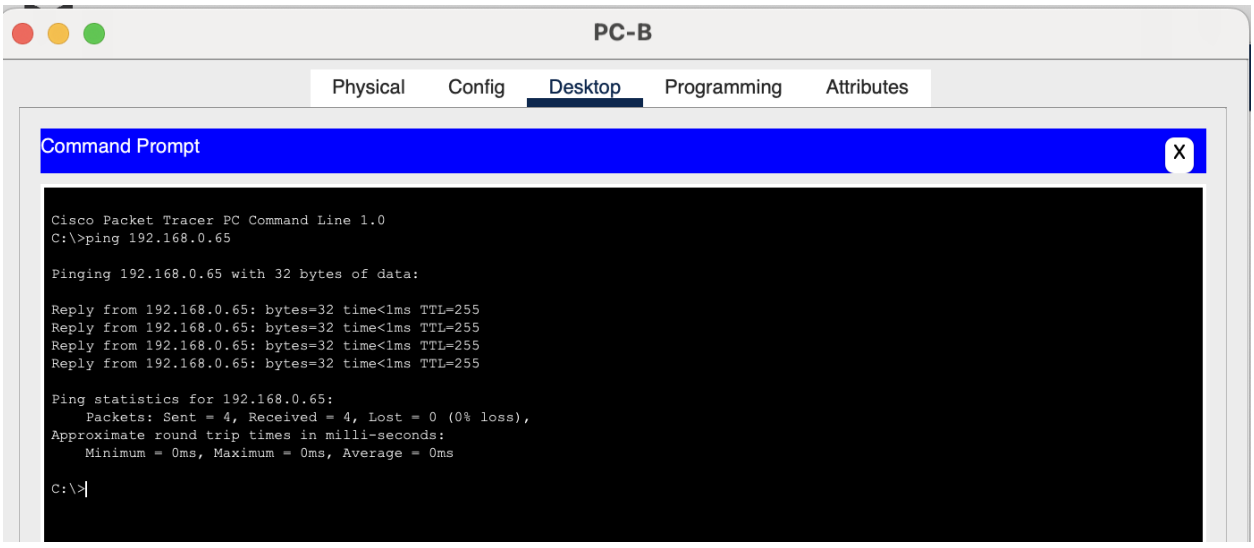
Subnet Address	Prefix	Subnet Mask
192.168.0.0	**/26**	**255.255.255.192**
192.168.0.64	**/26**	**255.255.255.192**
192.168.0.128	**/26**	**255.255.255.192**
192.168.0.192	**/26**	**255.255.255.192**

TASK #01 - Part 3:

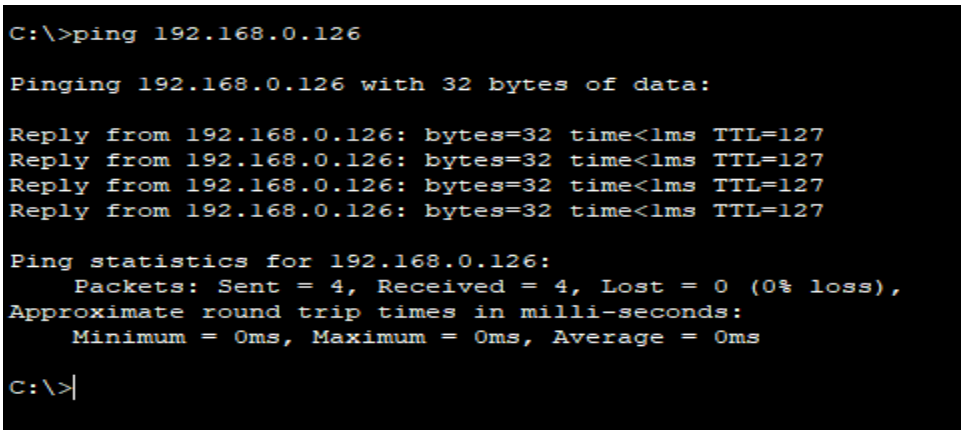
a. Determine if PC-A can communicate with its default gateway. Do you get a reply?
Ans: Yes, I get a reply



b. Determine if PC-B can communicate with its default gateway. Do you get a reply?
Ans: Yes, I get a reply



c. Determine if PC-A can communicate with PC-B. Do you get a reply?
Ans: Yes, I get a reply



Challenges (if any):