FACULTY OF COMPUTING AND INFORMATION TECHNOLOGY

AACS2034 Fundamentals of Computer Networks

Assignment

Academic Session: 202201 (Sem 3, 2021/22)

Programme: DFT

Tutorial Group: Group 1

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1.0 Introduction

From the assignment scenario, I was hired as an engineer by Innovative Bhd. I have been tasked to design and set up a local area network for the company in different locations. I have been assigned 3 locations to set a local area network. For **location A**, it has 3 departments on each floor. The ground floor is the Sales Department, the first floor is the Administrative Department and the second floor is the Management Department. Three hosts required in these three departments are 135,000, 740 and 80. After that, **location B** has two departments. It is the Research and Development Department, it has 945,000 hosts required and in the Manufacturing Plant, it has 1,356,720 hosts required. In **location C**, it is Living Quarters, its host required is 4,116,500.

Then, my topology is star topology, because our network design is connected like a star. I use one router and six switches to connect each department network. In **location A**, the Sales department, i use 2 pc and 1 laptop to represent the 135,000 hosts and in the management department and administrative department, i use 1 pc and 1 laptop to represent the 80 hosts and 740 hosts. In **location B**, I use 2 PCs and 1 laptop to represent the research and development department and manufacturing plant. There are 945,000 hosts and 1,356,720 hosts. In **location C**, I use 2 PCs and 1 laptop to represent the 4,116,500 hosts in the living quarters. In my topology design, I use Fast Ethernet interface to connect the switches from the router to each department. Besides, all the end devices are connected to each other by using copper straight-through cable.

By completing the assignment, I am able to use various digital resources to complete tasks related to network configuration based on the questions given. For example, I use the Cisco packet tracer, Panopto and other platforms to complete this assignment and enhance my understanding of this computer network. By doing so, digital skills such as digital collaboration skills, social media skills and so on are very helpful for us to live in a digital and technological society nowadays.

When I am subnetting an IP address for the network, the class that has been used is class A addressing, it is a private address space that can be used by a new company. The techniques that I implemented are Variable Length Subnet Masks (VLSM) which allows us to use different subnet masks and create subnets depending on each department host that is required. The address space can be allocated efficiently because IP addresses are given based on the number of hosts needed, so not too many IP addresses are wasted.

So, from this assignment, I will learn how to calculate a growth table, subnetting table and use it to design a network topology. I also learned how to use the command in packet tracer to configure the network address.

2.0 Growth Table

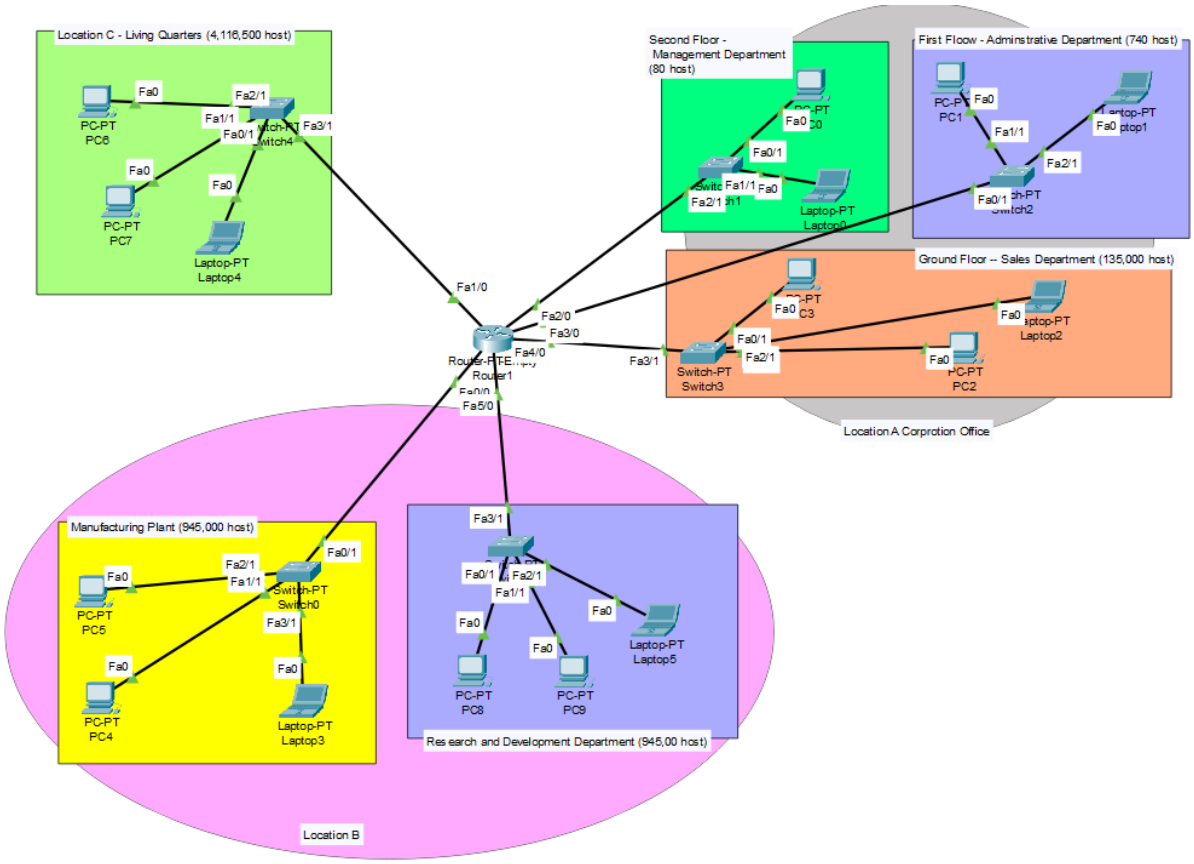
A (Management Department)
Host address in subnet mask: 80 85% growth in subnet mask: 80 x 85% = **68** Total of address in subnet mask: 68 + 80 = **148**
A (Administrative Department)
Host address in subnet mask: 740 85% growth in subnet mask: 740 x 85% = **629** Total of address in subnet mask: 740 + 629 = **1,369**
A (Sales Department)
Host address in subnet mask: 135,000 85% growth in subnet mask: 135,000 x 85% = **114,750** Total of address in subnet mask: 135,000 + 114,750 = **249,750**
B (Research and Development Department)
Host address in subnet mask: 945,000 85% growth in subnet mask: 945,000 x 85% = **803,250** Total of address in subnet mask: 945,000 + 803,250 = **1,748,250**
B (Manufacturing Plant)
Host address in subnet mask: 1,356,720 85% growth in subnet mask: 1,356,720 x 85% = **1,153,212** Total of address in subnet mask: 1,356,720 + 1,153,212 = **2,509,932**
C (Living Quarters)
Host address in subnet mask: 4,116,500

85% growth in subnet mask: 4,116,500 x 85% = **3,499,025**

Total of address in subnet mask: 4,116,500 + 3,499,025 = **7,615,525**

The conclusion of this growth table is the total number of addresses required for the largest subnet in all area is location C , it need 7,615,525

3.0 Network Design



4.0 Subnetting Table

- Before growth

Location (Department)	Number of host Required	Prefix	Subnet Mask	Subnet Address	First Usable IP address	Last Usable IP address	Broadcast Address
C (Living Quarters)	**4,116,500**	/10	255.192.0.0	10.0.0.0	10.0.0.1	10.63.255.254	10.63.255.255
B (Manufacturing Plant)	**1,356,720**	/11	255.224.0.0	10.64.0.0	10.64.0.1	10.95.255.254	10.95.255.255
Research and Development	**945,000**	/12	255.240.0.0	10.96.0.0	10.96.0.1	10.111.255.254	10.111.255.255
A (Sales)	**135,000**	/14	255.252.0.0	10.112.0.0	10.112.0.1	10.115.255.254	10.115.255.255
A (Administrative)	**740**	/22	255.255.252.0	10.116.0.0	10.116.0.1	10.116.3.254	10.116.3.255
A (Management)	**80**	/25	255.255.255.128	10.116.4.0	10.116.4.1	10.116.4.126	10.116.4.127
				10.116.4.128			

- After growth

Location (Department)	Number of host Required	Prefix	Subnet Mask	Subnet Address	First Usable IP address	Last Usable IP address	Broadcast Address
C (Living Quarters)	**7,615,525**	/9	255.128.0.0	10.0.0.0	10.0.0.1	10.127.255.254	10.127.255.255
B (Manufacturing Plant)	**2,509,932**	/10	255.192.0.0	10.128.0.0	10.128.0.1	10.191.255.254	10.191.255.255
Research and Development	**1,748,250**	/11	255.224.0.0	10.192.0.0	10.192.0.1	10.223.255.254	10.223.255.255
A (Sales)	**249,750**	/14	255.252.0.0	10.224.0.0	10.224.0.1	10.227.255.254	10.227.255.255
A (Administrative)	**1,369**	/21	255.255.248.0	10.228.0.0	10.228.0.1	10.228.7.254	10.228.7.255
A (Management)	**148**	/24	255.255.255.0	10.228.8.0	10.228.8.1	10.228.8.254	10.228.8.225

- Assign the **first usable IP address** to **Router**
- Assign the **last usable IP address** for **Host**

5.0 Table for the each location connections and end devices

Location (Department)	**Router**	**Switch**	**End Device**
Location A (Management Department)	Fa 2/0	Switch 1	- PC 0 - Laptop 0
Location A (Sales Department)	Fa 4/0	Switch 3	- PC 2 - PC 3 - Laptop 2
Location A (Administrative Department)	Fa 3/0	Switch 2	- PC 1 - Laptop 1
Location B (Manufacturing Department)	Fa 0/0	Switch 0	- PC 4 - PC 5 - Laptop 3
Location B (Research and Development Department)	Fa 5/0	Switch 5	- PC 8 - PC 9 - Laptop 5
Location C (Living Quarters)	Fa 1/0	Switch 4	- PC 6 - PC 7 - Laptop 4

6.0 Addressing Table

Device	Interface	IPv4 Address	Subnet Mask	Default Gateway
Router	**Fa 0/0**	10.128.0.1	255.192.0.0	N/A
	Fa 2/0	10.228.8.1	255.255.255.0	
	Fa 4/0	10.224.0.1	255.252.0.0	
	Fa 1/0	10.0.0.1	255.128.0.0	
	Fa 5/0	10.192.0.1	255.224.0.0	
	Fa 3/0	10.228.0.1	255.255.248.0	
Switch 0	**VLAN 1**	10.128.0.2	255.192.0.0	10.128.0.1
Switch 1		10.228.8.2	255.255.255.0	10.228.8.1
Switch 2		10.228.0.2	255.255.248.0	10.228.0.1
Switch 3		10.224.0.2	255.252.0.0	10.224.0.1
Switch 4		10.0.0.2	255.128.0.0	10.0.0.1
Switch 5		10.192.0.2	255.224.0.0	10.192.0.1
PC 0	**NIC**	10.228.8.254	255.255.255.0	10.228.8.1
PC 1		10.228.7.254	255.255.248.0	10.228.0.1
PC 2		10.227.255.254	255.252.0.0	10.224.0.1
PC 3		10.227.255.253	255.252.0.0	10.224.0.1
PC 4		10.191.255.254	255.192.0.0	10.128.0.1

PC 5		10.191.255.253	2558.192.0.0	10.128.0.1
PC 6		10.127.255.254	255.128.0.0	10.0.0.1
PC 7		10.127.255.253	255.128.0.0	10.0.0.1
PC 8		10.223.225.254	255.224.0.0	10.192.0.1
PC 9		10.223.225.253	255.224.0.0	10.192.0.1
LAPTOP 0	**NIC**	10.228.8.253	255.255.255.0	10.228.8.1
LAPTOP 1		10.228.7.253	255.255.248.0	10.228.0.1
LAPTOP 2		10.227.255.253	255.252.0.0	10.224.0.1
LAPTOP 3		10.191.255.252	255.192.0.0	10.128.0.1
LAPTOP 4		10.127.255.252	255.128.0.0	10.0.0.1
LAPTOP 5		10.223.255.252	255.224.0.0	10.192.0.1

7.0 Configuration

Device	Configure Command
Router & Switch (set password & secret)	To set router and switch password and secret Secret = AACS2034 Password = C!sco Router > enable Router(config)# line console 0 Router(config-line)# password _____ (password) Router(config-line)# login Router(config-line)# enable secret _____ (secret password) **example:** `Router>enable` `Router#configure terminal` `Enter configuration commands, one per line. End with CNTL/Z.` `Router(config)#` `Router(config)#line console 0` `Router(config-line)#password C!sco` `Router(config-line)#login` `Router(config-line)#enable secret AACS2034`
Router	To assign IP Address and subnet mask Router > enable Router# configure terminal Router(config)# interface _____ (interface name) Router(config-if)# ip address _____ (IPv4 address) _____(subnet mask) Router(config-if)# no shutdown Router(config-if)# exit Router(config)# exit Router# copy running-config startup-config Router# show ip interface brief **example:**

```
Router(config)#interface fastethernet 5/0
Router(config-if)#ip address 10.192.0.1 255.224.0.0
Router(config-if)#no shutdown
Router(config-if)#interface fastethernet 3/0
Router(config-if)#ip address 10.228.0.1 255.255.248.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

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

```
Router#show ip interface brief
Interface              IP-Address      OK? Method Status
Protocol
FastEthernet0/0        10.128.0.1      YES manual up                    up
FastEthernet1/0        10.0.0.1        YES manual up                    up
FastEthernet2/0        10.228.8.1      YES manual up                    up
FastEthernet3/0        10.228.0.1      YES manual up                    up
FastEthernet4/0        10.224.0.1      YES manual up                    up
FastEthernet5/0        10.192.0.1      YES manual up                    up
FastEthernet6/0        unassigned      YES unset  administratively down down
FastEthernet7/0        unassigned      YES unset  administratively down down
FastEthernet8/0        unassigned      YES unset  administratively down down
FastEthernet9/0        unassigned      YES unset  administratively down down
Router#
```

Switch

To assign IP Address, subnet mask and default gateway

Switch > enable

Switch# configure terminal

Switch(config)# interface VLAN1

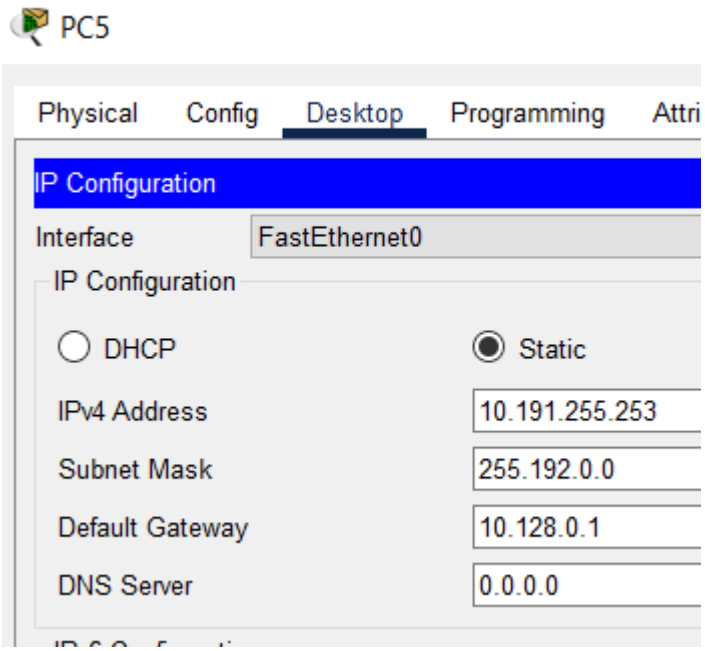
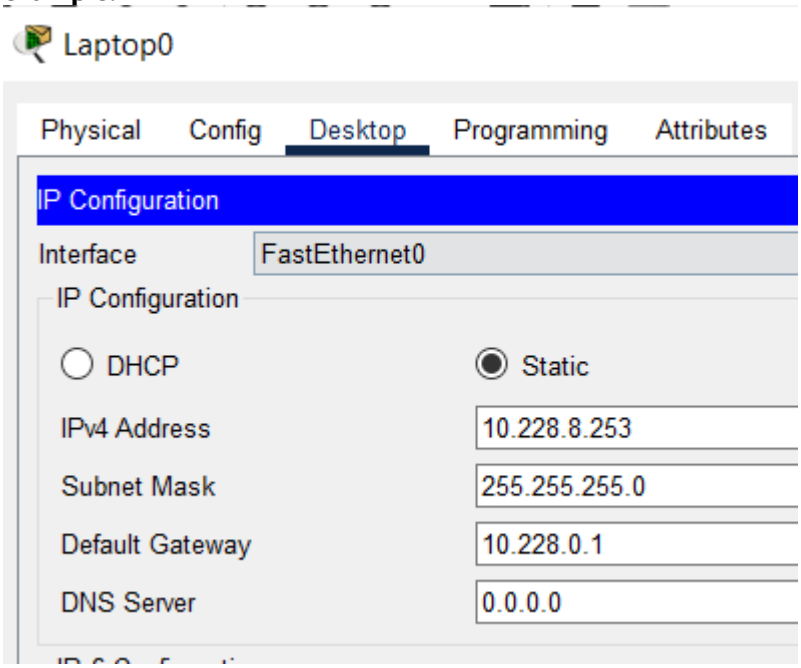
Switch(config-if)# ip address ____ (IPv4 address) ____ (subnet mask)

Switch(config-if)# no shutdown

Switch(config)# ip default-gateway _____ (default gateway)

example:

	`` Switch>enable Switch#configure terminal Enter configuration commands, one per line. End with CNTL/Z. Switch(config)#interface vlan1 Switch(config-if)#ip address 10.0.0.2 255.128.0.0 Switch(config-if)#no shutdown Switch(config-if)#exit Switch(config)#ip default-gateway 10.0.0.1 Switch(config)# ```
Set hostname (Router and Switch)	Router / Switch > enable Router / Switch# configure terminal Router / Switch(config)# hostname _____ (hostname) **example:** ``` Router>enable Router#configure terminal Enter configuration commands, one per line. End with CNTL/Z. Router(config)#hostname R1 R1(config)# ```
Set banner (Router & Switch)	Router / Switch > enable Router / Switch# configure terminal Router / Switch(config)# banner motd **example:** ``` R1> R1>enable R1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. R1(config)#banner motd > Enter TEXT message. End with the character '>'. ******************** * Innovative Bhd * ******************** User Access Verification > R1(config)# ```
PC	Assign the IP address , subnet mask and default gateway in the IP Configuration

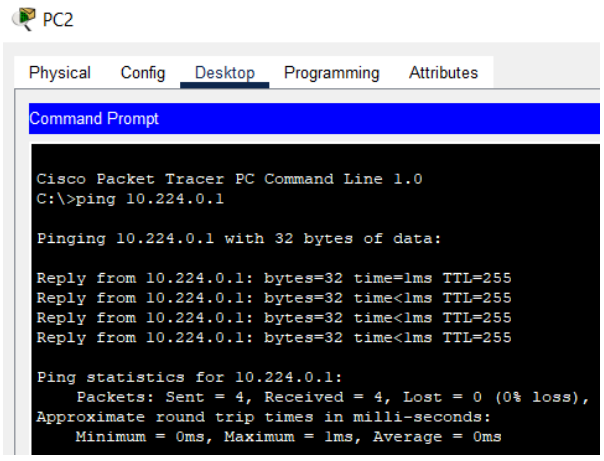
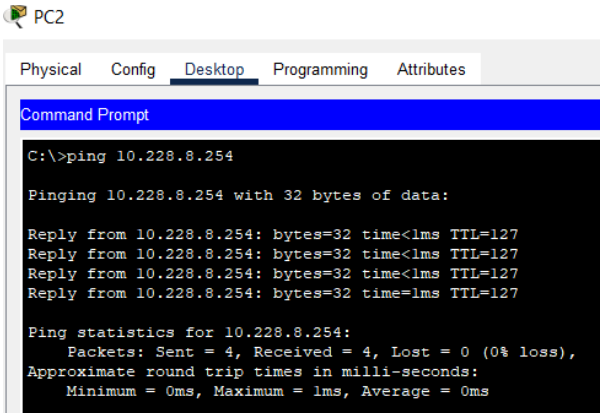
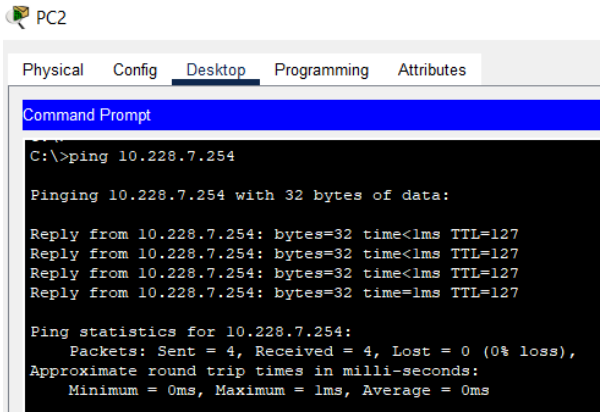
	example: 
LAPTOP	Assign the IP address , subnet mask and default gateway in the IP Configuration **example:** 

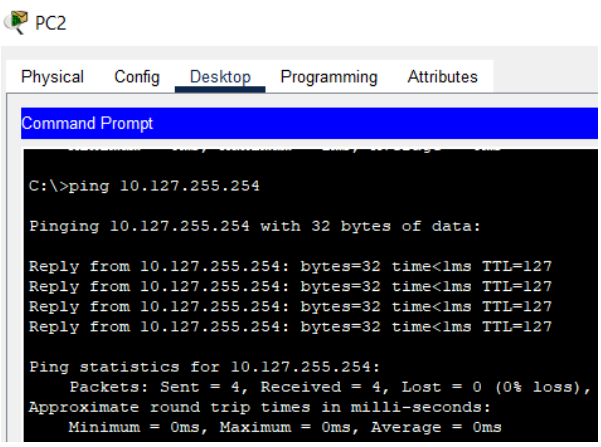
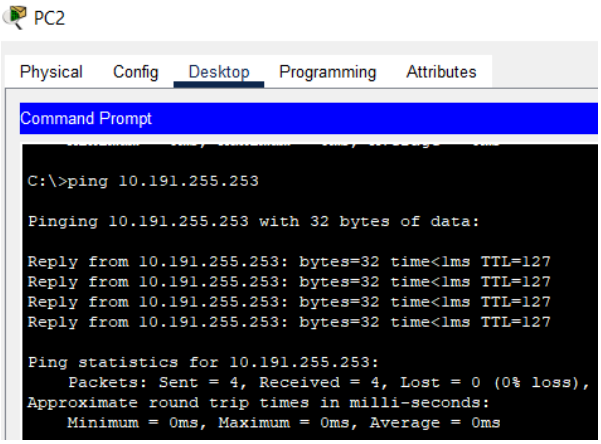
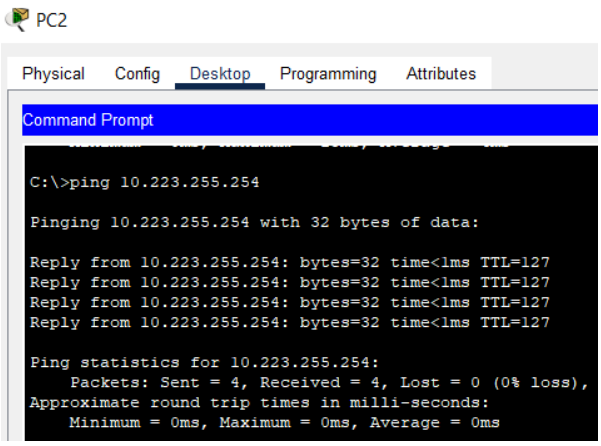
8.0 Screen capture for ping connectivity

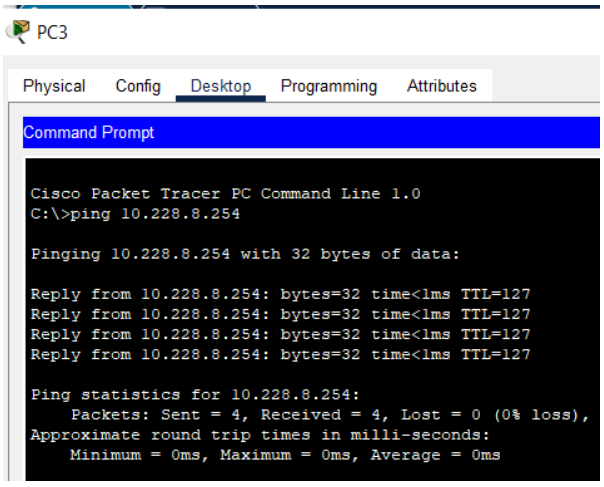
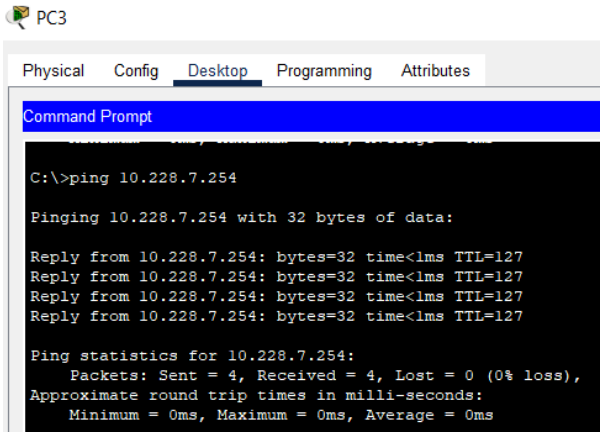
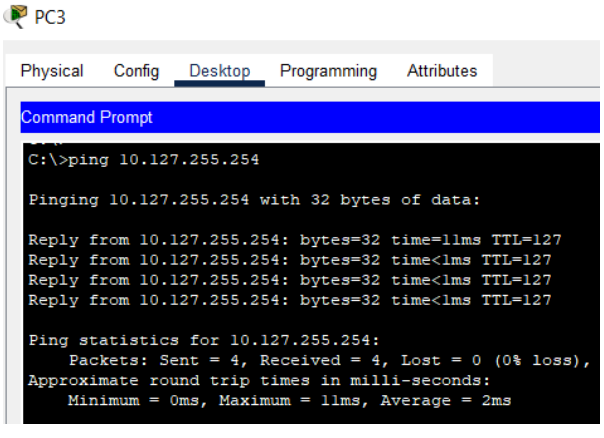
This is the screen capture for the default gateway ping on the each end devices and it also is the each location end devices ping to each other

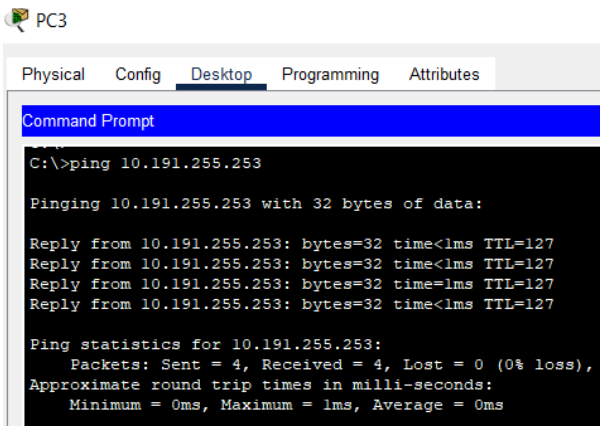
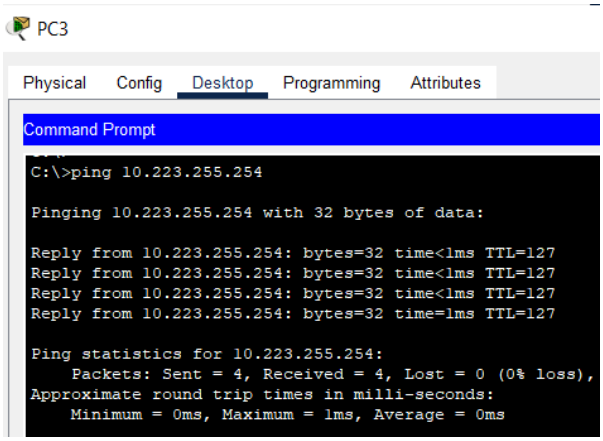
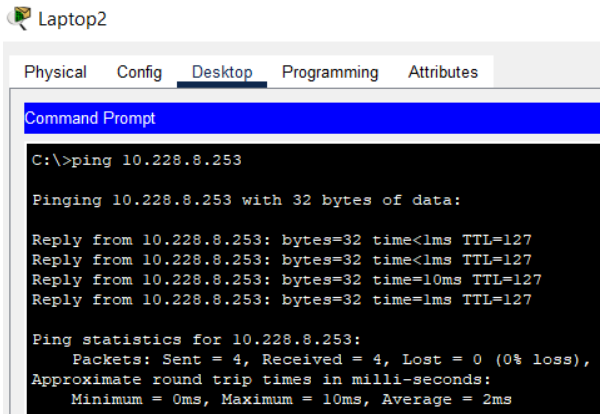
Location A

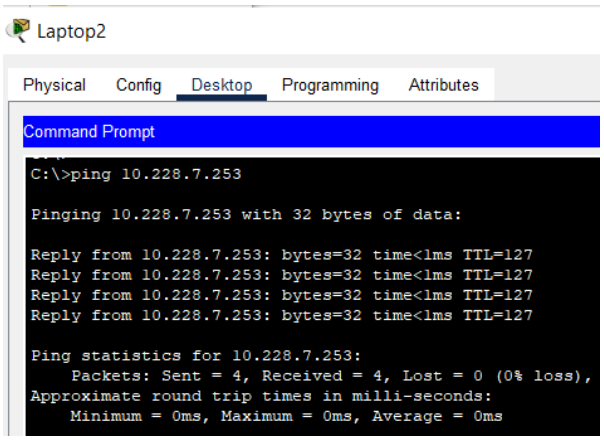
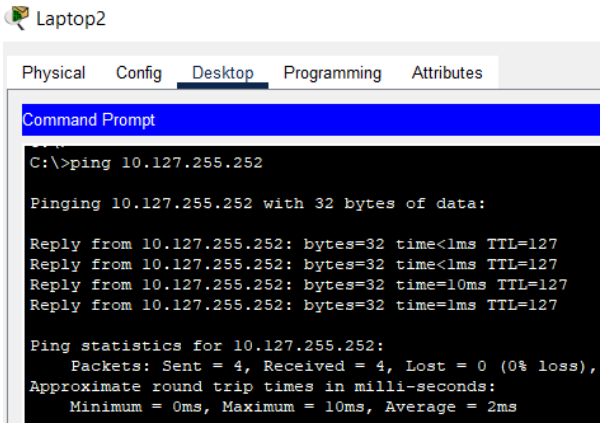
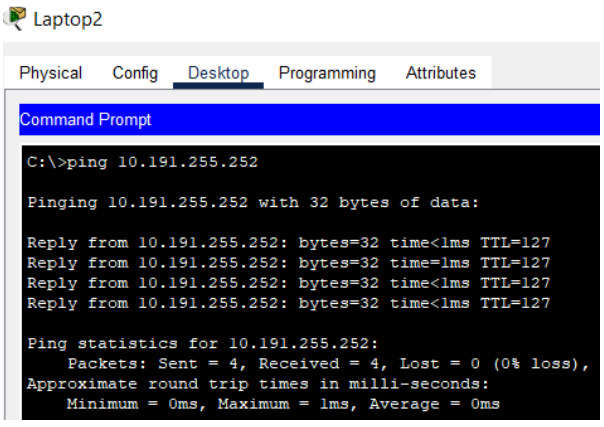
Location A – Ground Floor (Sales Department)	Connectivity Testing
PC 2, PC 3, and Laptop 2 to it's default gateway	PC3 Physical Config Desktop Programming Attributes Command Prompt Cisco Packet Tracer PC Command Line 1.0 C:\>ping 10.224.0.1 Pinging 10.224.0.1 with 32 bytes of data: Reply from 10.224.0.1: bytes=32 time<1ms TTL=255 Reply from 10.224.0.1: bytes=32 time<1ms TTL=255 Reply from 10.224.0.1: bytes=32 time<1ms TTL=255 Reply from 10.224.0.1: bytes=32 time<1ms TTL=255 Ping statistics for 10.224.0.1: Packets: Sent = 4, Received = 4, Lost = 0 (0% loss), Approximate round trip times in milli-seconds: Minimum = 0ms, Maximum = 0ms, Average = 0ms Laptop2 Physical Config Desktop Programming Attributes Command Prompt Cisco Packet Tracer PC Command Line 1.0 C:\>ping 10.224.0.1 Invalid Command. C:\>ping 10.224.0.1 Pinging 10.224.0.1 with 32 bytes of data: Reply from 10.224.0.1: bytes=32 time<1ms TTL=255 Reply from 10.224.0.1: bytes=32 time<1ms TTL=255 Reply from 10.224.0.1: bytes=32 time<1ms TTL=255 Reply from 10.224.0.1: bytes=32 time<1ms TTL=255 Ping statistics for 10.224.0.1: Packets: Sent = 4, Received = 4, Lost = 0 (0% loss), Approximate round trip times in milli-seconds: Minimum = 0ms, Maximum = 0ms, Average = 0ms

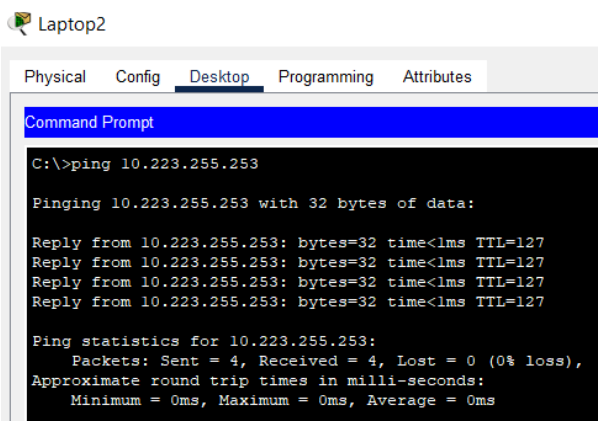
	
PC 2 link to other subnet devices	
(Sales Department) PC 2 to (Management Department) PC 0	
(Sales Department) PC 2 to (Administrative Department) PC 1	

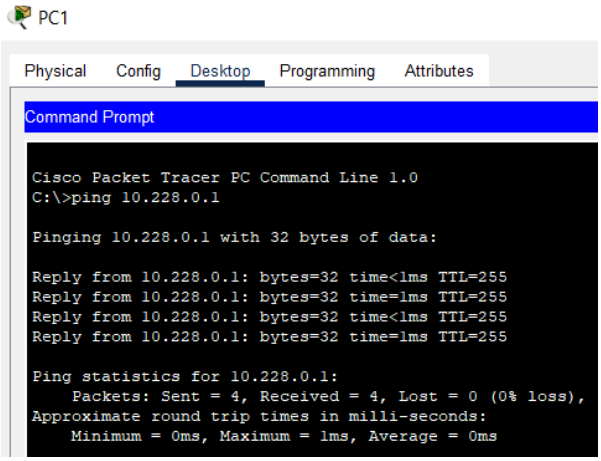
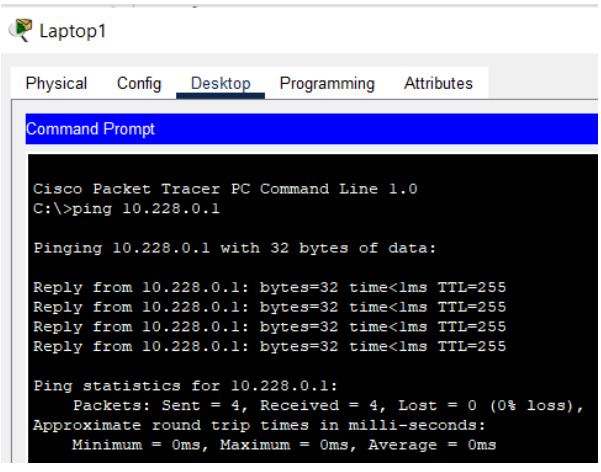
(Sales Department) PC 2 to Location C (Living Quarters) PC 6	
(Sales Department) PC 2 to Location B (Manufacturing Plant) PC 5	
(Sales Department) PC 2 to Location B (Research and Development Department) PC 8	
PC 3 link to other subnet devices	

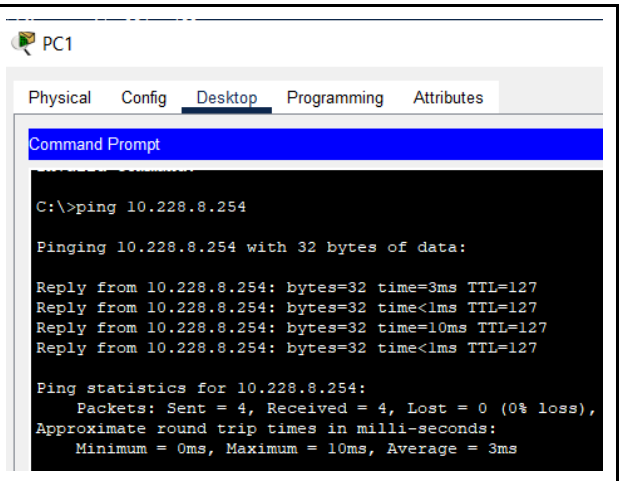
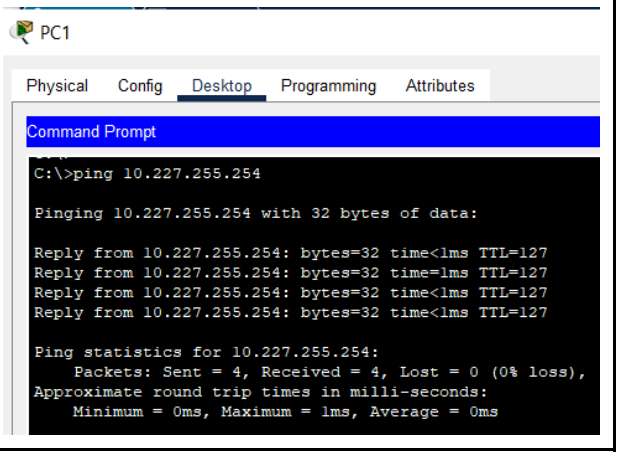
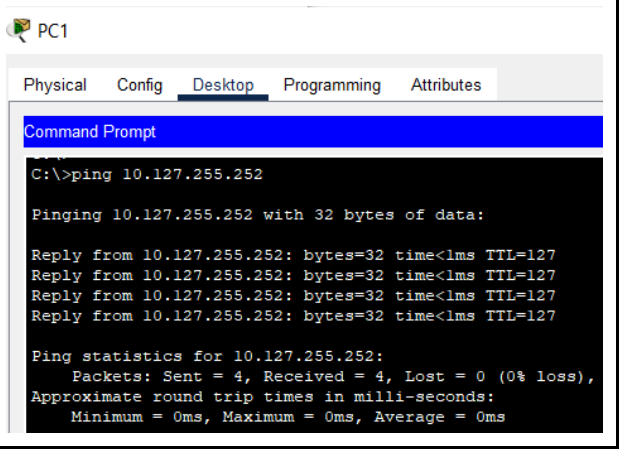
(Sales Department) PC 3 to Location A (Management Department) PC 0	
(Sales Department) PC 3 to Location A (Administrative Department) PC 1	
(Sales Department) PC 3 to Location C (Living Quarters) PC 6	

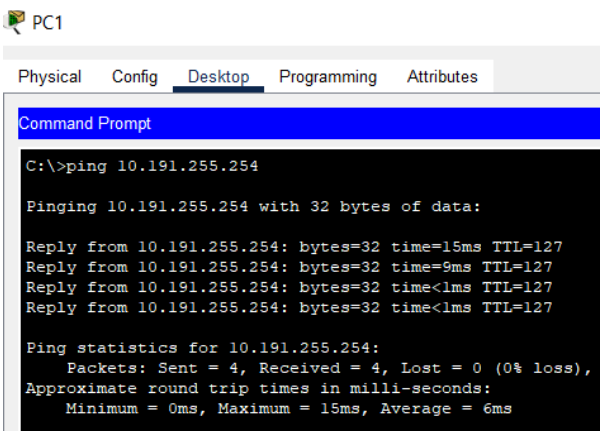
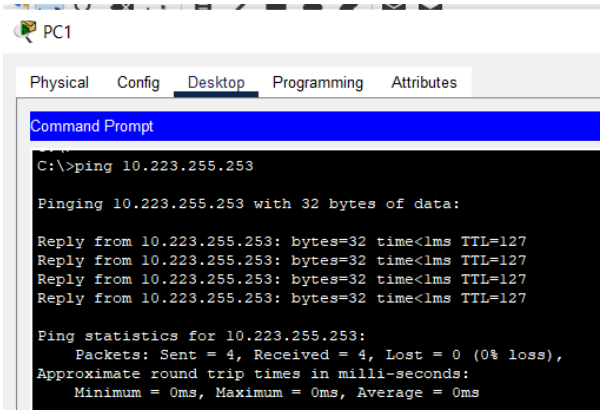
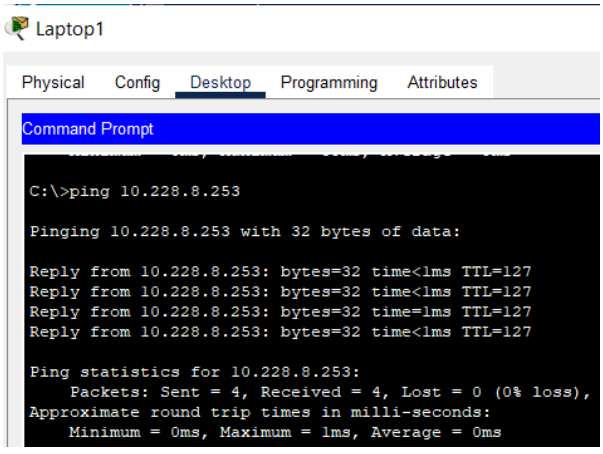
(Sales Department) PC 3 to Location B (Manufacturing Plant) PC 4	
(Sales Department) PC 3 to Location B (Research and Development Department) PC 8	
Laptop 2 link to other subnet devices	
(Sales Department) Laptop 2 to Location A (Management Department) Laptop 0	

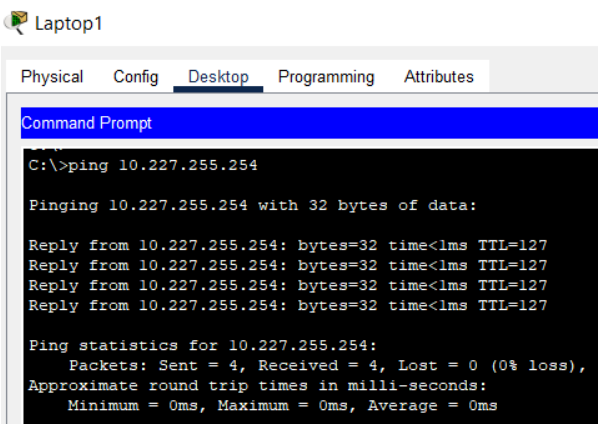
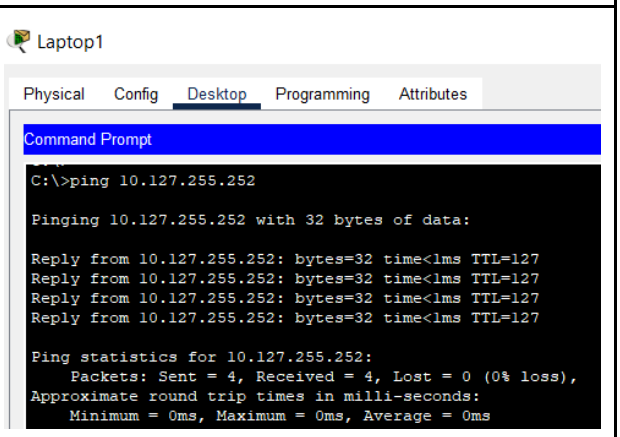
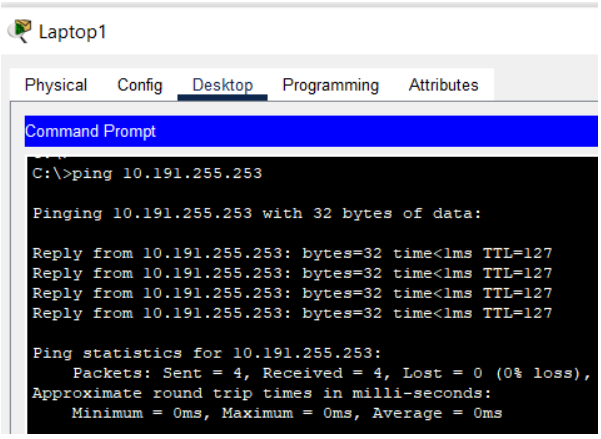
(Sales Department) Laptop 2 to Location A (Administrative Department) Laptop 1	
(Sales Department) Laptop 2 to Location C (Living Quarters) Laptop 4	
(Sales Department) Laptop 2 to Location B (Manufacturing Plant) Laptop 3	

(Sales Department) Laptop 2 to Location B (Research and Development Department) Laptop 5	

Location A – First Floor (Administrative Department)	**Connectivity Testing**
PC1 and Laptop 1 to it's default gateway	 
PC 1 link to other subnet devices	

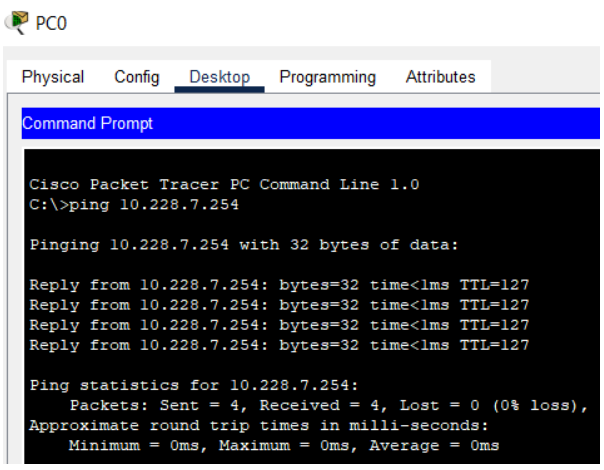
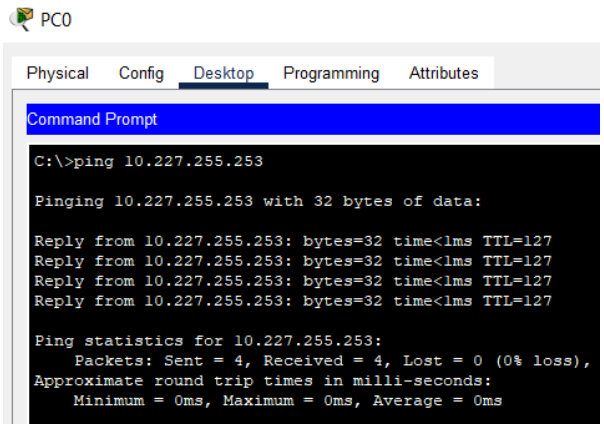
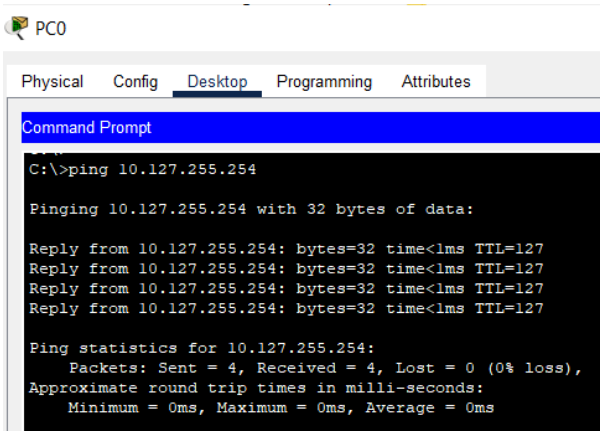
(Administrative Department) PC 1 to Location A (Management Department) PC 0	
(Administrative Department) PC 1 to Location A (Sales Department) PC 1	
(Administrative Department) PC 1 to Location C (Living Quarters) PC 6	

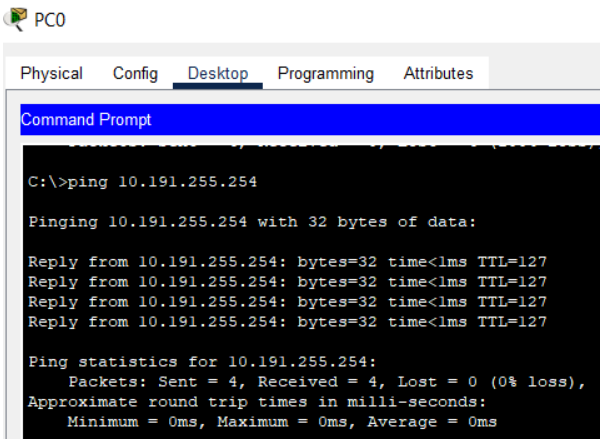
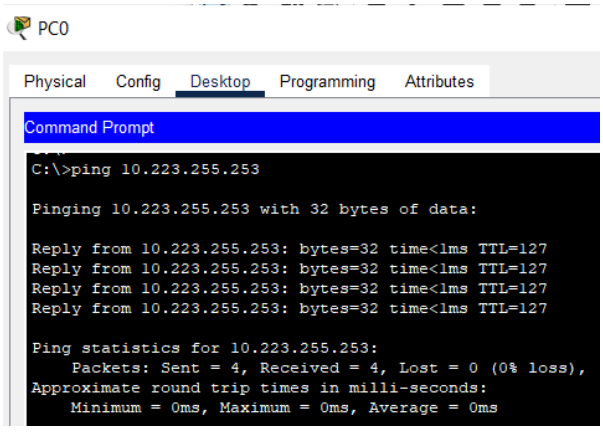
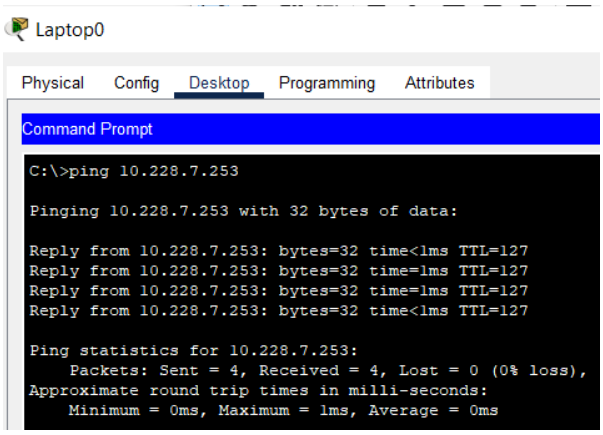
(Administrative Department) PC 1 to Location B (Manufacturing Plant) PC 4	
(Administrative Department) PC 1 to Location B (Research and Development Department) PC 9	
Laptop 1 link to other subnet devices	
(Administrative Department) Laptop 1 to Location A (Management Department) Laptop 0	

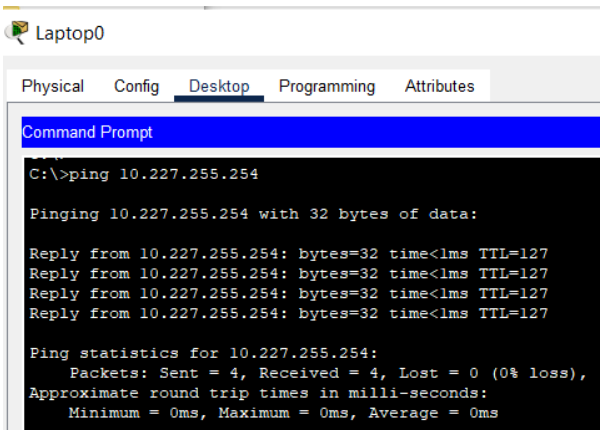
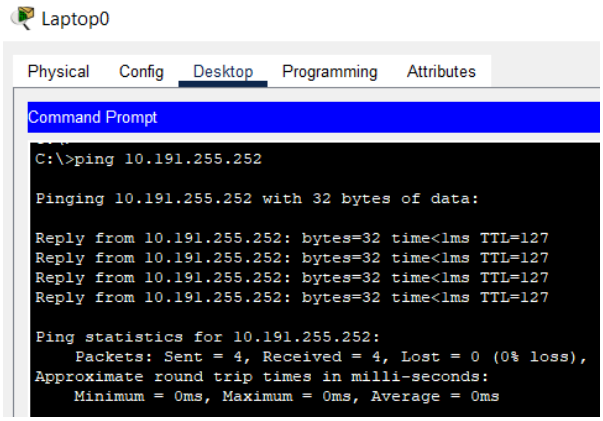
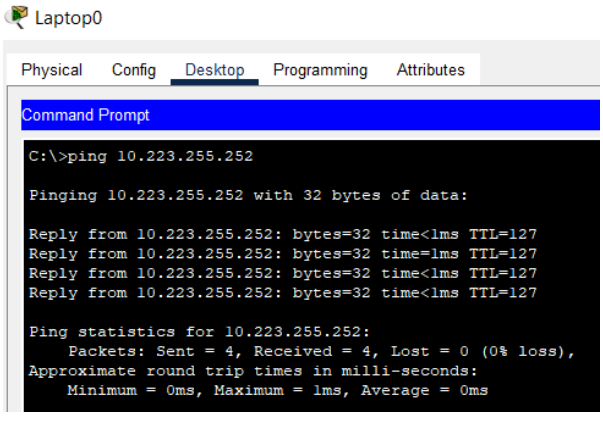
(Administrative Department) Laptop 1 to Location A (Sales Department) Laptop 2	
(Administrative Department) Laptop 1 to Location C (Living Quarters) Laptop 4	
(Administrative Department) Laptop 1 to Location B (Manufacturing Plant) Laptop 3	

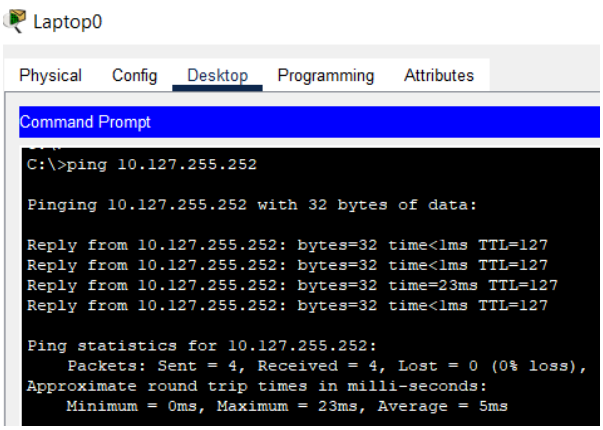
(Administrative Department) Laptop 1 to Location B (Research and Development Department) Laptop 5	Laptop1 Physical Config Desktop Programming Attributes Command Prompt C:\>ping 10.223.255.253 Pinging 10.223.255.253 with 32 bytes of data: Reply from 10.223.255.253: bytes=32 time<1ms TTL=127 Reply from 10.223.255.253: bytes=32 time=1ms TTL=127 Reply from 10.223.255.253: bytes=32 time=1ms TTL=127 Reply from 10.223.255.253: bytes=32 time<1ms TTL=127 Ping statistics for 10.223.255.253: Packets: Sent = 4, Received = 4, Lost = 0 (0% loss), Approximate round trip times in milli-seconds: Minimum = 0ms, Maximum = 1ms, Average = 0ms

Location A – Second Floor (Management Department)	**Connectivity Testing**
PC 0 and Laptop 0 to it's default gateway	PC0 Physical Config Desktop Programming Attributes Command Prompt C:\>ping 10.228.8.1 Pinging 10.228.8.1 with 32 bytes of data: Reply from 10.228.8.1: bytes=32 time=13ms TTL=255 Reply from 10.228.8.1: bytes=32 time<1ms TTL=255 Reply from 10.228.8.1: bytes=32 time<1ms TTL=255 Reply from 10.228.8.1: bytes=32 time<1ms TTL=255 Ping statistics for 10.228.8.1: Packets: Sent = 4, Received = 4, Lost = 0 (0% loss), Approximate round trip times in milli-seconds: Minimum = 0ms, Maximum = 13ms, Average = 3ms Laptop0 Physical Config Desktop Programming Attributes Command Prompt C:\>ping 10.228.8.1 Pinging 10.228.8.1 with 32 bytes of data: Reply from 10.228.8.1: bytes=32 time<1ms TTL=255 Reply from 10.228.8.1: bytes=32 time<1ms TTL=255 Reply from 10.228.8.1: bytes=32 time<1ms TTL=255 Reply from 10.228.8.1: bytes=32 time=1ms TTL=255 Ping statistics for 10.228.8.1: Packets: Sent = 4, Received = 4, Lost = 0 (0% loss), Approximate round trip times in milli-seconds: Minimum = 0ms, Maximum = 1ms, Average = 0ms
PC 0 link to other subnet devices	

(Management Department) PC 0 to Location A (Administrative Department) PC 1	
(Management Department) PC 0 to Location A (Sales Department) PC 2	
(Management Department) PC 0 to Location C (Living Quarters) PC 6	

(Management Department) PC 0 to Location B (Manufacturing Plant) PC 4	
(Management Department) PC 0 to Location B (Research and Development Department) PC 9	
Laptop 0 link to other subnet devices	
(Management Department) Laptop 0 to Location A (Administrative Department) Laptop 1	

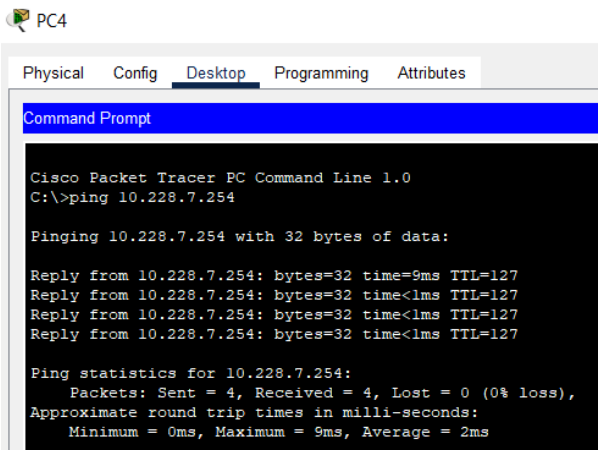
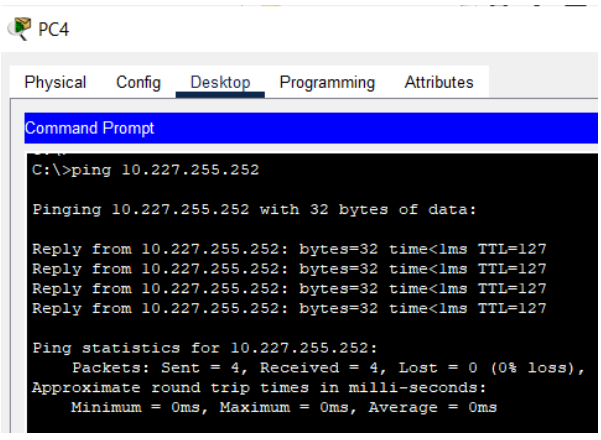
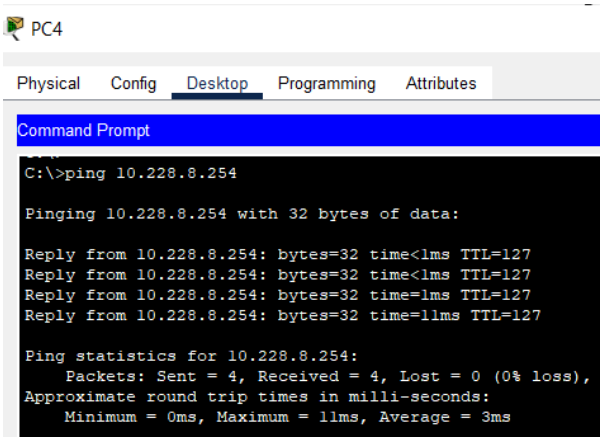
(Management Department) Laptop 0 to Location A (Sales Department) Laptop 2	
(Management Department) Laptop 0 to Location B (Manufacturing Plant) Laptop 3	
(Management Department) Laptop 0 to Location B (Research and Development Department) Laptop 5	

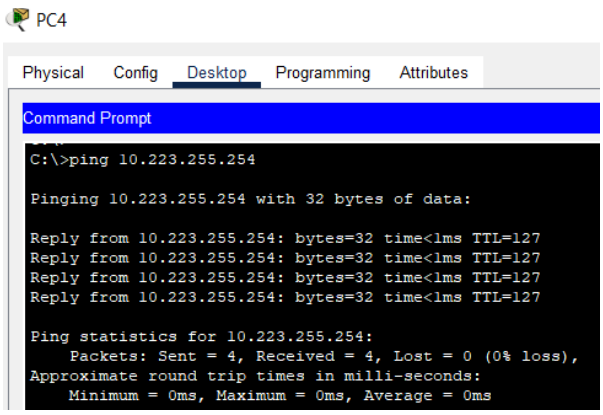
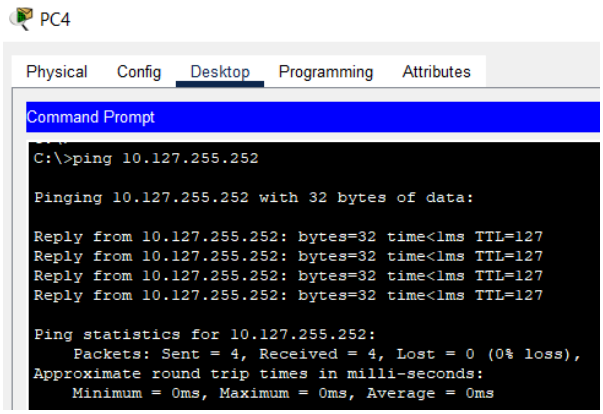
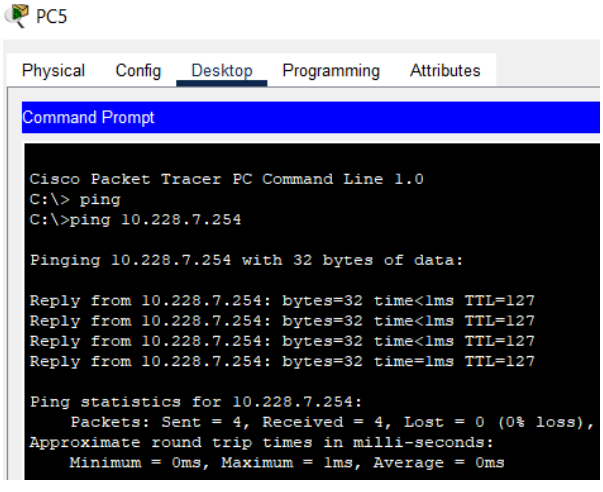
(Management Department) Laptop 0 to Location C (Living Quarters) Laptop 4	

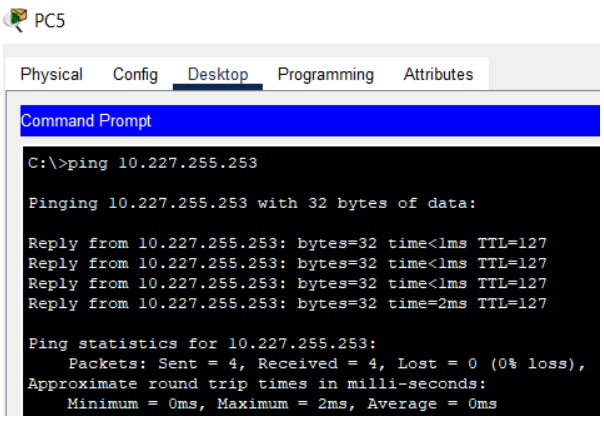
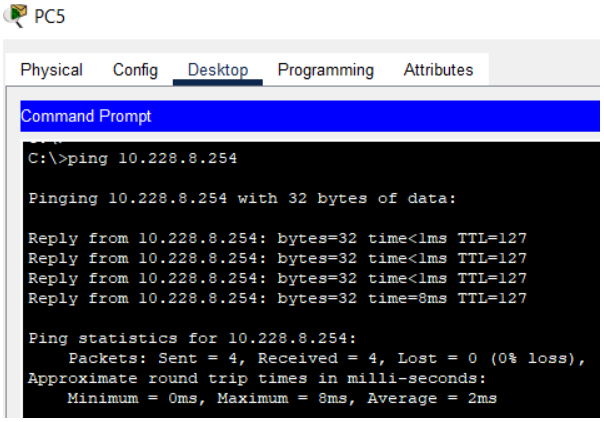
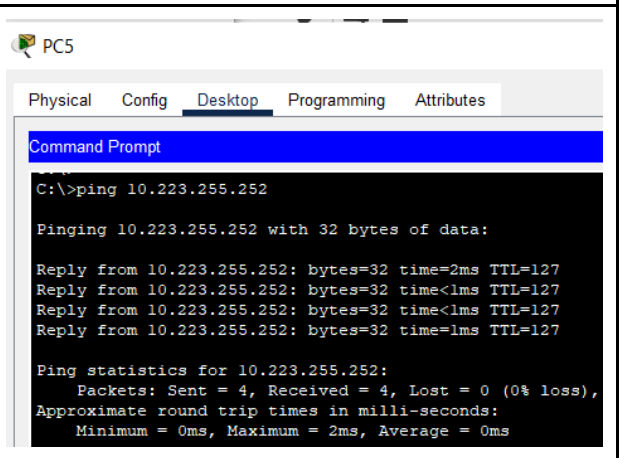
Location B

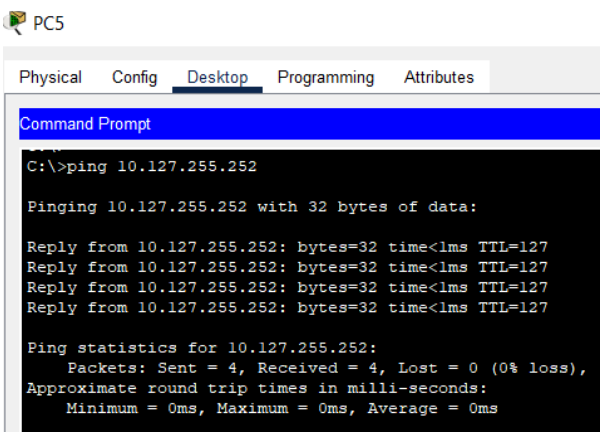
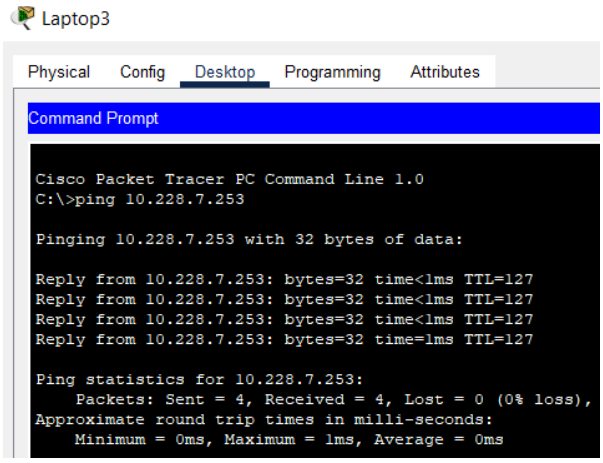
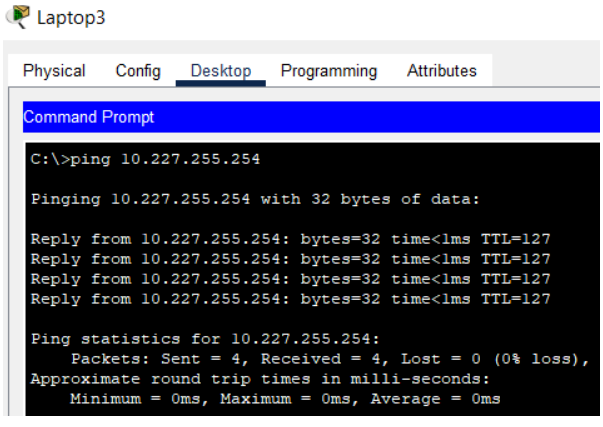
Since the location A all department ping successfully to all department and it end devices, so below will show connectivity between location B and location C

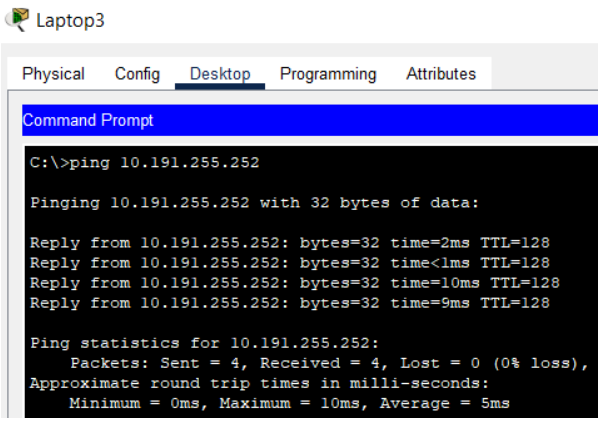
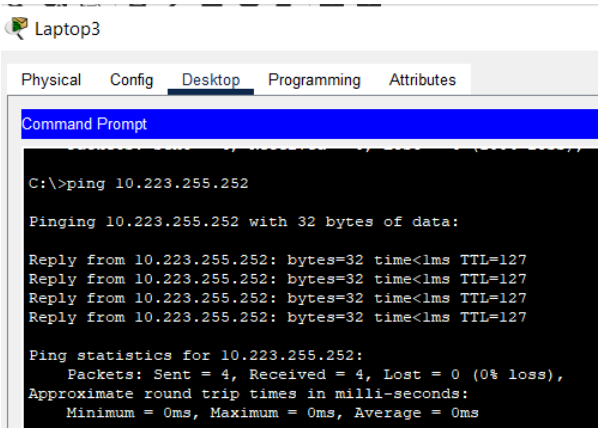
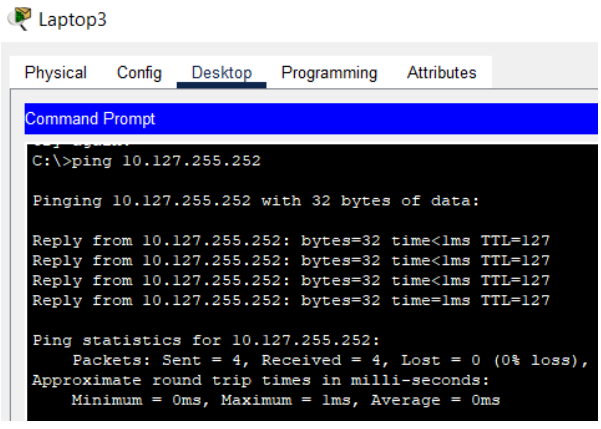
Location B – Manufacturing Plant	**Connectivity Testing**
PC 4, PC 5 and Laptop 3 to it's default gateway	PC4 Physical Config Desktop Programming Attributes Command Prompt Cisco Packet Tracer PC Command Line 1.0 C:\>ping 10.128.0.1 Pinging 10.128.0.1 with 32 bytes of data: Reply from 10.128.0.1: bytes=32 time=1ms TTL=255 Reply from 10.128.0.1: bytes=32 time<1ms TTL=255 Reply from 10.128.0.1: bytes=32 time<1ms TTL=255 Reply from 10.128.0.1: bytes=32 time<1ms TTL=255 Ping statistics for 10.128.0.1: Packets: Sent = 4, Received = 4, Lost = 0 (0% loss), Approximate round trip times in milli-seconds: Minimum = 0ms, Maximum = 1ms, Average = 0ms PC5 Physical Config Desktop Programming Attributes Command Prompt Cisco Packet Tracer PC Command Line 1.0 C:\>ping 10.128.0.1 Pinging 10.128.0.1 with 32 bytes of data: Reply from 10.128.0.1: bytes=32 time<1ms TTL=255 Reply from 10.128.0.1: bytes=32 time<1ms TTL=255 Reply from 10.128.0.1: bytes=32 time<1ms TTL=255 Reply from 10.128.0.1: bytes=32 time<1ms TTL=255 Ping statistics for 10.128.0.1: Packets: Sent = 4, Received = 4, Lost = 0 (0% loss), Approximate round trip times in milli-seconds: Minimum = 0ms, Maximum = 0ms, Average = 0ms Laptop3 Physical Config Desktop Programming Attributes Command Prompt Cisco Packet Tracer PC Command Line 1.0 C:\>ping 10.128.0.1 Pinging 10.128.0.1 with 32 bytes of data: Reply from 10.128.0.1: bytes=32 time<1ms TTL=255 Reply from 10.128.0.1: bytes=32 time<1ms TTL=255 Reply from 10.128.0.1: bytes=32 time=4ms TTL=255 Reply from 10.128.0.1: bytes=32 time<1ms TTL=255 Ping statistics for 10.128.0.1: Packets: Sent = 4, Received = 4, Lost = 0 (0% loss), Approximate round trip times in milli-seconds: Minimum = 0ms, Maximum = 4ms, Average = 1ms

PC 4 link to other subnet devices	
(Manufacturing Plant) PC 4 to Location A (Administrative Department) Laptop 1	
(Manufacturing Plant) PC 4 to Location A (Sales Department) PC 2	
(Manufacturing Plant) PC 4 to Location A (Management Department) PC 0	

(Manufacturing Plant) PC 4 to Location B (Research and Development Department) PC 8	
(Manufacturing Plant) PC 4 to Location C (Living Quarters) Laptop 4	
PC 5 link to other subnet devices	
(Manufacturing Plant) PC 5 to Location A (Administrative Department) PC 1	

(Manufacturing Plant) PC 5 to Location A (Sales Department) PC 3	
(Manufacturing Plant) PC 5 to Location A (Management Department) PC 0	
(Manufacturing Plant) PC 5 to Location B (Research and Development Department) PC 9	

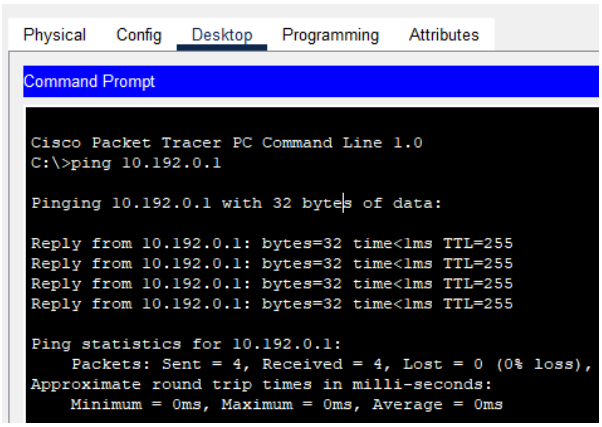
(Manufacturing Plant) PC 5 to Location C (Living Quarters) PC 7	
Laptop 3 link to other subnet devices	
(Manufacturing Plant) Laptop 0 to Location A (Administrative Department) Laptop 1	
(Manufacturing Plant) Laptop 0 to Location A (Sales Department) Laptop 2	

(Manufacturing Plant) Laptop 0 to Location A (Management Department) Laptop 3	
(Manufacturing Plant) Laptop 0 to Location B (Research and Development Department) Laptop 5	
(Manufacturing Plant) Laptop 0 to Location C (Living Quarters) Laptop 4	

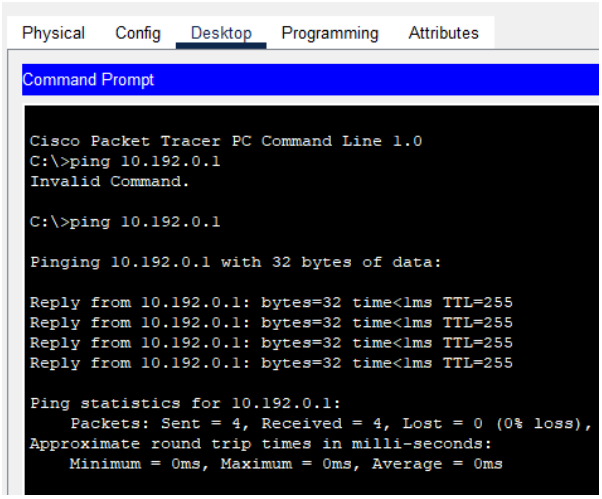
Location B – Research and Development Department	**Connectivity Testing**

PC 8, PC 9 and Laptop 5 to it's default gateway

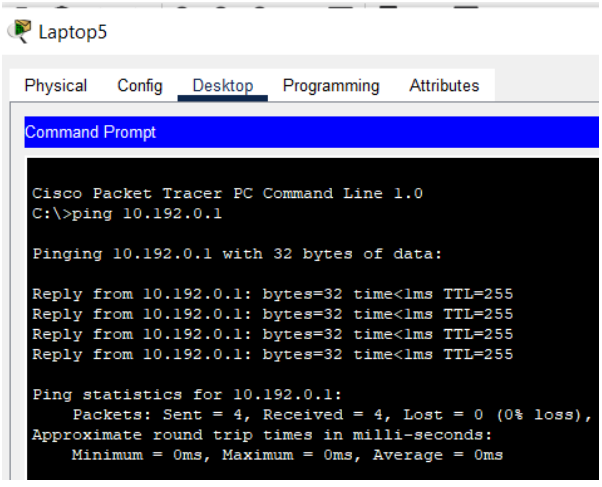
PC8



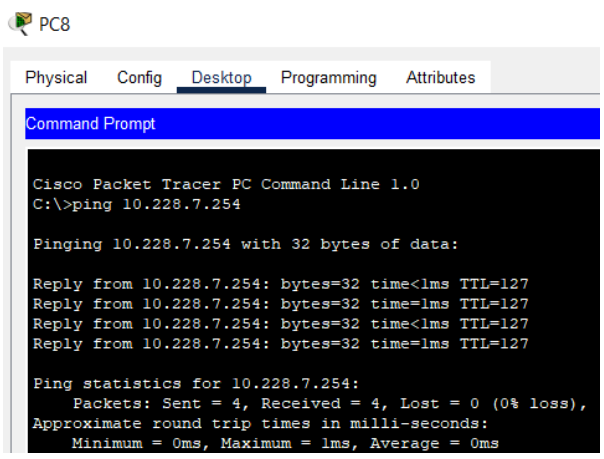
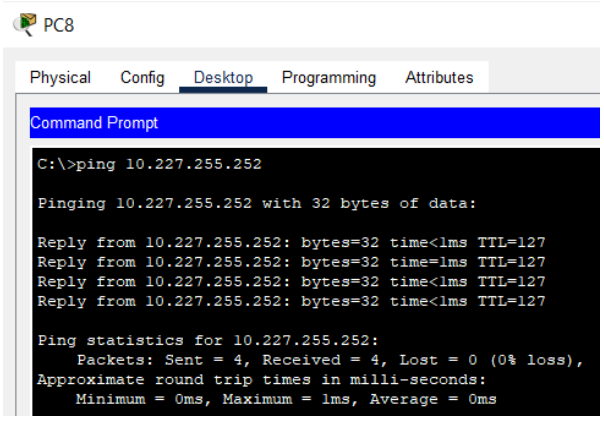
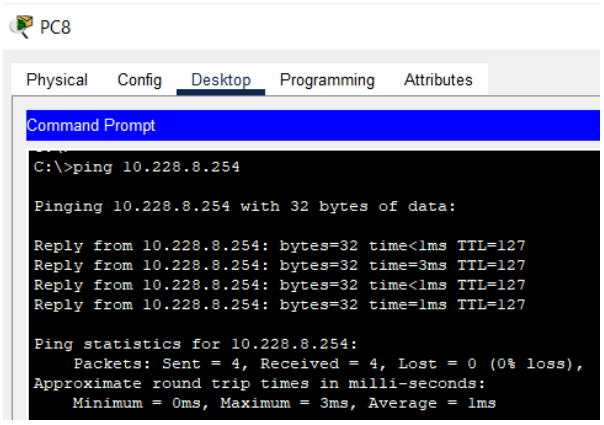
PC9

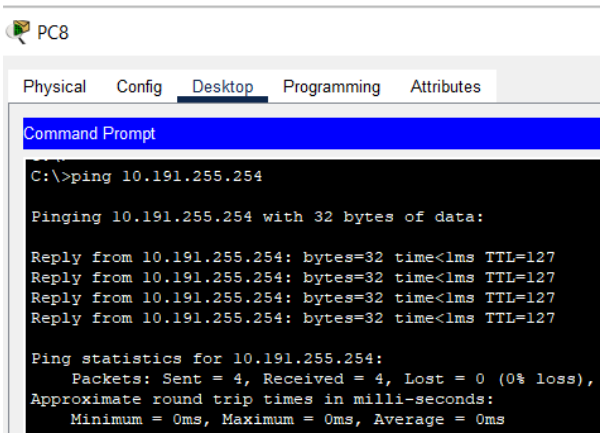
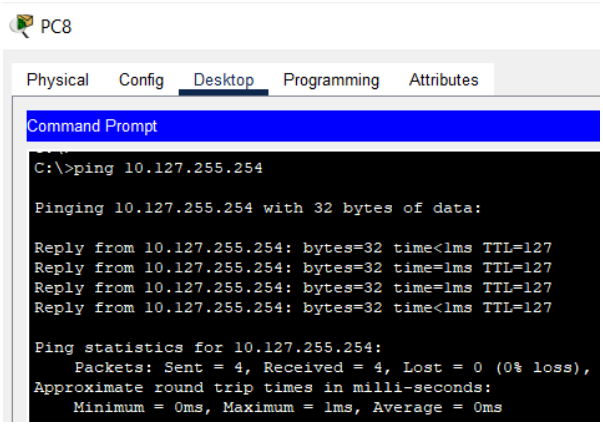
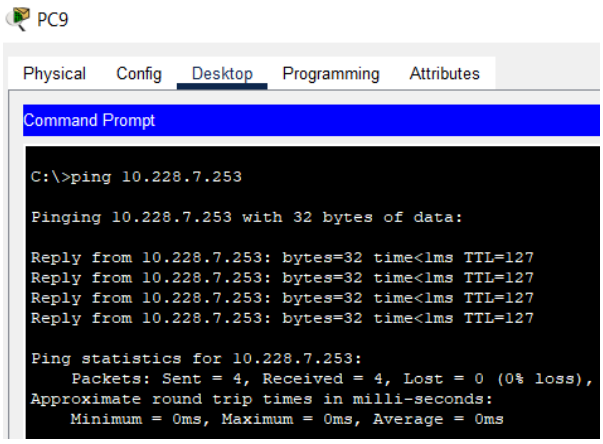


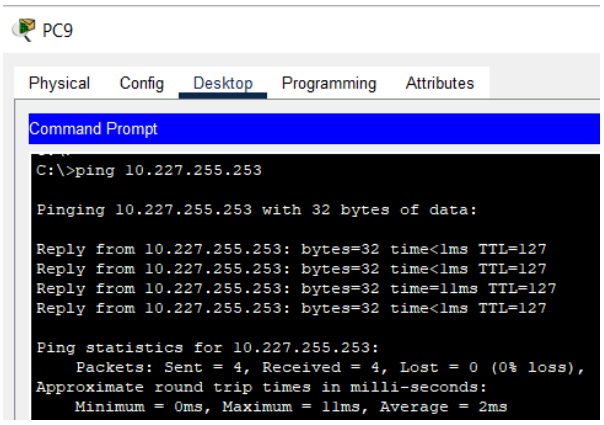
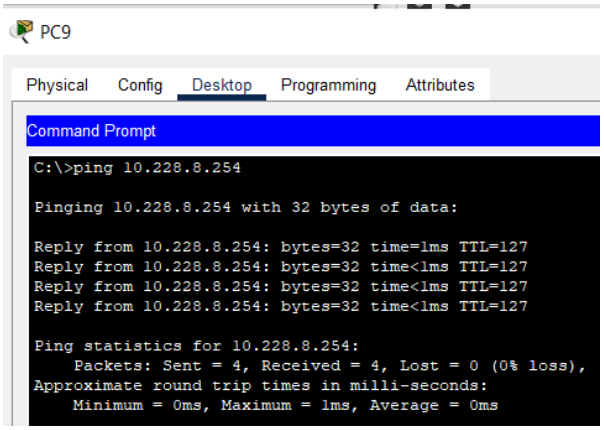
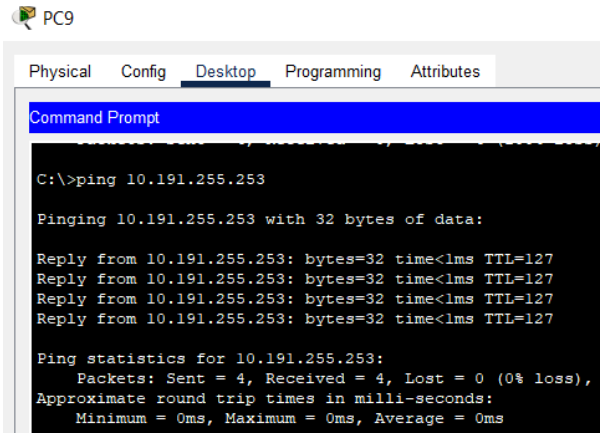
Laptop5

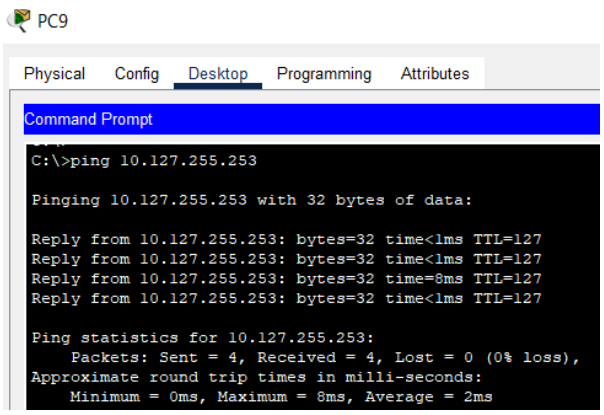
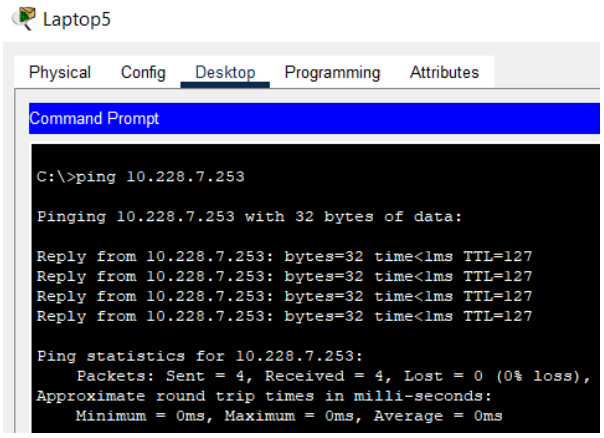
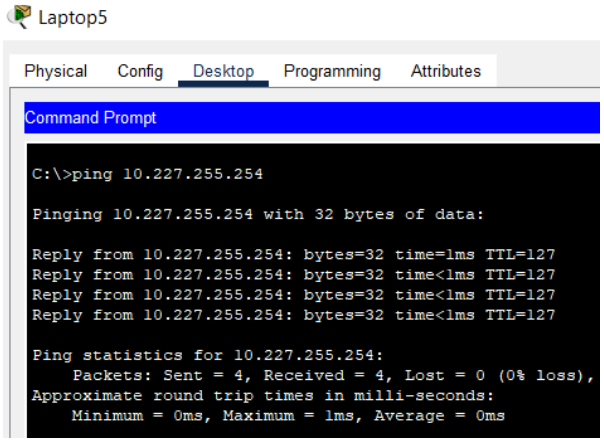


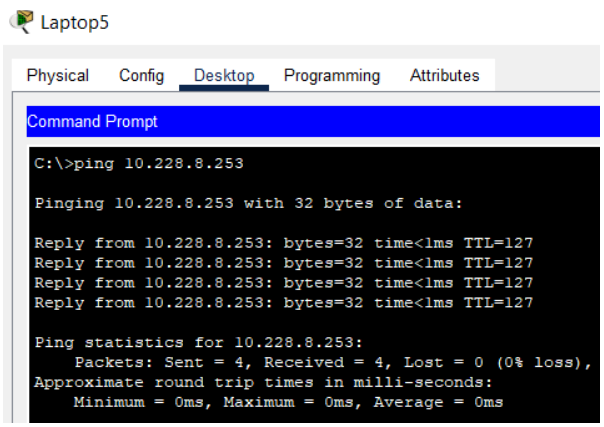
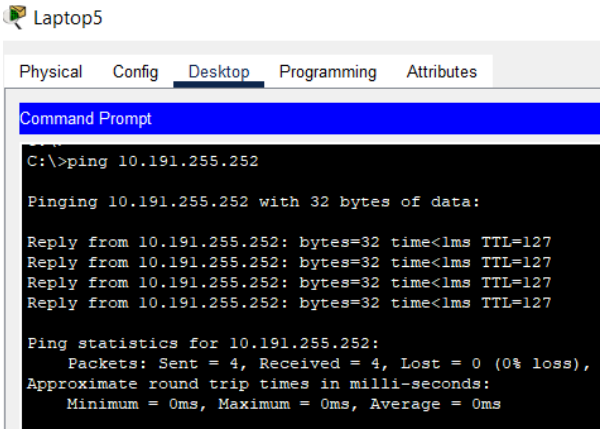
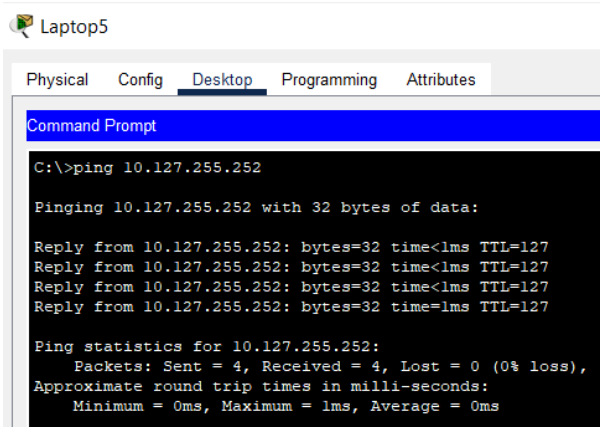
PC 8 link to other subnet devices

(Research and Development Department) PC 8 to Location A (Administrative Department) PC 1	
(Research and Development Department) PC 8 to Location A (Sales Department) PC 2	
(Research and Development Department) PC 8 to Location A (Management Department) PC 0	

(Research and Development Department) PC 8 to Location B (Manufacturing Plant) PC 4	
(Research and Development Department) PC 8 to Location C (Living Quarters) PC 6	
PC 9 link to other subnet devices	
(Research and Development Department) PC 9 to Location A (Administrative Department) Laptop 1	

(Research and Development Department) PC 9 to Location A (Sales Department) PC 3	
(Research and Development Department) PC 9 to Location A (Management Department) PC 0	
(Research and Development Department) PC 9 to Location B (Manufacturing Plant) PC 5	

(Research and Development Department) PC 9 to Location C (Living Quarters) PC 7	
Laptop 5 link to other subnet devices	
(Research and Development Department) Laptop 5 to Location A (Administrative Department) Laptop 1	
(Research and Development Department) Laptop 5 to Location A (Sales Department) Laptop 2	

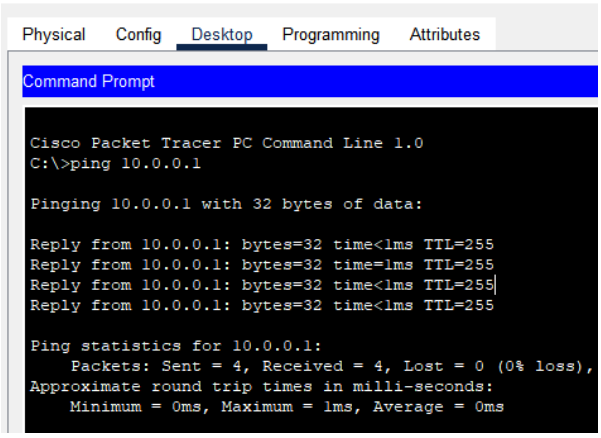
(Research and Development Department) Laptop 5 to Location A (Management Department) Laptop 0	
(Research and Development Department) Laptop 5 to Location B (Manufacturing Plant) Laptop 3	
(Research and Development Department) Laptop 5 to Location C (Living Quarter) Laptop 4	

Location C

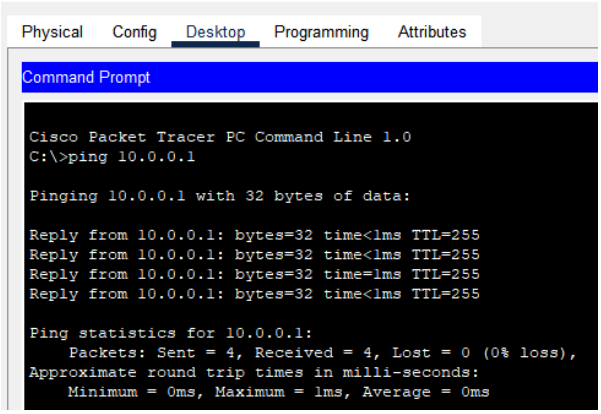
Location C – Living Quarters	**Connectivity Testing**

PC6, PC 7 and Laptop 4 to it's default gateway

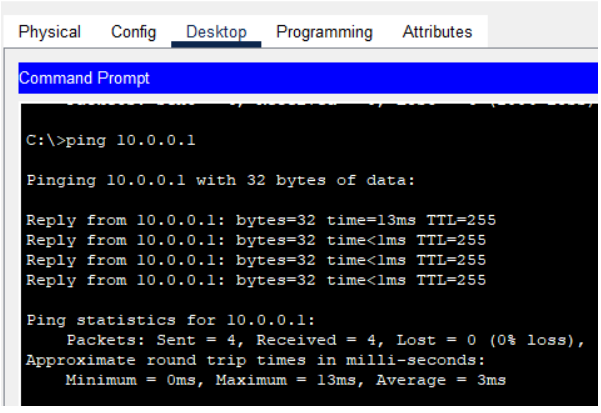
Laptop4



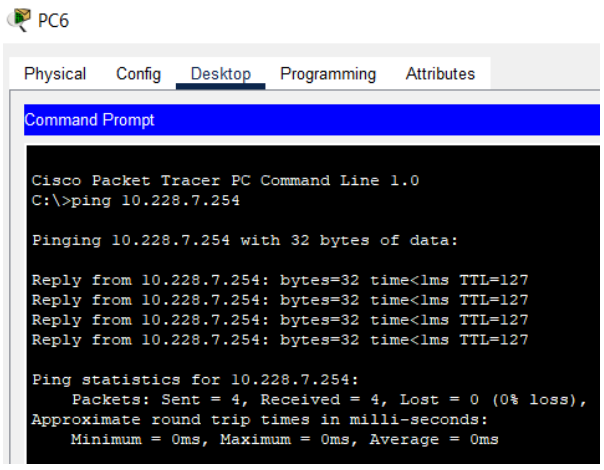
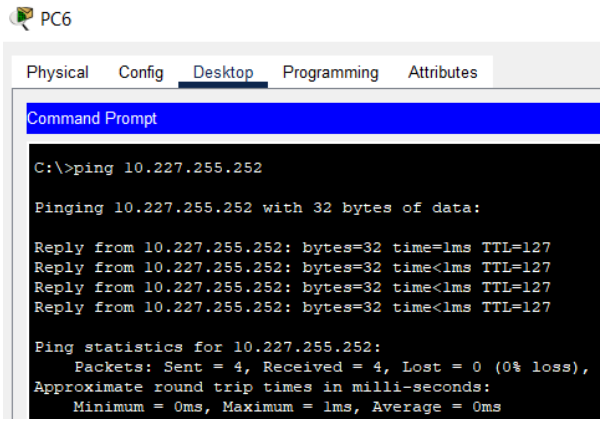
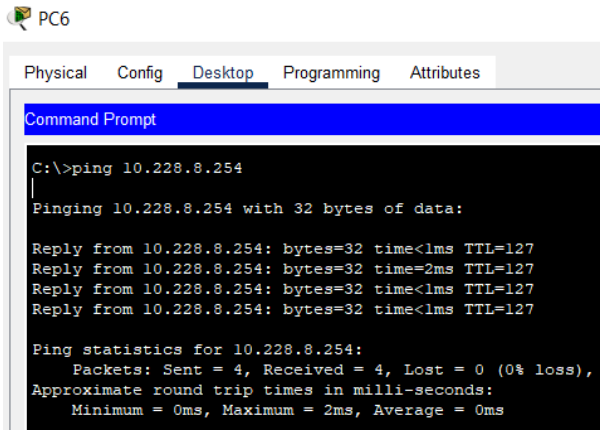
PC7

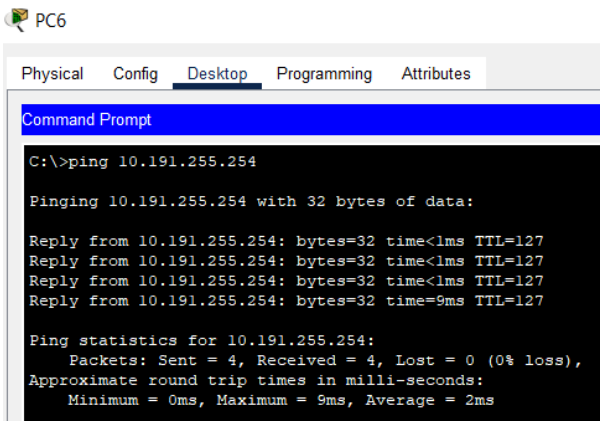
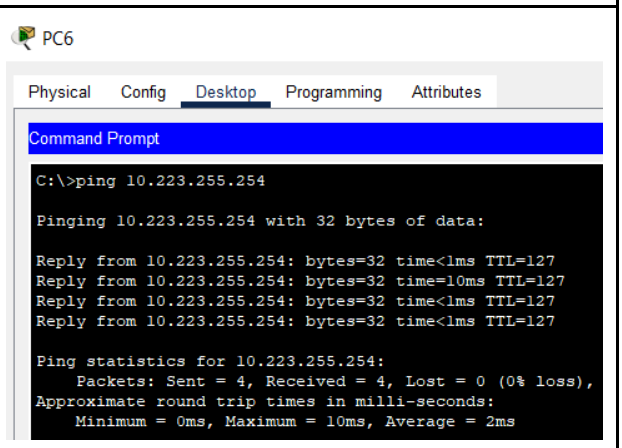
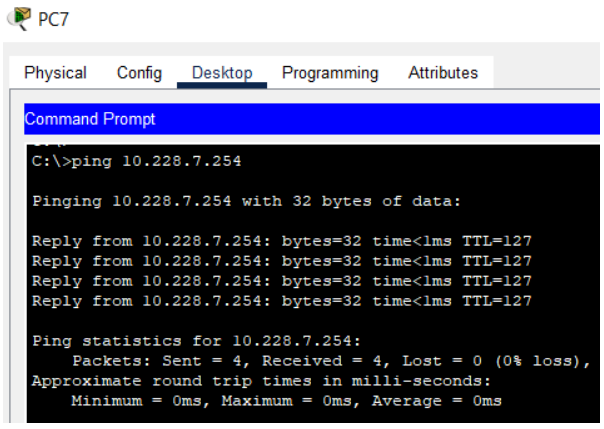


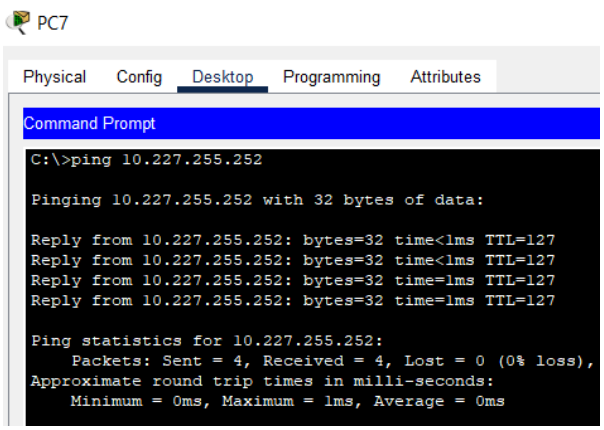
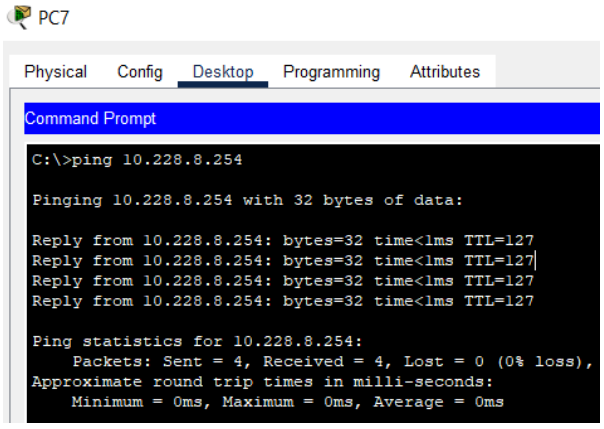
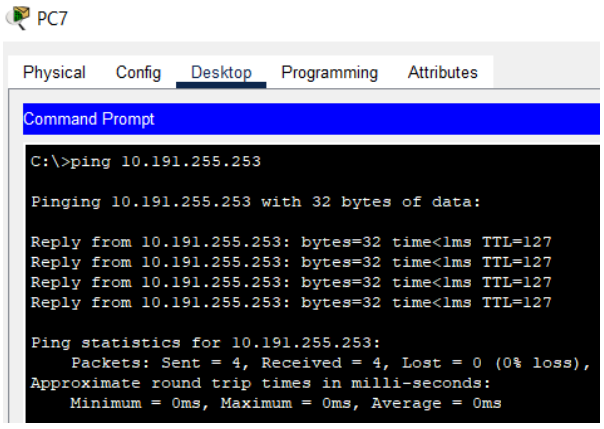
PC6

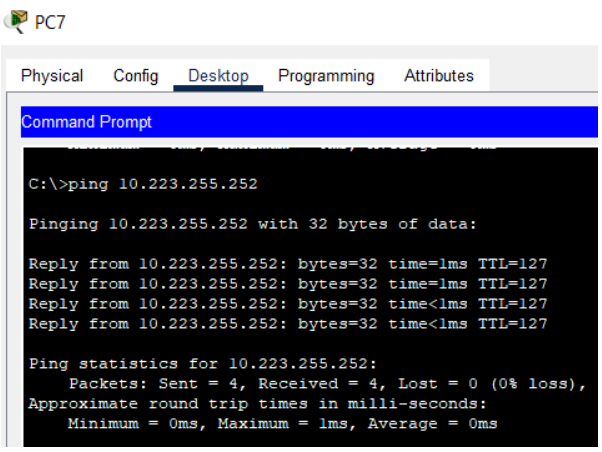
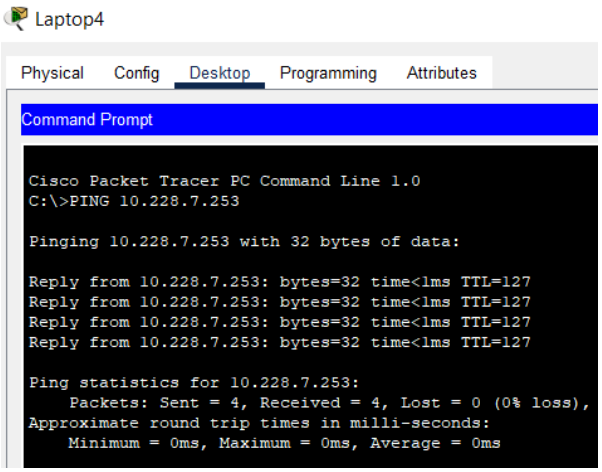
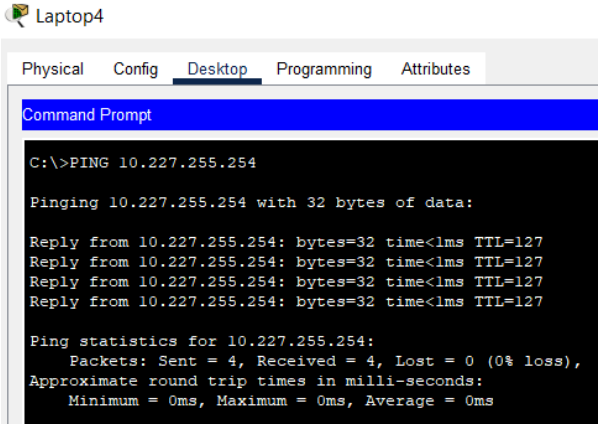


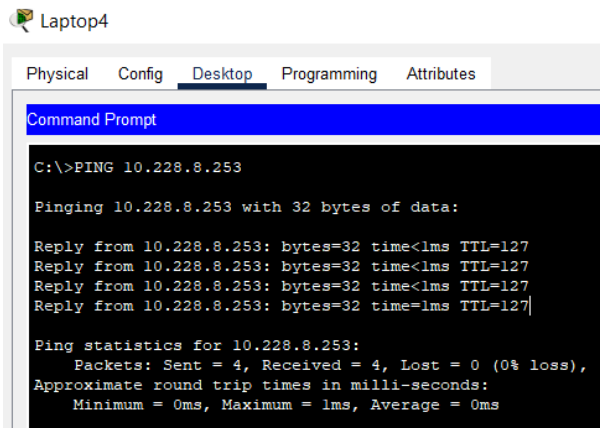
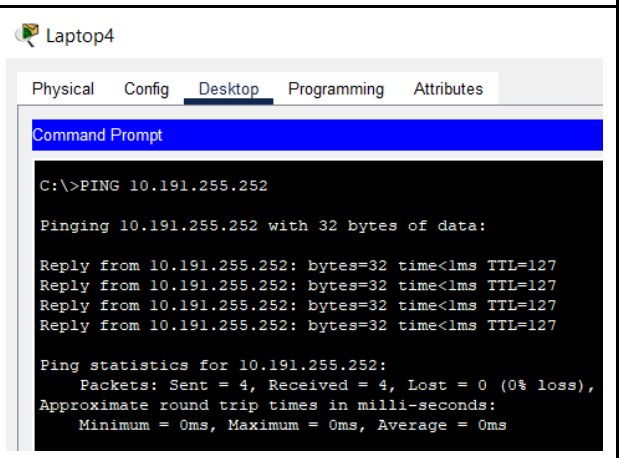
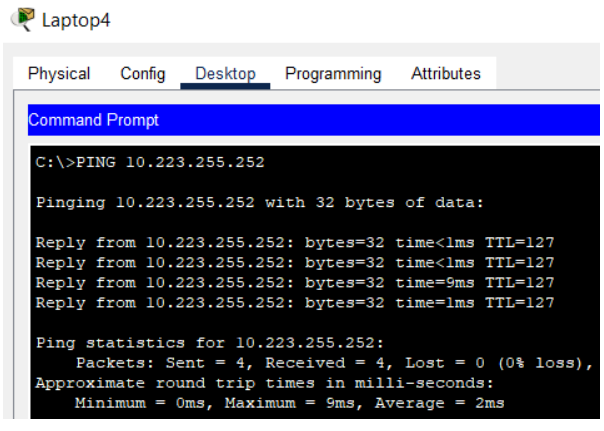
PC 6 link to other subnet devices

(Living Quarter) PC 6 to Location A (Administrative Department) PC 1	
(Living Quarter) PC 6 to Location A (Sales Department) PC 2	
(Living Quarter) PC 6 to Location A (Management Department) PC 0	

(Living Quarter) PC 6 to Location B (Manufacturing Plant) PC 4	
(Living Quarter) PC 6 to Location B (Research and Development Department) PC 8	
PC 7 link to other subnet devices	
(Living Quarter) PC 7 to Location A (Administrative Department) PC 1	

(Living Quarter) PC 7 to Location A (Sales Department) PC 3	
(Living Quarter) PC 7 to Location A (Management Department) PC 0	
(Living Quarter) PC 7 to Location B (Manufacturing Plant) PC 5	

(Living Quarter) PC 7 to Location B (Research and Development Department) PC 9	
Laptop 4 link to other subnet devices	
(Living Quarter) Laptop 4 to Location A (Administrative Department) Laptop 1	
(Living Quarter) Laptop 4 to Location A (Sales Department) Laptop 2	

(Living Quarter) Laptop 4 to Location A (Management Department) Laptop 0	
(Living Quarter) Laptop 4 to Location B (Manufacturing Plant) Laptop 3	
(Living Quarter) Laptop 4 to Location B (Research and Development Department) Laptop 5	

9.0 Digital Resource

- **Panopto**

This is a software that can record video, I use this software to record my presentation video. When use this software to record my presentation video, that can let me know how to use the digital resource to improve my digital skills during i was use this software to record my presentation video

- **Packet Tracer**

Packet Tracer is a software that can be used to let us design our network. Example, we no need to buy a real router, switches do our assignment, we can use the packet tracer to make our network and configure our network like the real situation

- **YouTube**

YouTube can improve our digital skills, because when we upload the video to youtube, we can learn how to upload the video and keep we presentation record video on the youtube

- **Netacad**

Netacad can let us learn how to use the digital software to read our learning material. Netacad has many courses and materials that can let us learn different things with this software. Example, we can read our online material on the Netacad without downloading and printing out.

10.0 YouTube Link

Social Media

11.0 References

Anon., 2017. *Cisco 800M Series ISR Software Configuration Guide.* [Online]

Available at:
https://www.cisco.com/c/en/us/td/docs/routers/access/800M/software/800MSCG/routconf.html

[Accessed 22 3 2022].

Anon., n.d. *CISCO NETWORKING ACADEMY.* [Online]

Available at: https://www.netacad.com/

[Accessed 22 01 2022].

Anon., n.d. *Subnet Masks Reference Table.* [Online]

Available at: https://www.cloudaccess.net/cloud-control-panel-ccp/157-dns-management/322-subnet-masks-reference-table.html

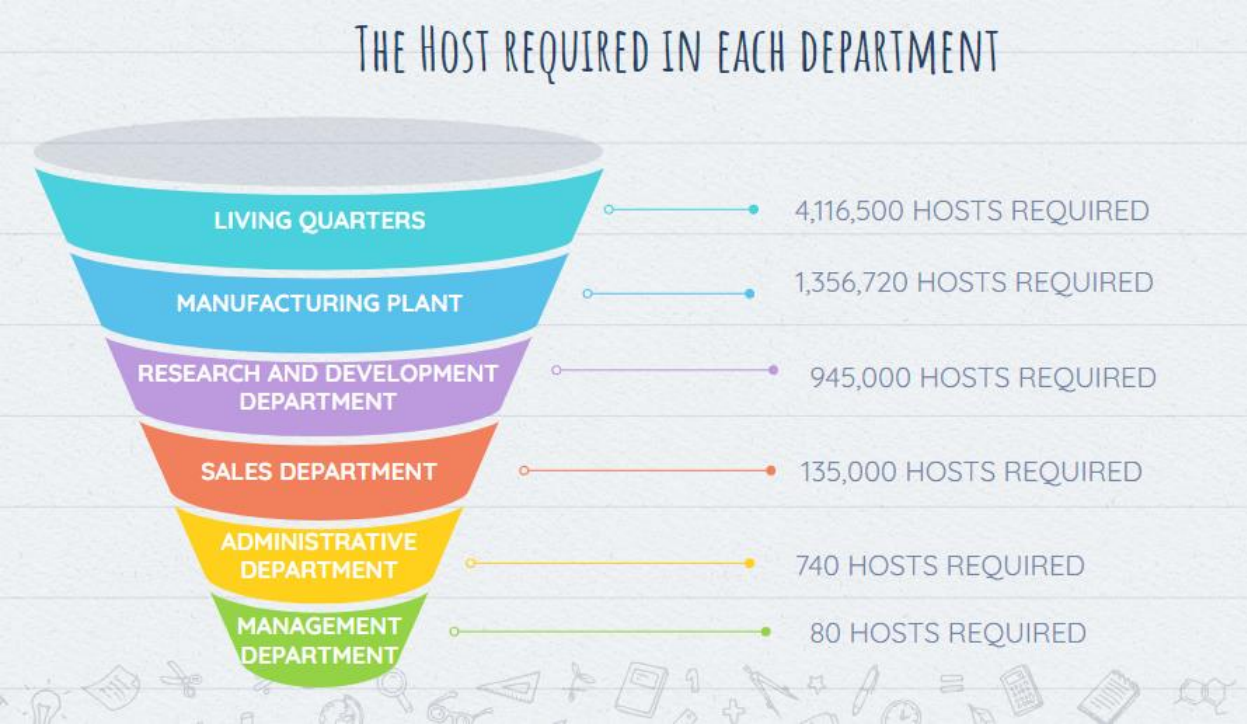
[Accessed 22 3 2022].

Jones, R., n.d. IP Addressing and Subnetting Workbook Version 2.0. In: R. Jones, ed. *IP Addressing and Subnetting Workbook Version 2.0.* Frederick, Maryland, USA: s.n., p. 82.

Jones, R., n.d. Variable-Length Subnet Mask. In: R. Jones, ed. *Variable-Length Subnet Mask Workbook Version 2.0.* Frederick, Maryland, USA: s.n., p. 86.

12.0 Appendix

Class A Addressing Guide					
CIDR	# of Bits Borrowed	Subnet Mask	Total # of Subnets	Total # of Hosts	Usable # of Hosts
/8	0	255.0.0.0	1	16,777,216	16,777,214
/9	1	255.128.0.0	2	8,388,608	8,388,606
/10	2	255.192.0.0	4	4,194,304	4,194,302
/11	3	255.224.0.0	8	2,097,152	2,097,150
/12	4	255.240.0.0	16	1,048,576	1,048,574
/13	5	255.248.0.0	32	524,288	524,286
/14	6	255.252.0.0	64	262,144	262,142
/15	7	255.254.0.0	128	131,072	131,070
/16	8	255.255.0.0	256	65,536	65,534
/17	9	255.255.128.0	512	32,768	32,766
/18	10	255.255.192.0	1,024	16,384	16,382
/19	11	255.255.224.0	2,048	8,192	8,190
/20	12	255.255.240.0	4,096	4,096	4,094
/21	13	255.255.248.0	8,192	2,048	2,046
/22	14	255.255.252.0	16,384	1,024	1,022
/23	15	255.255.254.0	32,768	512	510
/24	16	255.255.255.0	65,536	256	254
/25	17	255.255.255.128	131,072	128	126
/26	18	255.255.255.192	262,144	64	62
/27	19	255.255.255.224	524,288	32	30
/28	20	255.255.255.240	1,048,576	16	14
/29	21	255.255.255.248	2,097,152	8	6
/30	22	255.255.255.252	4,194,304	4	2



FIND CIDR AND SUBNET MASK FOR EACH DEPARTMENT

LOCATION C (LIVING QUARTERS) - 4,116,500 HOSTS

LOCATION B (MANUFACTURING PLANT) - 1,356,720 HOSTS

LOCATION B (RESEARCH AND DEVELOPMENT DEPARTMENT) - 945,000 HOSTS

LOCATION A (SALES DEPARTMENT) - 135,000 HOSTS

LOCATION B (ADMINISTRATIVE DEPARTMENT) - 740 HOSTS

LOCATION B (MANAGEMENT DEPARTMENT) - 80 HOSTS

Class A Addressing Guide

CIDR	# of Bits Borrowed	Subnet Mask	Total # of Subnets	Total # of Hosts	Usable # of Hosts
/8	0	255.0.0.0	1	16,777,216	16,777,214
/9	1	255.128.0.0	2	8,388,608	8,388,606
/10	2	255.192.0.0	4	4,194,304	4,194,302
/11	3	255.224.0.0	8	2,097,152	2,097,150
/12	4	255.240.0.0	16	1,048,576	1,048,574
/13	5	255.248.0.0	32	524,288	524,286
/14	6	255.252.0.0	64	262,144	262,142
/15	7	255.254.0.0	128	131,072	131,070
/16	8	255.255.0.0	256	65,536	65,534
/17	9	255.255.128.0	512	32,768	32,766
/18	10	255.255.192.0	1,024	16,384	16,382
/19	11	255.255.224.0	2,048	8,192	8,190
/20	12	255.255.240.0	4,096	4,096	4,094
/21	13	255.255.248.0	8,192	2,048	2,046
/22	14	255.255.252.0	16,384	1,024	1,022
/23	15	255.255.254.0	32,768	512	510
/24	16	255.255.255.0	65,536	256	254
/25	17	255.255.255.128	131,072	128	126
/26	18	255.255.255.192	262,144	64	62
/27	19	255.255.255.224	524,288	32	30
/28	20	255.255.255.240	1,048,576	16	14
/29	21	255.255.255.248	2,097,152	8	6
/30	22	255.255.255.252	4,194,304	4	2

6

GROWTH TABLE

	BEFORE GROWTH	AFTER 85% GROWTH
LIVING QUARTERS	4,116,500	7,615,525
MANUFACTURING PLANT	1,356,720	2,509,932
RESEARCH AND DEVELOPMENT DEPARTMENT	945,000	1,748,250
SALES DEPARTMENT	135,000	249,750
ADMINISTRATIVE DEPARTMENT	740	1,369
MANAGEMENT DEPARTMENT	80	148

7

FIND SUBNET MASK FOR EACH DEPARTMENT

LOCATION (DEPARTMENT)	CIDR	SUBNET ADDRESS
LOCATION C (LIVING QUARTERS)	/9	10.0.0.0
LOCATION B (MANUFACTURING PLANT)	/10	10.128.0.0
LOCATION B (RESEARCH AND DEVELOPMENT DEPARTMENT)	/11	10.192.0.0
LOCATION A (SALES DEPARTMENT)	/14	10.224.0.0
LOCATION A (ADMINISTRATIVE DEPARTMENT)	/21	10.228.0.0
LOCATION A (MANAGEMENT DEPARTMENT)	/24	10.228.8.0

Byte 1	Byte 2	Byte 3	Byte 4
N	H	H	H
1111 1111	1000 0000	0000 0000	0000 0000
10	2^7 = 128	0	0

1111 1111	1100 0000	0000 0000	0000 0000
10	(2^6) + 128 = 192	0	0

ADDRESSING TABLE

- ASSIGN THE FIRST USABLE IP ADDRESS TO ROUTER
- ASSIGN THE LAST USABLE IP ADDRESS FOR HOST

LOCATION (DEPARTMENT)	Subnet Address	First Usable	Last Usable	Broadcast Address
LOCATION C (LIVING QUARTERS)	10.0.0.0	10.0.0.1	10.127.255.254	10.127.255.255
LOCATION B (MANUFACTURING PLANT)	10.128.0.0	10.128.0.1	10.191.255.254	10.191.255.255
LOCATION B (RESEARCH AND DEVELOPMENT DEPARTMENT)	10.192.0.0	10.192.0.1	10.223.255.254	10.223.255.255
LOCATION A (SALES DEPARTMENT)	10.224.0.0	10.224.0.1	10.227.255.254	10.227.255.255
LOCATION A (ADMINISTRATIVE DEPARTMENT)	10.228.0.0	10.228.0.1	10.228.7.254	10.228.7.255
LOCATION A (MANAGEMENT DEPARTMENT)	10.228.8.0	10.228.8.1	10.228.8.254	10.228.8.255