UNIVERSITI TEKNOLOGI MARA

INTRODUCTION TO DATA COMMUNICATION AND NETWORKING (ITT300)

GROUP PROJECT

SUBNETTING IPv4 ADDRESSING (USING PACKET TRACER)

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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 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:

Questions:

1A. How many host addresses are needed in the largest required subnet?

Answer: **In LAN-A network it mention 50 host IP addresses so the largest required subnet is 50**

1B. What is the minimum number of subnets required?

Answer: **The minimum number of subnets that are required by the two company combine with two additional networks for the future expansion is 4 networks.**

1C. The network that you are tasked to subnet is 192.168.0.0/24. What is the /24 subnet mask in binary?

Answer: **11111111.11111111.11111111.00000000**

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.

Questions:

1D. In the network mask, what do the ones represent?

Answer: **The ones represent the network portion.**

1E. In the network mask, what do the zeros represent?

Answer: **The zeroes represent the host portion.**

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.

Questions:

1F. 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?

1) (/25) 11111111.11111111.11111111.10000000
   Dotted decimal subnet mask equivalent:
   Answer: **255.255.255.128**
   Number of subnets? Number of hosts?:
   Answer: **Two subnets (2^1) and 128 hosts (2^7) – 2 = 126 hosts per subnet**
2) (/26) 11111111.11111111.11111111.11000000
   Dotted decimal subnet mask equivalent:
   Answer: **255.255.255.192**
   Number of subnets? Number of hosts?:
   Answer: **Four subnets (2^2) and 64 hosts (2^6) – 2 = 62 hosts per subnet**
3) (/27) 11111111.11111111.11111111.11100000
   Dotted decimal subnet mask equivalent:
   Answer: **255.255.255.224**
   Number of subnets? Number of hosts?
   Answer: **Eight subnets (2^3) and 32 hosts (2^5) – 2 = 30 hosts per subnet**
4) (/28) 11111111.11111111.11111111.11110000
   Dotted decimal subnet mask equivalent:
   Answer: **255.255.255.240**
   Number of subnets? Number of hosts?
   Answer: **Sixteen subnets (2^4) and 16 hosts (2^4) – 2 = 14 hosts per subnet**
5) (/29) 11111111.11111111.11111111.11111000
   Dotted decimal subnet mask equivalent:
   Answer: **255.255.255.248**
   Number of subnets? Number of hosts?
   Answer: **Thirty two subnets (2^5) and 8 hosts (2^3) – 2 = 6 hosts per subnet**
6) (/30) 11111111.11111111.11111111.11111100
   Dotted decimal subnet mask equivalent:
   Answer: **255.255.255.252**
   Number of subnets? Number of hosts?
   Answer: **Sixty four subnets (2^6) and 4 hosts (2^2) – 2 = 2 hosts per subnet**

1G. Considering your answers above, which subnet masks meet the required number of minimum host addresses?

Answer: **/25, /26**

1H. Considering your answers above, which subnet masks meets the minimum number of subnets required?

Answer: **/26, /27, /28, /29, /30 will give the required number of subnets.**

1I. Considering your answers above, which subnet mask meets both the required minimum number of hosts and the minimum number of subnets required?

Answer:

/26 will give the four subnets that are required, and 62 hosts per subnet, which is greater than the 50 hosts required for the first subnet.

1J. 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

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	N/A
	S0/1/0	209.165.201.2	255.255.255.252	N/A
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	N/A
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

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.

Answer :

```
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#enable secret Class123
Router(config)#line console 0
Router(config-line)#password Cisco123
Router(config-line)#login
Router(config-line)#exit
Router(config)#hostname CustomerRouter

CustomerRouter(config)#int f0/0
CustomerRouter(config-if)#ip add 192.168.0.1 255.255.255.192
CustomerRouter(config-if)#no shutdown

CustomerRouter(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed
state to up

CustomerRouter(config-if)#int f0/1
CustomerRouter(config-if)#ip add 192.168.0.62 255.255.255.192
CustomerRouter(config-if)#no shut

CustomerRouter(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed
state to up
^Z
CustomerRouter#
%SYS-5-CONFIG_I: Configured from console by console

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

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.

LAN A:

```
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#int vlan1
Switch(config-if)#ip add 192.168.0.2 255.255.255.192
Switch(config-if)#no shut

Switch(config-if)#
%LINK-5-CHANGED: Interface Vlan1, changed state to up

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

Switch(config-if)#exit
Switch(config)#ip default-gateway 192.168.0.1
Switch(config)#^Z
Switch#
%SYS-5-CONFIG_I: Configured from console by console

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

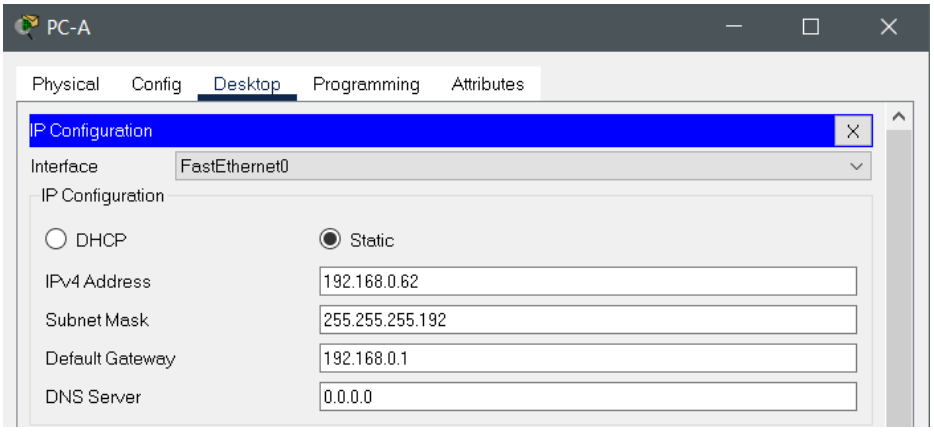
LAN B:

```
Switch>en
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#int vlan1
Switch(config-if)#ip add 192.168.0.66 255.255.255.192
Switch(config-if)#no shut

Switch(config-if)#
%LINK-5-CHANGED: Interface Vlan1, changed state to up

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

Switch(config-if)#exit
Switch(config)#ip default-gateway 192.168.0.65
Switch(config)#^Z
Switch#
%SYS-5-CONFIG_I: Configured from console by console

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

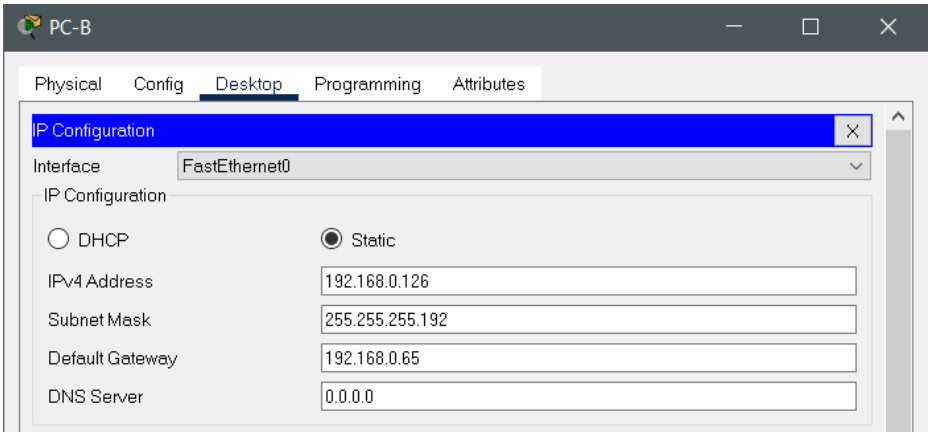
Step 3: Configure the PC interfaces.

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

PC-A:



PC-B:

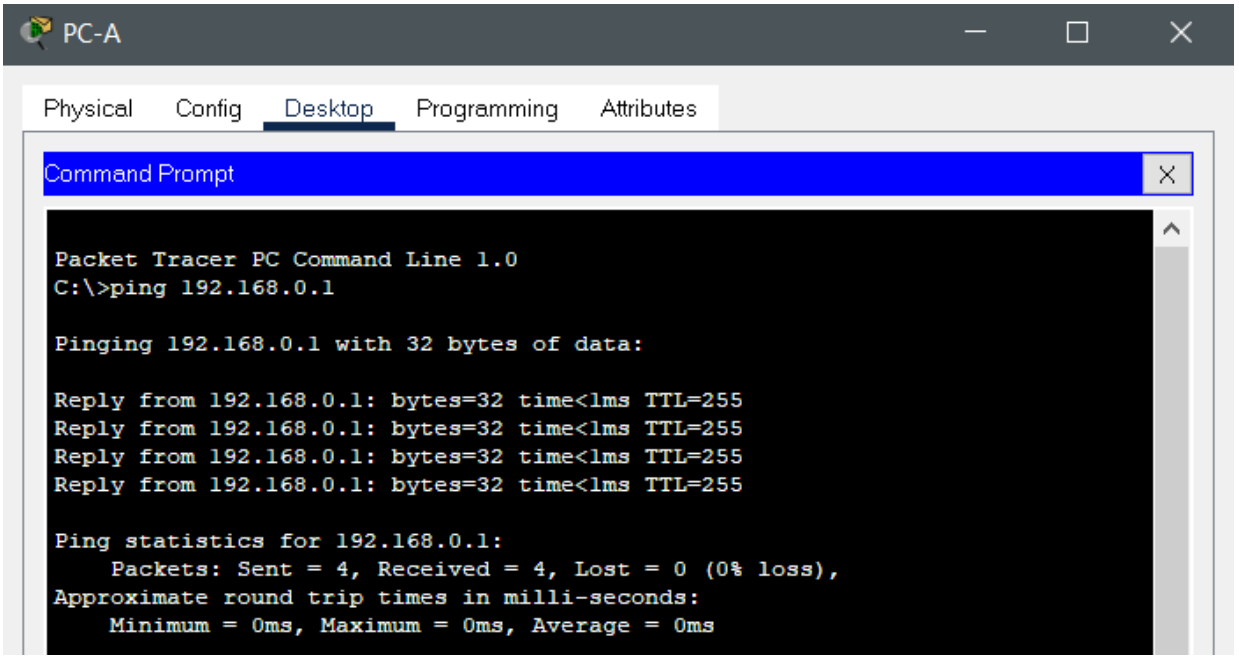


PART 3: TEST AND TROUBLESHOOT THE NETWORK

In Part 3, you will use the ping command to test network connectivity. Provide proves (snapshots) of the ping results.

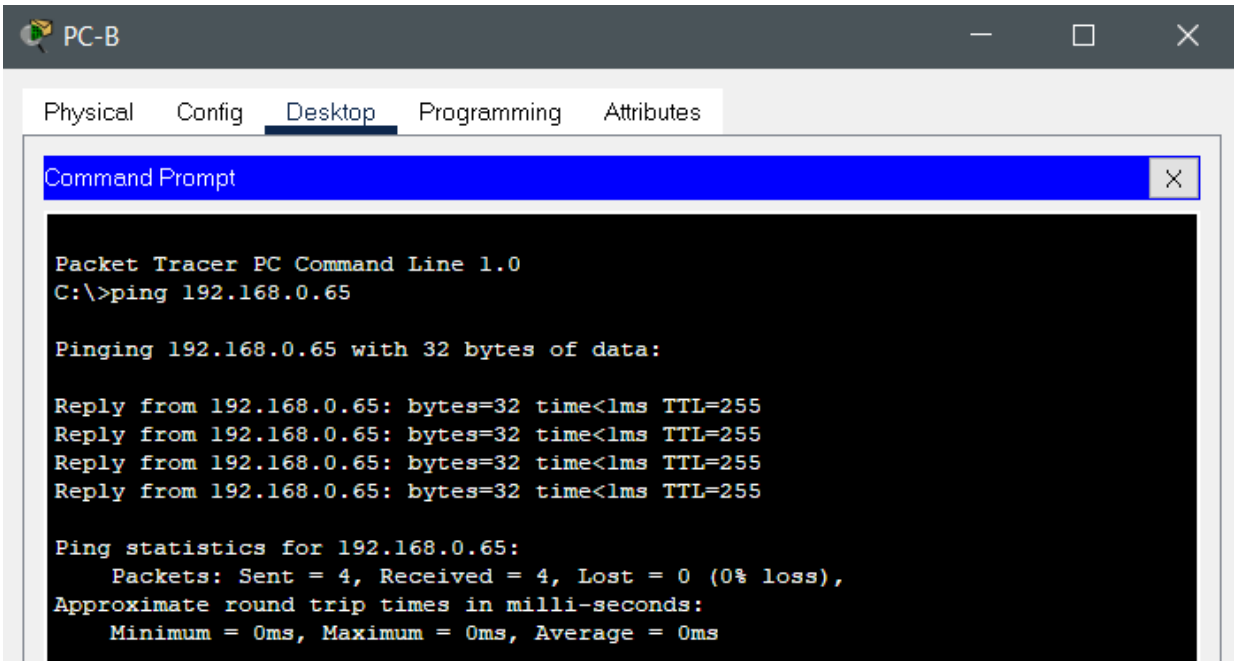
a. Determine if PC-A can communicate with its default gateway. Do you get a reply?

Answer: Yes



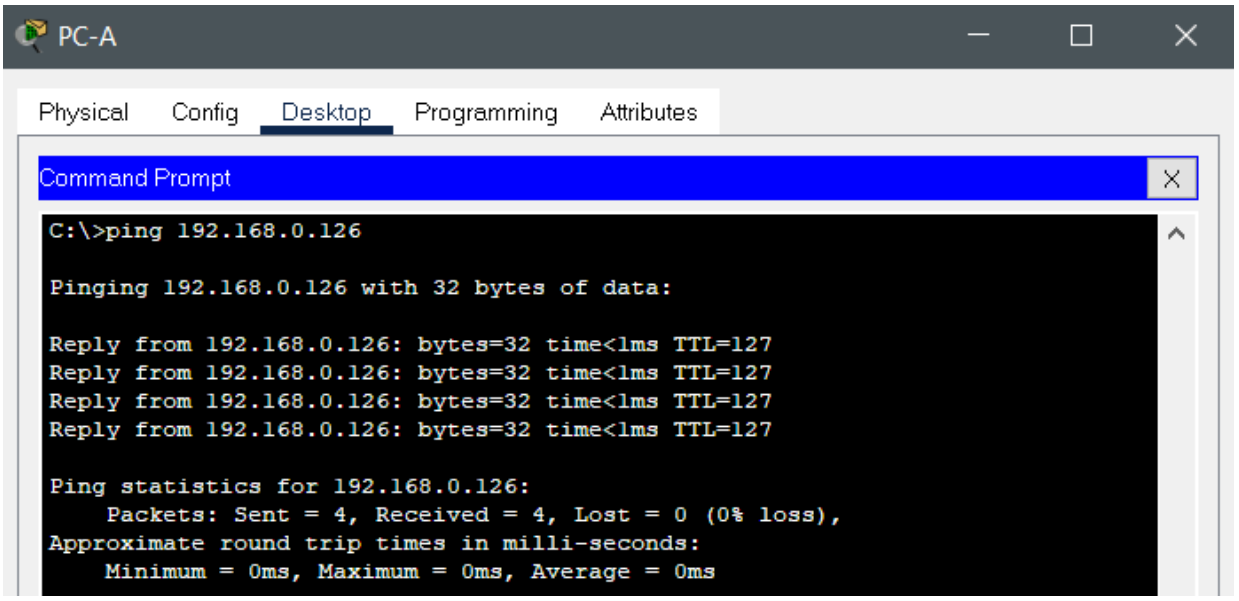
b. Determine if PC-B can communicate with its default gateway. Do you get a reply?

Answer: Yes



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

Answer: Yes



Scoring Rubric:

ACTIVITY SECTION		QUESTIONS	POINTS	EARNED POINTS
Part 1: Design	Step 1	1A	1	
		1B	1	
		1C	1	
		1D	1	
		1E	1	
		1F	12	
		1G	2	
		1H	2	
		1I	1	
		1J	12	
	Step 2	2	16	
	TOTAL (5%)		50	
Part 2: Configuration of devices	Step 1		20	
	Step 2		5	
	Step 3		5	
Part 3: Testing		a, b, c	20	
	TOTAL (15%)		50	