



Computer Science & Engineering
CSE3501 – Information Security Analysis and Audit

LAB ASSIGNMENT 6

Submitted to **Prof. RAJA SP**

NAME: PUNIT MIDDHA

REG.NO: 19BCE2060

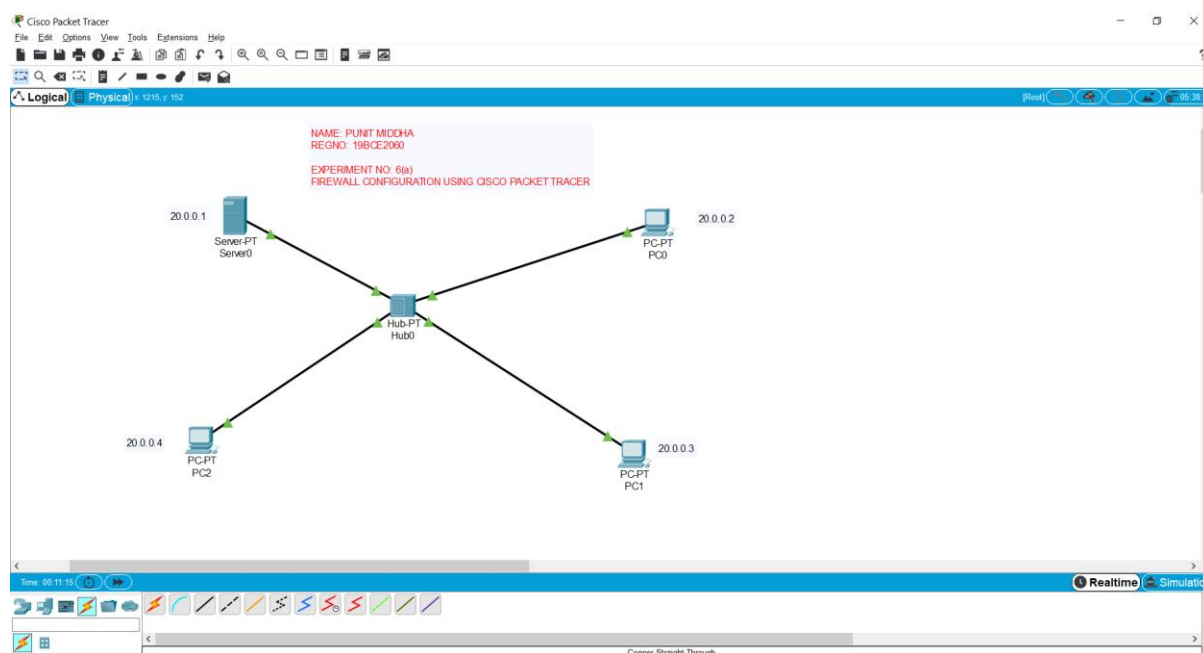
SLOT: L39+L40

DATE: 28/11/2021

6(a). Firewall Configuration Using Cisco Packet Tracer

Procedure:

1. Go to end devices and place 1 hub, 1 server and 3 PC's.
2. Now, go to connections and choose Copper-Straight Through cable and connect as in screenshot given below.
 - Connect hub with 3 PC's and 1 Server i.e., Server0, PC0, PC1, PC2.



3. After completing the connection procedure, go to **Desktop → IP Configuration** and set the IP Addresses for each and every end device
 - **Server0:**
IPv4 Address – 20.0.0.1
 - **PC0:**

IPv4 Address - 20.0.0.2

- **PC1:**

IPv4 Address - 20.0.0.3

- **PC2:**

IPv4 Address - 20.0.0.4

The screenshot shows the 'Server0' configuration window with the 'Desktop' tab selected. The 'IP Configuration' section is active, showing settings for both IPv4 and IPv6. The IPv4 configuration is set to 'Static' with an IP Address of 20.0.0.1, Subnet Mask of 255.0.0.0, Default Gateway of 0.0.0.0, and DNS Server of 0.0.0.0. The IPv6 configuration is also set to 'Static' with a Link Local Address of FE80::240:BFF:FE75:BEE. The 802.1X section is currently disabled.

IP Configuration	
<input type="radio"/> DHCP <input checked="" type="radio"/> Static	
IP Address	20.0.0.1
Subnet Mask	255.0.0.0
Default Gateway	0.0.0.0
DNS Server	0.0.0.0

IPv6 Configuration	
<input type="radio"/> DHCP <input type="radio"/> Auto Config <input checked="" type="radio"/> Static	
IPv6 Address	
Link Local Address	FE80::240:BFF:FE75:BEE
IPv6 Gateway	
IPv6 DNS Server	

802.1X	
<input type="checkbox"/> Use 802.1X Security	
Authentication	MD5
Username	
Password	

☐ Top

The screenshot shows the 'PC0' configuration window with the 'Desktop' tab selected. The 'IP Configuration' section is active, showing settings for both IPv4 and IPv6. The IPv4 configuration is set to 'Static' with an IP Address of 20.0.0.2, Subnet Mask of 255.0.0.0, Default Gateway of 0.0.0.0, and DNS Server of 0.0.0.0. The IPv6 configuration is also set to 'Static' with a Link Local Address of FE80::2E0:A3FF:FEA2:6D60. The 802.1X section is currently disabled.

IP Configuration	
<input type="radio"/> DHCP <input checked="" type="radio"/> Static	
IP Address	20.0.0.2
Subnet Mask	255.0.0.0
Default Gateway	0.0.0.0
DNS Server	0.0.0.0

IPv6 Configuration	
<input type="radio"/> DHCP <input type="radio"/> Auto Config <input checked="" type="radio"/> Static	
IPv6 Address	
Link Local Address	FE80::2E0:A3FF:FEA2:6D60
IPv6 Gateway	
IPv6 DNS Server	

802.1X	
<input type="checkbox"/> Use 802.1X Security	
Authentication	MD5
Username	
Password	

☐ Top

PC1

Physical Config **Desktop** Programming Attributes

IP Configuration X

Interface FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IP Address 20.0.0.3

Subnet Mask 255.0.0.0

Default Gateway 0.0.0.0

DNS Server 0.0.0.0

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address /

Link Local Address FE80::201:63FF:FE6D:3421

IPv6 Gateway

IPv6 DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

Username

Password

☐ Top

PC2

Physical Config **Desktop** Programming Attributes

IP Configuration X

Interface FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IP Address 20.0.0.4

Subnet Mask 255.0.0.0

Default Gateway 0.0.0.0

DNS Server 0.0.0.0

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address /

Link Local Address FE80::2E0:A3FF:FECD:D465

IPv6 Gateway

IPv6 DNS Server

802.1X

☐ Use 802.1X Security

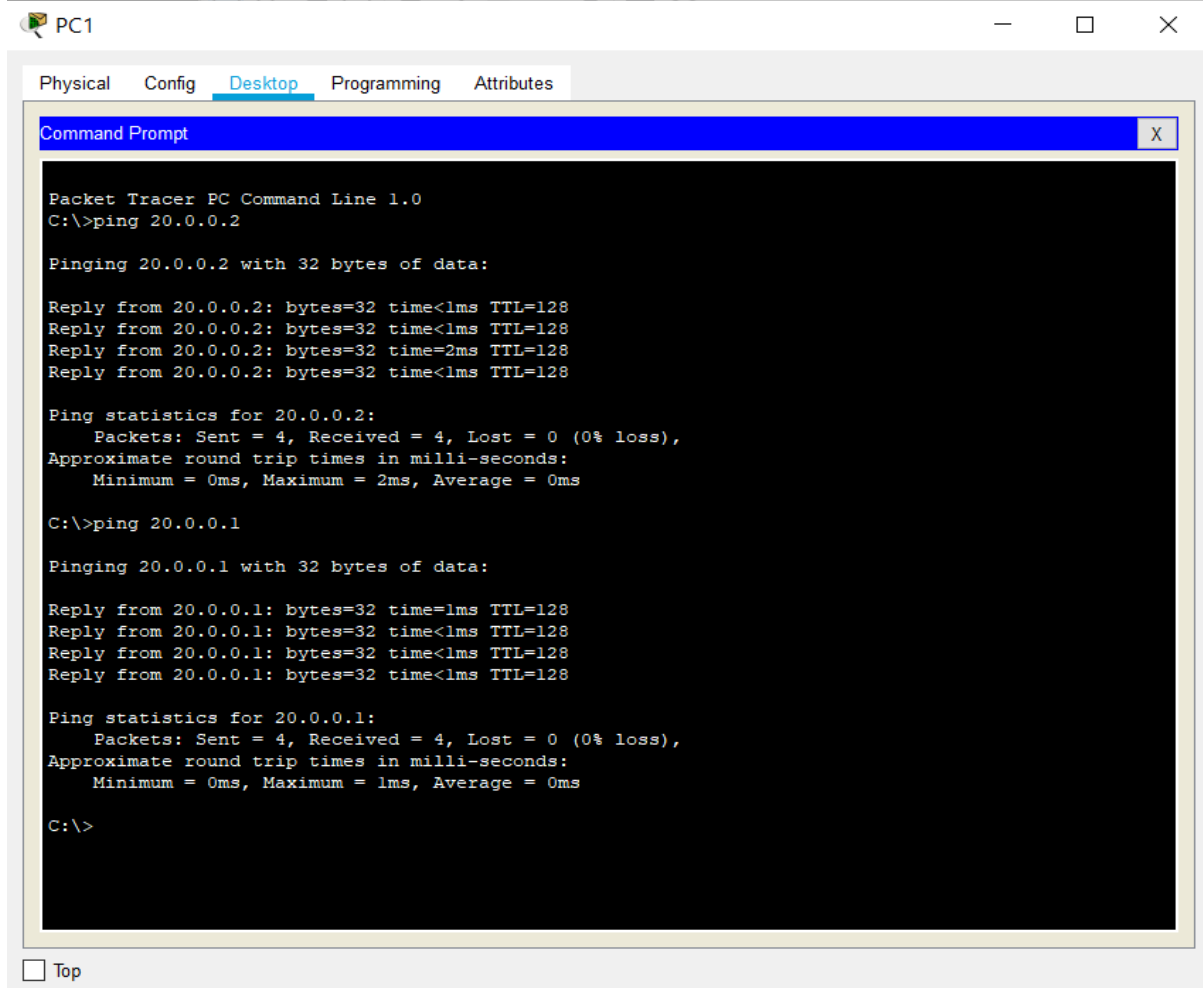
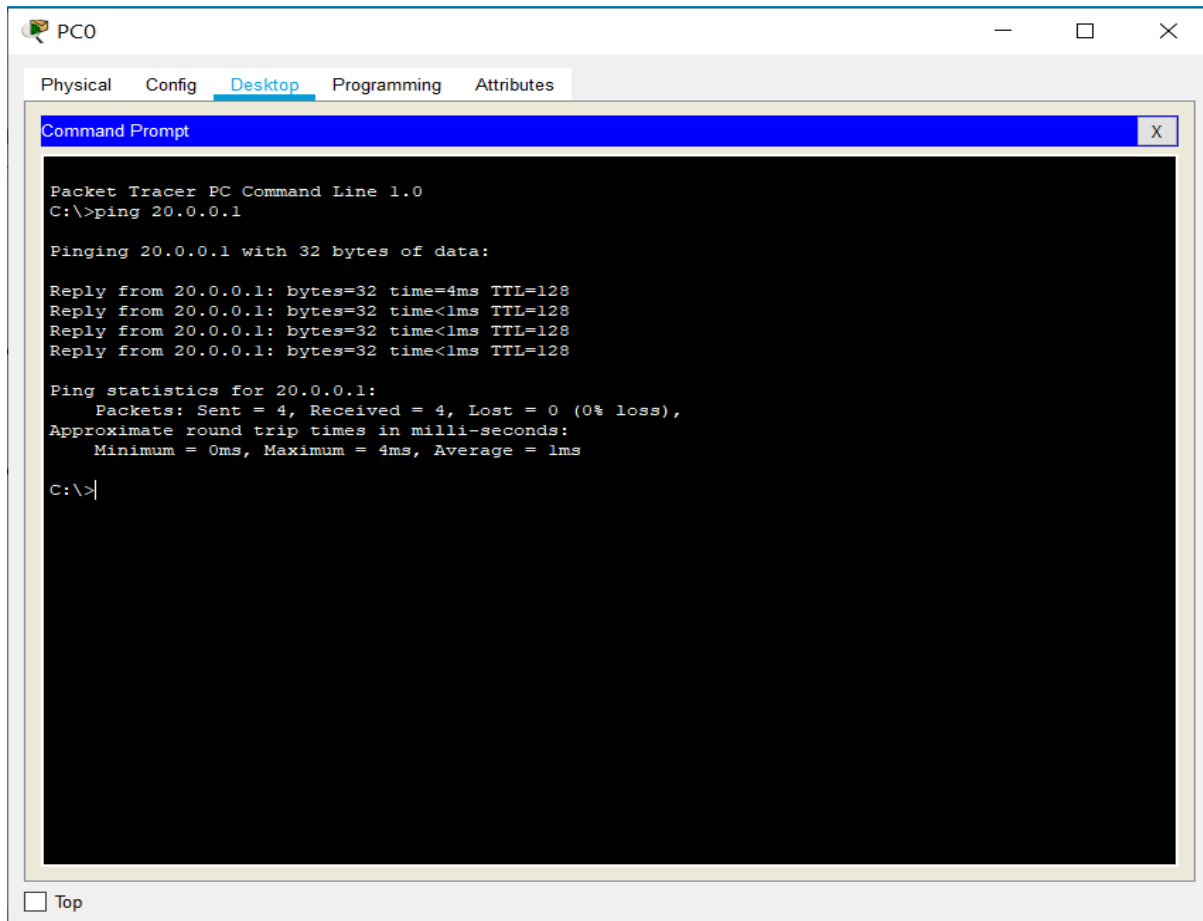
Authentication MD5

Username

Password

☐ Top

4. Now to check the connection (**Before Firewall Configuration**), we have to use ping command from one end device to another end device as shown below in given screenshot.



5. We can see that we are able to successfully ping from one device to another device. Now to configure firewall, go to **Server0 → Desktop → Firewall**.

Select the following settings:

Interface → FastEthernet0

Action → Deny

Protocol → ICMP

Remote IP → 0.0.0.0

Remote Wildcard Mask → 255.255.255.255

Now, 'ON' the services, click on 'Add' and 'Save' the settings.

Server0

Physical Config Services **Desktop** Programming Attributes

Firewall

Service ☒ On ☐ Off

Interface FastEthernet0

Inbound Rules

Action Deny Protocol ICMP

Remote IP 0.0.0.0 Remote Wildcard Mask 255.255.255.255

Remote Port Local Port

Save Remove Add

Action	Protocol	Remote IP	Remote Wild Card	Remote Port	Local Port
--------	----------	-----------	------------------	-------------	------------

☐ Top

Server0

Physical Config Services **Desktop** Programming Attributes

Firewall

Service ☒ On ☐ Off

Interface FastEthernet0

Inbound Rules

Action Protocol

Remote IP Remote Wildcard Mask

Remote Port Local Port

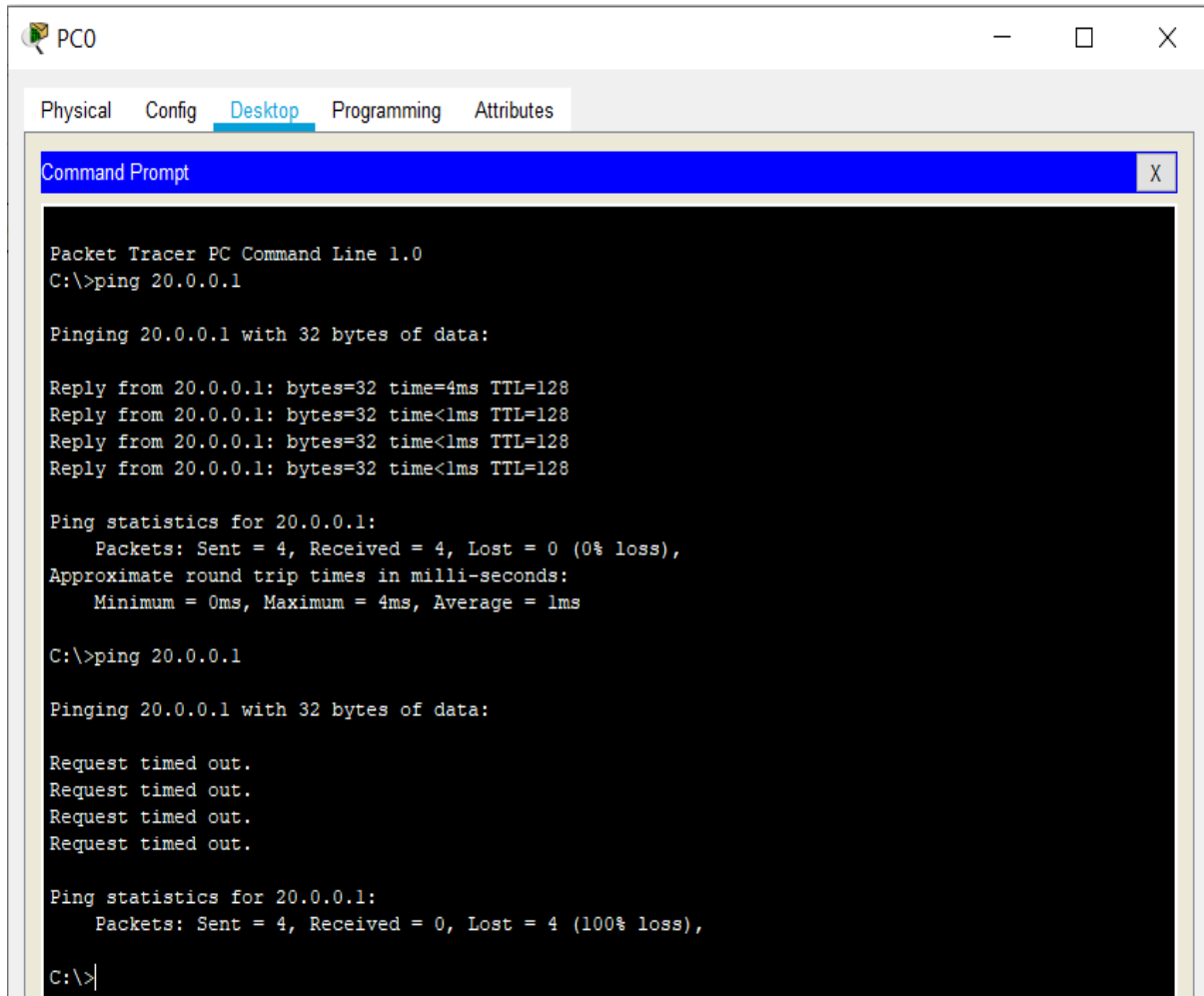
Save Remove Add

Action	Protocol	Remote IP	Remote Wild Card	Remote Port	Local Port
1 Deny	ICMP	0.0.0.0	255.255.255.255	-	-

- After configuring Firewall, we will try to ping from one device to another. Go to **PC0** → **Desktop** → **Command Prompt**. Now, try to ping from PC0 to Server0 using **ping 20.0.0.1** command.

Output:

We can see that after configuration of firewall, we are not able to get any reply from one device to another. It is showing 'Request timed out' for all the packets. Hence, we can say that Firewall Configuration is working properly.



The screenshot shows the PC0 desktop environment with the 'Desktop' tab selected. A Command Prompt window is open, displaying the output of a ping command to 20.0.0.1. The output shows four successful replies with 32 bytes of data, a time of 4ms, and a TTL of 128. The ping statistics indicate that all four packets were sent and received, with 0% loss.

```
Packet Tracer PC Command Line 1.0
C:\>ping 20.0.0.1

Pinging 20.0.0.1 with 32 bytes of data:

Reply from 20.0.0.1: bytes=32 time=4ms TTL=128
Reply from 20.0.0.1: bytes=32 time<1ms TTL=128
Reply from 20.0.0.1: bytes=32 time<1ms TTL=128
Reply from 20.0.0.1: bytes=32 time<1ms TTL=128

Ping statistics for 20.0.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 4ms, Average = 1ms

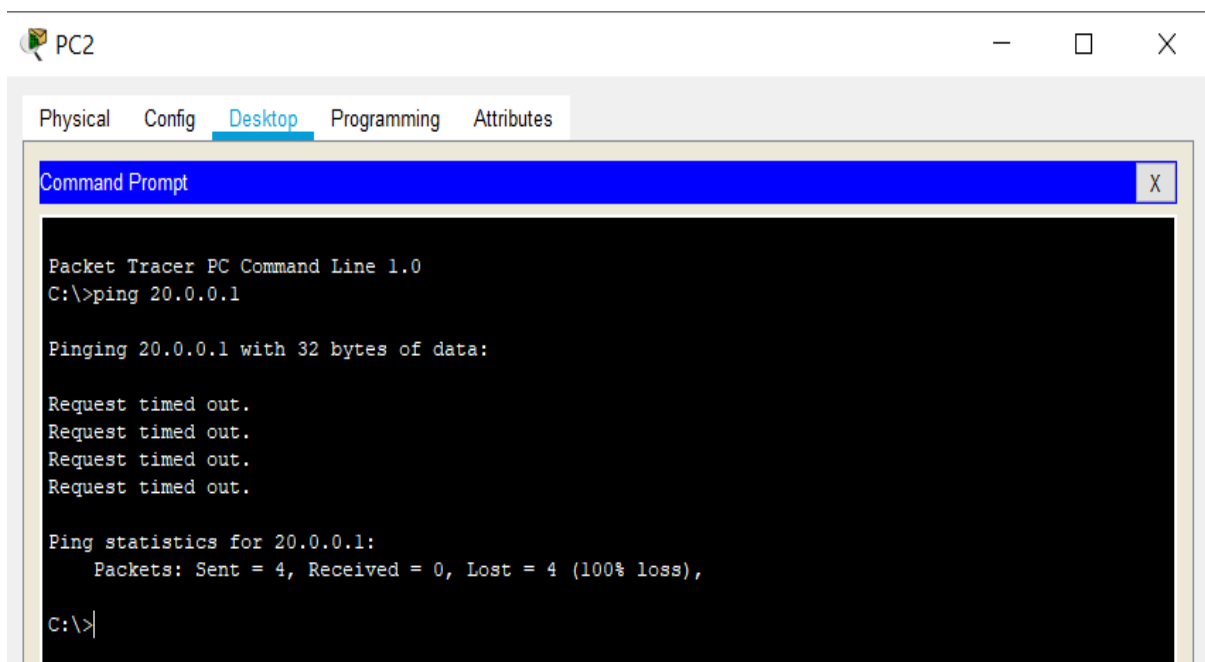
C:\>ping 20.0.0.1

Pinging 20.0.0.1 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 20.0.0.1:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>
```



The screenshot shows the PC2 desktop environment with the 'Desktop' tab selected. A Command Prompt window is open, displaying the output of a ping command to 20.0.0.1. The output shows four failed requests, each timing out. The ping statistics indicate that all four packets were sent, but none were received, resulting in a 100% loss.

```
Packet Tracer PC Command Line 1.0
C:\>ping 20.0.0.1

Pinging 20.0.0.1 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 20.0.0.1:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

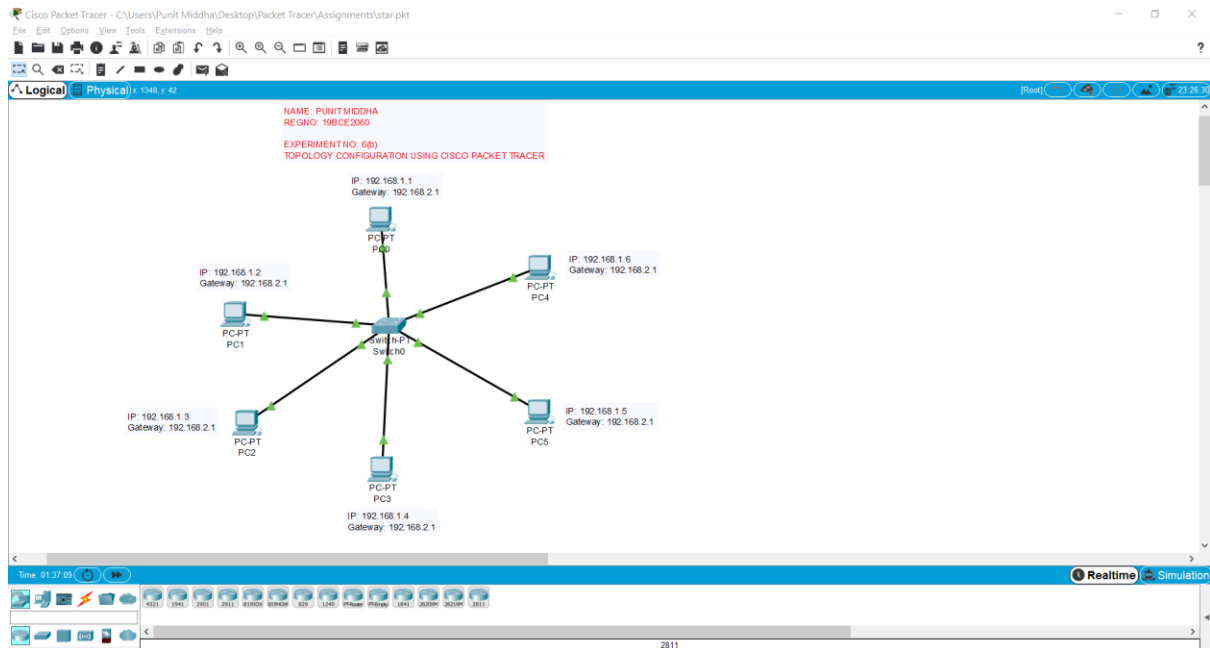
C:\>
```

6(b). Topology Configuration Using Cisco Packet Tracer

I. Star Topology:

Procedure:

1. Go to end devices and place 1 switch and 6 PC's.
2. Now, go to connections and choose Copper-Straight Through cable and connect as in screenshot given below.
 - Connect Switch0 with 6 PC's i.e., PC0, PC1, PC2, PC3, PC4, PC5.



3. After completing the connection procedure, go to **Desktop → IP Configuration** and set the IP Addresses for each and every end device
 - **PC0:**
IPv4 Address – 192.168.1.1
Default Gateway - 192.168.2.1
 - **PC1:**
IPv4 Address – 192.168.1.2
Default Gateway - 192.168.2.1
 - **PC2:**
IPv4 Address – 192.168.1.3
Default Gateway - 192.168.2.1
 - **PC3:**
IPv4 Address – 192.168.1.4
Default Gateway - 192.168.2.1
 - **PC4:**
IPv4 Address – 192.168.1.6
Default Gateway - 192.168.2.1
 - **PC5:**
IPv4 Address – 192.168.1.5
Default Gateway - 192.168.2.1

PC0

Physical Config **Desktop** Programming Attributes

IP Configuration X

Interface FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IP Address 192.168.1.1

Subnet Mask 255.255.255.0

Default Gateway 192.168.2.1

DNS Server 0.0.0.0

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address /

Link Local Address FE80::2D0:FFFF:FEB4:6120

IPv6 Gateway

IPv6 DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

Username

Password

☐ Top

PC2

Physical Config **Desktop** **Programming** Attributes

IP Configuration X

Interface FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IP Address 192.168.1.3

Subnet Mask 255.255.255.0

Default Gateway 192.168.2.1

DNS Server 0.0.0.0

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address /

Link Local Address FE80::202:4AFF:FEC5:EC7C

IPv6 Gateway

IPv6 DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

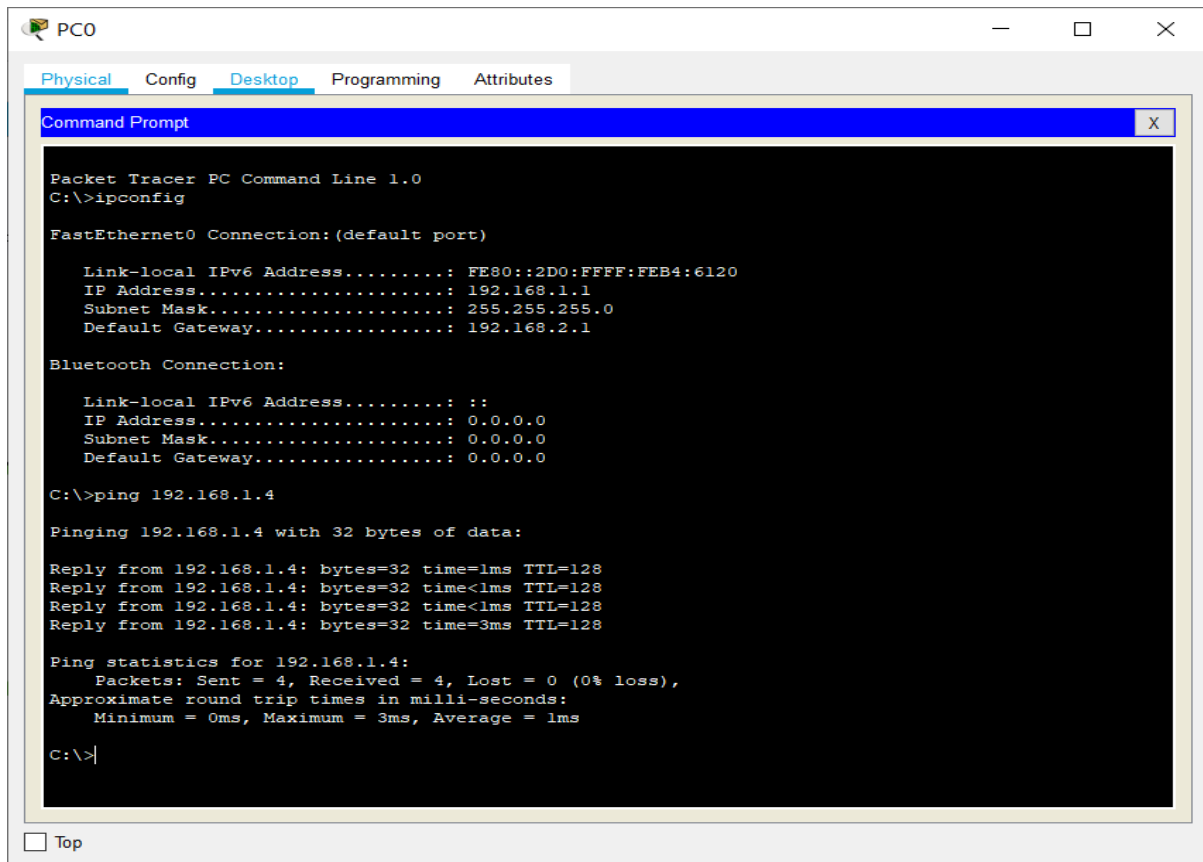
Username

Password

☐ Top

Output:

To check the connection, go to **PC → Desktop → Command Prompt** use **ipconfig** and **ping command** as shown in screenshot below. We can see that ping command (**ping 192.168.1.4**, **ping 192.168.1.5**) is executing successfully hence, implementation of mesh topology using cisco packet tracer is correct.



The screenshot shows the Command Prompt window for PC0 in Cisco Packet Tracer. The window has tabs for Physical, Config, Desktop, Programming, and Attributes, with Desktop selected. The Command Prompt displays the output of the 'ipconfig' and 'ping 192.168.1.4' commands. The 'ipconfig' output shows the FastEthernet0 interface with IPv4 address 192.168.1.1 and subnet mask 255.255.255.0. The 'ping' command shows four successful replies from 192.168.1.4 with 0% loss.

```
Packet Tracer PC Command Line 1.0
C:\>ipconfig

FastEthernet0 Connection: (default port)

    Link-local IPv6 Address . . . . . : FE80::2D0:FFFF:FEB4:6120
    IP Address. . . . . : 192.168.1.1
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 192.168.2.1

Bluetooth Connection:

    Link-local IPv6 Address . . . . . : ::
    IP Address. . . . . : 0.0.0.0
    Subnet Mask . . . . . : 0.0.0.0
    Default Gateway . . . . . : 0.0.0.0

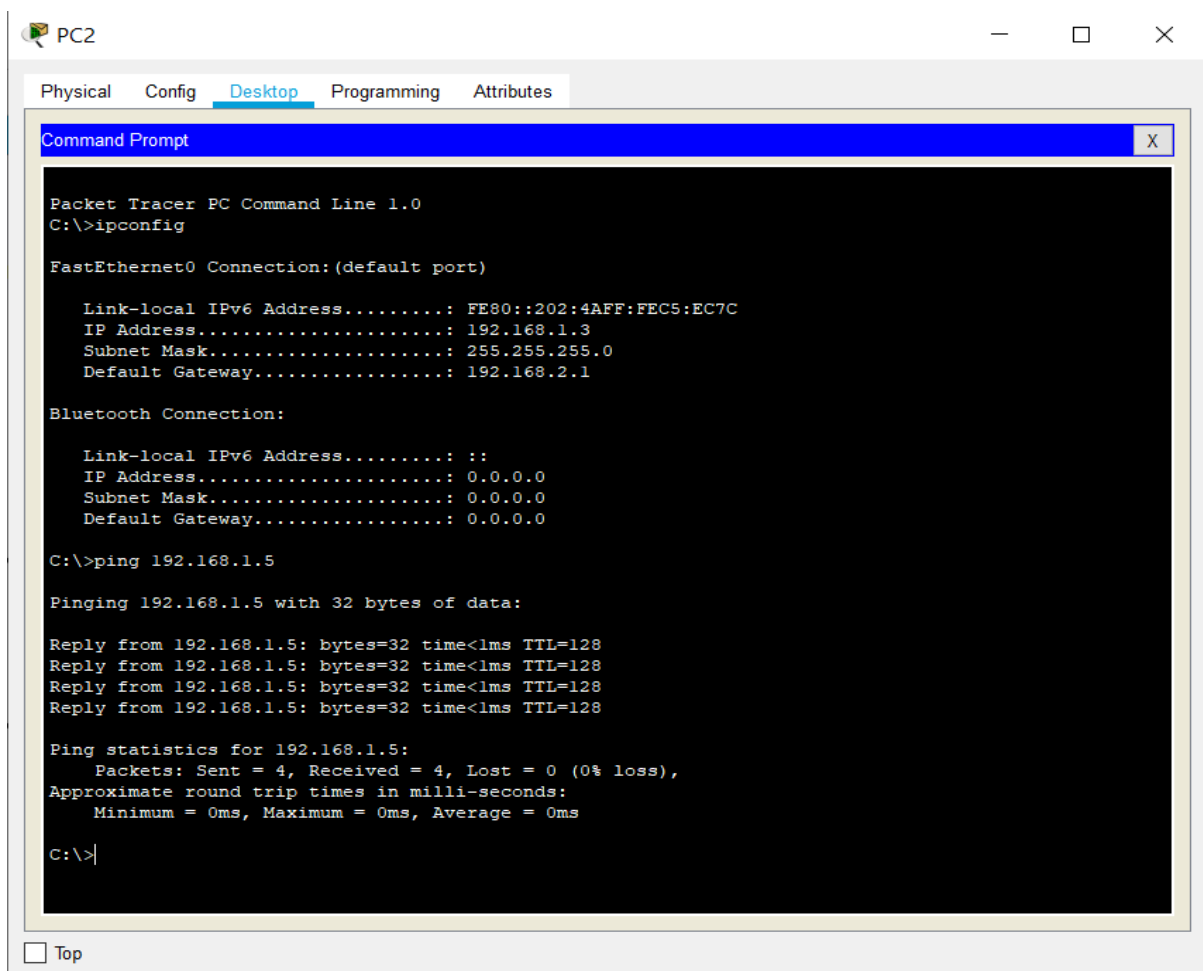
C:\>ping 192.168.1.4

Pinging 192.168.1.4 with 32 bytes of data:

Reply from 192.168.1.4: bytes=32 time=1ms TTL=128
Reply from 192.168.1.4: bytes=32 time<1ms TTL=128
Reply from 192.168.1.4: bytes=32 time<1ms TTL=128
Reply from 192.168.1.4: bytes=32 time=3ms TTL=128

Ping statistics for 192.168.1.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 3ms, Average = 1ms

C:\>
```



The screenshot shows the Command Prompt window for PC2 in Cisco Packet Tracer. The window has tabs for Physical, Config, Desktop, Programming, and Attributes, with Desktop selected. The Command Prompt displays the output of the 'ipconfig' and 'ping 192.168.1.5' commands. The 'ipconfig' output shows the FastEthernet0 interface with IPv4 address 192.168.1.3 and subnet mask 255.255.255.0. The 'ping' command shows four successful replies from 192.168.1.5 with 0% loss.

```
Packet Tracer PC Command Line 1.0
C:\>ipconfig

FastEthernet0 Connection: (default port)

    Link-local IPv6 Address . . . . . : FE80::202:4AFF:FEC5:EC7C
    IP Address. . . . . : 192.168.1.3
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 192.168.2.1

Bluetooth Connection:

    Link-local IPv6 Address . . . . . : ::
    IP Address. . . . . : 0.0.0.0
    Subnet Mask . . . . . : 0.0.0.0
    Default Gateway . . . . . : 0.0.0.0

C:\>ping 192.168.1.5

Pinging 192.168.1.5 with 32 bytes of data:

Reply from 192.168.1.5: bytes=32 time<1ms TTL=128
Reply from 192.168.1.5: bytes=32 time<1ms TTL=128
Reply from 192.168.1.5: bytes=32 time<1ms TTL=128
Reply from 192.168.1.5: bytes=32 time<1ms TTL=128

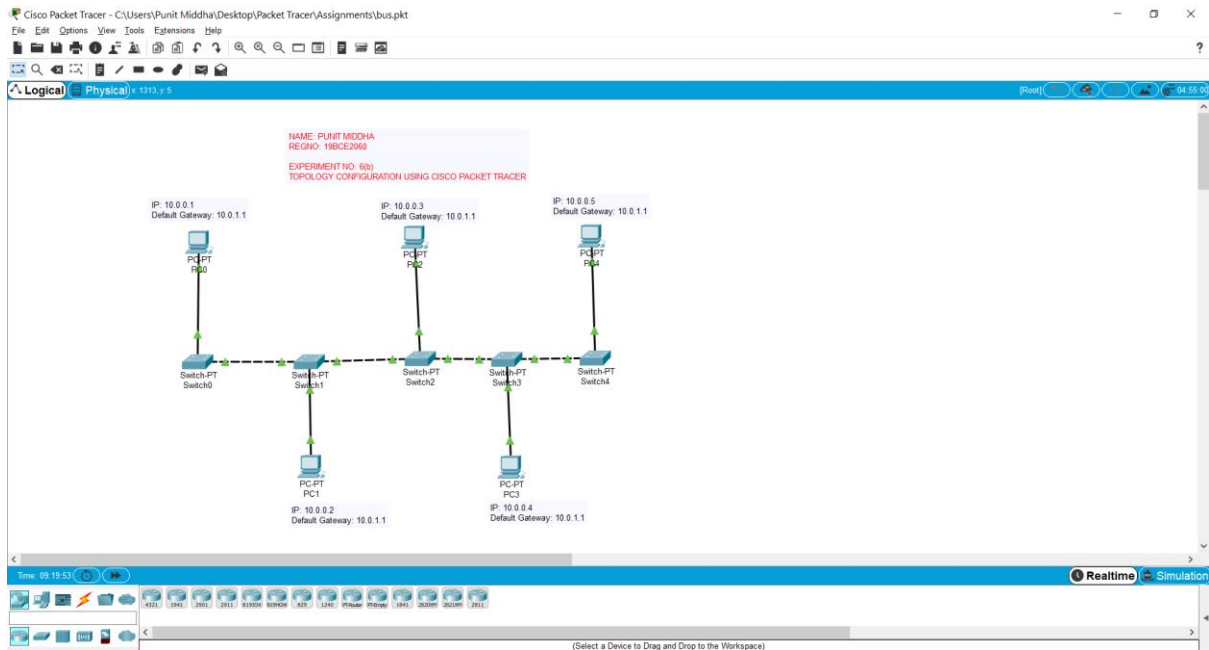
Ping statistics for 192.168.1.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

II. Bus Topology:

Procedure:

1. Go to end devices and place 5 switch and 5 PC's.
2. Now, go to connections and choose Copper-Straight Through cable and connect as in screenshot given below.
 - Connect one PC with each Switch.



3. After completing the connection procedure, go to **Desktop → IP Configuration** and set the IP Addresses for each and every end device
 - **PC0:**
IPv4 Address – 10.0.0.1
Default Gateway – 10.0.1.1
 - **PC1:**
IPv4 Address – 10.0.0.2
Default Gateway – 10.0.1.1
 - **PC2:**
IPv4 Address – 10.0.0.3
Default Gateway – 10.0.1.1
 - **PC3:**
IPv4 Address – 10.0.0.4
Default Gateway – 10.0.1.1
 - **PC4:**
IPv4 Address – 10.0.0.5
Default Gateway – 10.0.1.1

PC0

Physical Config **Desktop** Programming Attributes

IP Configuration X

Interface FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IP Address 10.0.0.1

Subnet Mask 255.0.0.0

Default Gateway 10.0.1.1

DNS Server 0.0.0.0

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address /

Link Local Address FE80::2D0:BCFF:FE95:A5B

IPv6 Gateway

IPv6 DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

Username

Password

☐ Top

PC2

Physical Config **Desktop** Programming Attributes

IP Configuration X

Interface FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IP Address 10.0.0.3

Subnet Mask 255.0.0.0

Default Gateway 10.0.1.1

DNS Server 0.0.0.0

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address /

Link Local Address FE80::204:9AFF:FE45:8DBD

IPv6 Gateway

IPv6 DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

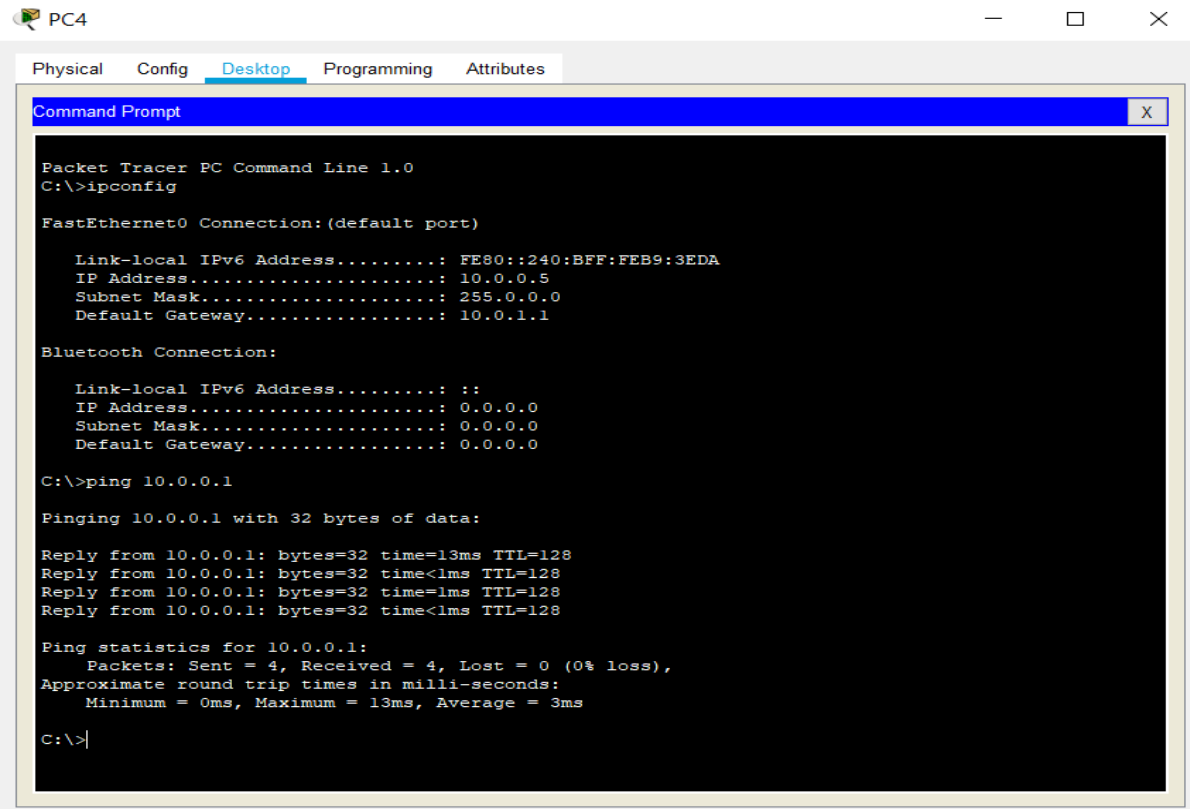
Username

Password

☐ Top

Output:

To check the connection, go to **PC → Desktop → Command Prompt** use **ipconfig** and **ping command** as shown in screenshot below. We can see that ping command (**ping 10.0.0.1**, **ping 10.0.0.4**) is executing successfully hence, implementation of bus topology using cisco packet tracer is correct.



The screenshot shows the Command Prompt window for PC4 in Cisco Packet Tracer. The window has tabs for Physical, Config, Desktop (selected), Programming, and Attributes. The Command Prompt displays the output of the 'ipconfig' and 'ping 10.0.0.1' commands. The 'ipconfig' output shows the FastEthernet0 interface with IP 10.0.0.5, subnet mask 255.0.0.0, and default gateway 10.0.1.1. The 'ping 10.0.0.1' command shows four successful replies with 0% loss and an average round trip time of 3ms.

```
Packet Tracer PC Command Line 1.0
C:\>ipconfig

FastEthernet0 Connection:(default port)

    Link-local IPv6 Address . . . . . : FE80::240:BFF:FEB9:3EDA
    IP Address. . . . . : 10.0.0.5
    Subnet Mask . . . . . : 255.0.0.0
    Default Gateway . . . . . : 10.0.1.1

Bluetooth Connection:

    Link-local IPv6 Address . . . . . : ::
    IP Address . . . . . : 0.0.0.0
    Subnet Mask . . . . . : 0.0.0.0
    Default Gateway . . . . . : 0.0.0.0

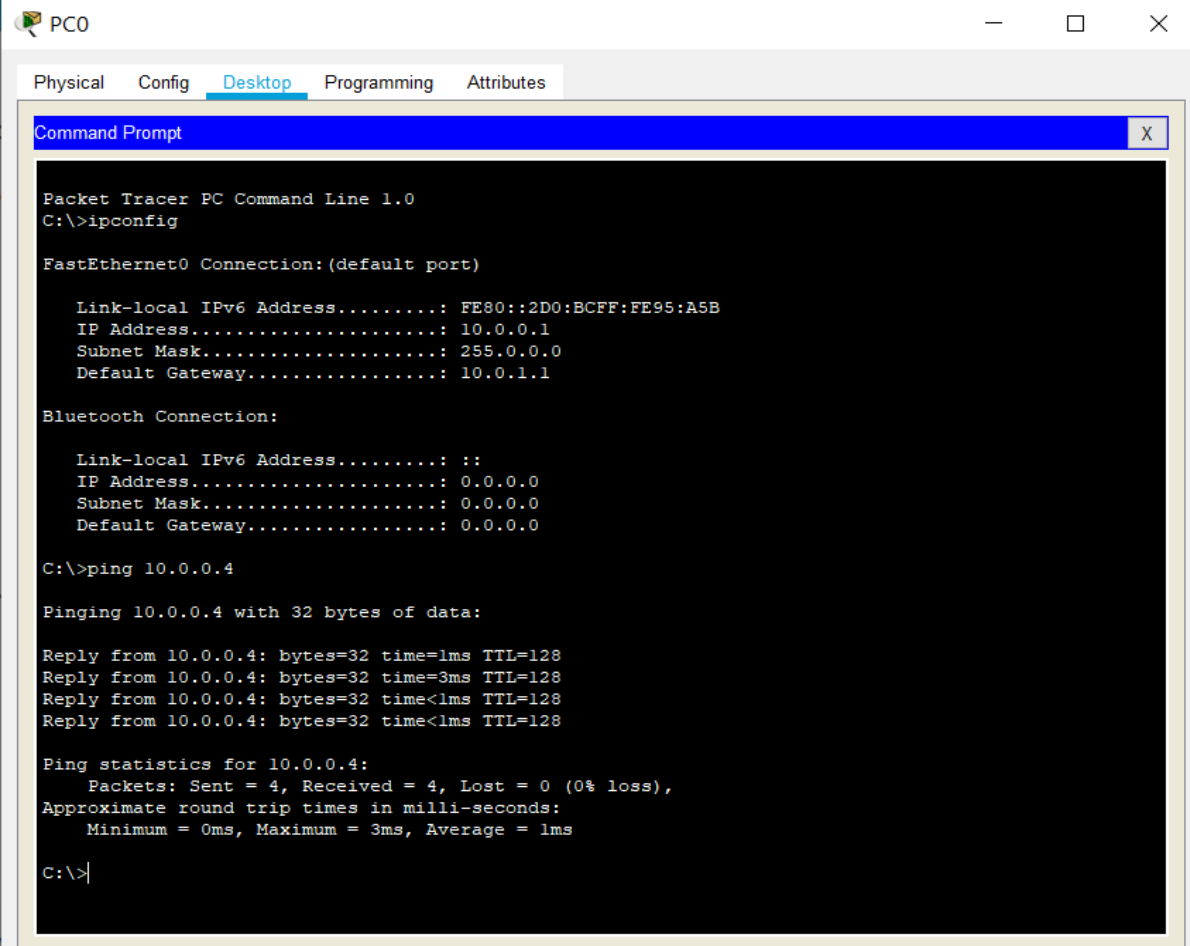
C:\>ping 10.0.0.1

Pinging 10.0.0.1 with 32 bytes of data:

Reply from 10.0.0.1: bytes=32 time=13ms TTL=128
Reply from 10.0.0.1: bytes=32 time<1ms TTL=128
Reply from 10.0.0.1: bytes=32 time=1ms TTL=128
Reply from 10.0.0.1: bytes=32 time<1ms TTL=128

Ping statistics for 10.0.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 13ms, Average = 3ms

C:\>|
```



The screenshot shows the Command Prompt window for PC0 in Cisco Packet Tracer. The window has tabs for Physical, Config, Desktop (selected), Programming, and Attributes. The Command Prompt displays the output of the 'ipconfig' and 'ping 10.0.0.4' commands. The 'ipconfig' output shows the FastEthernet0 interface with IP 10.0.0.1, subnet mask 255.0.0.0, and default gateway 10.0.1.1. The 'ping 10.0.0.4' command shows four successful replies with 0% loss and an average round trip time of 1ms.

```
Packet Tracer PC Command Line 1.0
C:\>ipconfig

FastEthernet0 Connection:(default port)

    Link-local IPv6 Address . . . . . : FE80::2D0:BCFF:FE95:A5B
    IP Address. . . . . : 10.0.0.1
    Subnet Mask . . . . . : 255.0.0.0
    Default Gateway . . . . . : 10.0.1.1

Bluetooth Connection:

    Link-local IPv6 Address . . . . . : ::
    IP Address . . . . . : 0.0.0.0
    Subnet Mask . . . . . : 0.0.0.0
    Default Gateway . . . . . : 0.0.0.0

C:\>ping 10.0.0.4

Pinging 10.0.0.4 with 32 bytes of data:

Reply from 10.0.0.4: bytes=32 time=1ms TTL=128
Reply from 10.0.0.4: bytes=32 time=3ms TTL=128
Reply from 10.0.0.4: bytes=32 time<1ms TTL=128
Reply from 10.0.0.4: bytes=32 time<1ms TTL=128

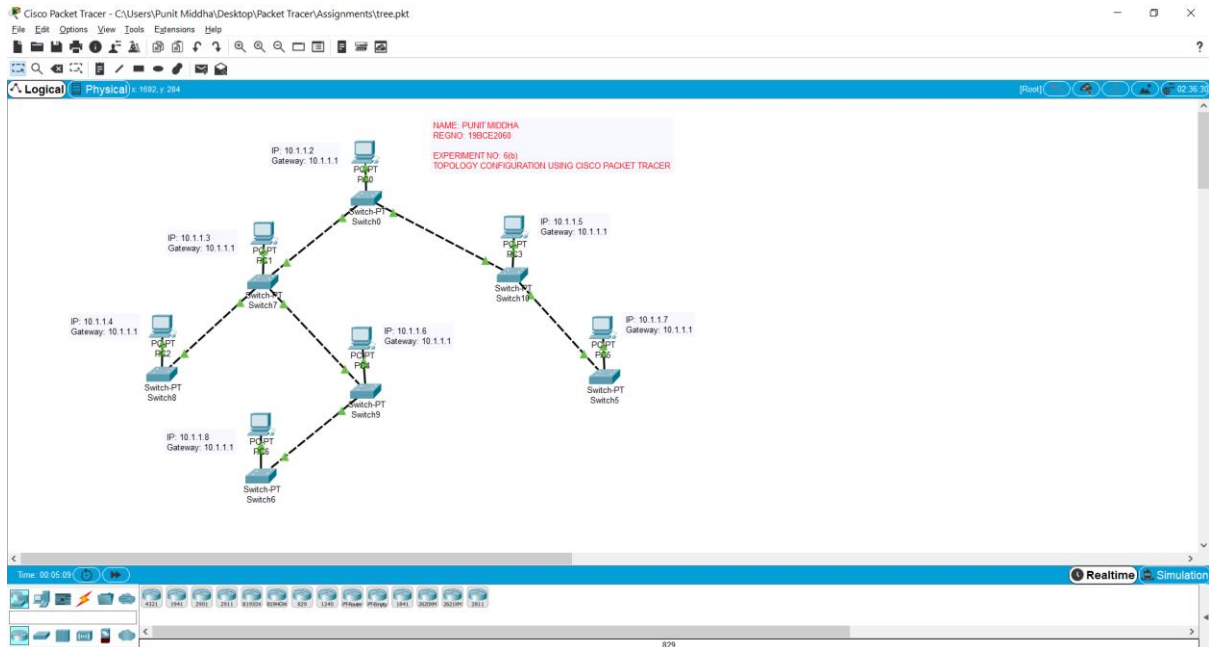
Ping statistics for 10.0.0.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 3ms, Average = 1ms

C:\>|
```

III. Tree Topology:

Procedure:

1. Go to end devices and place 7 switch and 7 PC's.
2. Now, go to connections and choose Copper-Straight Through cable and connect as in screenshot given below.
 - Connect one PC with each Switch.



3. After completing the connection procedure, go to **Desktop → IP Configuration** and set the IP Addresses for each and every end device
 - **PC0:**
IPv4 Address – 10.1.1.2
Default Gateway – 10.1.1.1
 - **PC1:**
IPv4 Address – 10.1.1.3
Default Gateway – 10.1.1.1
 - **PC2:**
IPv4 Address – 10.1.1.4
Default Gateway – 10.1.1.1
 - **PC3:**
IPv4 Address – 10.1.1.5
Default Gateway – 10.1.1.1
 - **PC4:**
IPv4 Address – 10.1.1.6
Default Gateway – 10.1.1.1
 - **PC5:**
IPv4 Address – 10.1.1.7
Default Gateway – 10.1.1.1
 - **PC6:**
IPv4 Address – 10.1.1.8
Default Gateway – 10.1.1.1

PC0

Physical Config **Desktop** Programming Attributes

IP Configuration X

Interface: FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IP Address: 10.1.1.2

Subnet Mask: 255.0.0.0

Default Gateway: 10.1.1.1

DNS Server: 0.0.0.0

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address: /

Link Local Address: FE80::201:43FF:FEE3:61D0

IPv6 Gateway:

IPv6 DNS Server:

802.1X

☐ Use 802.1X Security

Authentication: MD5

Username:

Password:

☐ Top

PC5

Physical Config **Desktop** Programming Attributes

IP Configuration X

Interface: FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IP Address: 10.1.1.7

Subnet Mask: 255.0.0.0

Default Gateway: 10.1.1.1

DNS Server: 0.0.0.0

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address: /

Link Local Address: FE80::20C:CFFF:FEA6:3147

IPv6 Gateway:

IPv6 DNS Server:

802.1X

☐ Use 802.1X Security

Authentication: MD5

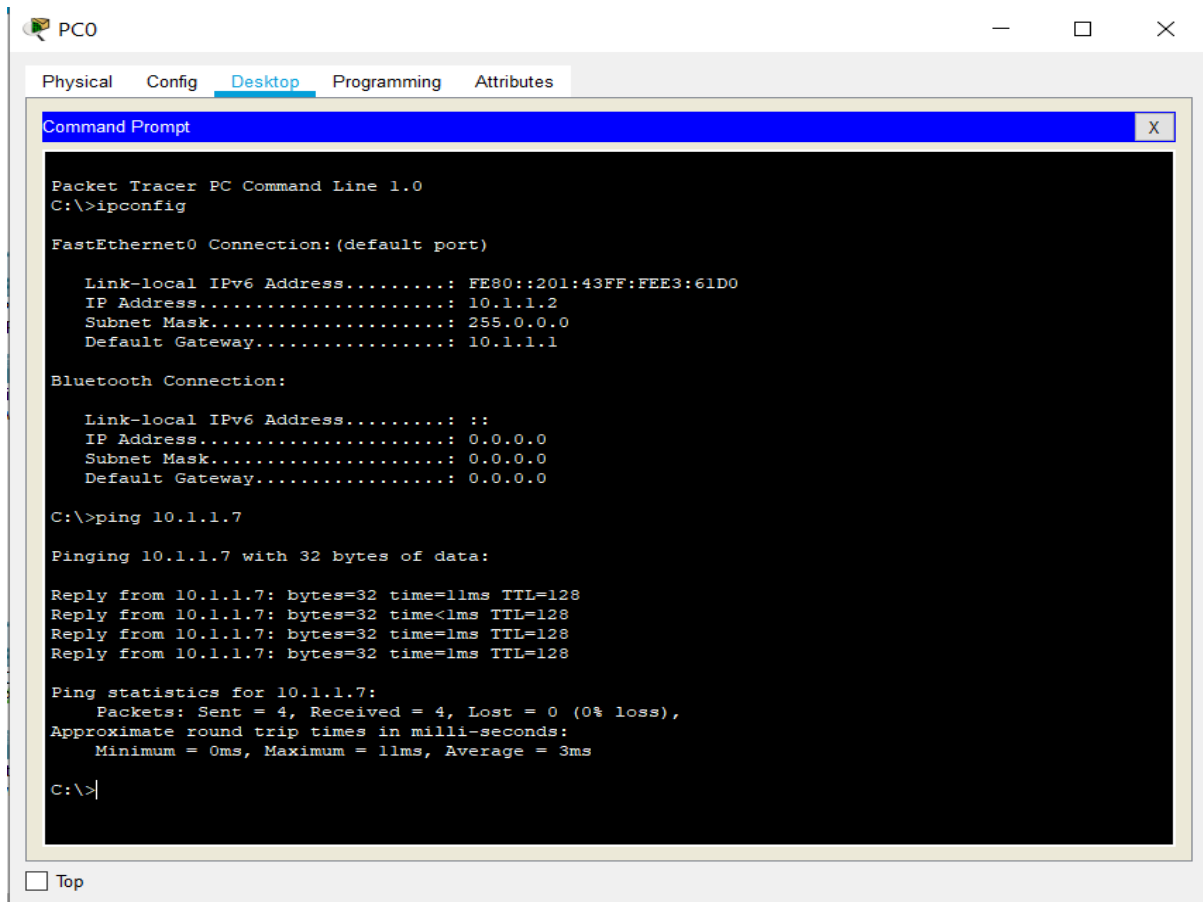
Username:

Password:

☐ Top

Output:

To check the connection, go to **PC → Desktop → Command Prompt** use **ipconfig** and **ping command** as shown in screenshot below. We can see that ping command (**ping 10.1.1.7**, **ping 10.1.1.5**) is executing successfully hence, implementation of tree topology using cisco packet tracer is correct.



The screenshot shows the PC0 Desktop window with the Command Prompt open. The Command Prompt displays the output of the 'ipconfig' command, showing the configuration for FastEthernet0 and Bluetooth. It then shows the output of the 'ping 10.1.1.7' command, which is successful with 0% loss.

```
Packet Tracer PC Command Line 1.0
C:\>ipconfig

FastEthernet0 Connection:(default port)

    Link-local IPv6 Address.....: FE80::201:43FF:FEE3:61D0
    IP Address.....: 10.1.1.2
    Subnet Mask.....: 255.0.0.0
    Default Gateway.....: 10.1.1.1

Bluetooth Connection:

    Link-local IPv6 Address.....: ::
    IP Address.....: 0.0.0.0
    Subnet Mask.....: 0.0.0.0
    Default Gateway.....: 0.0.0.0

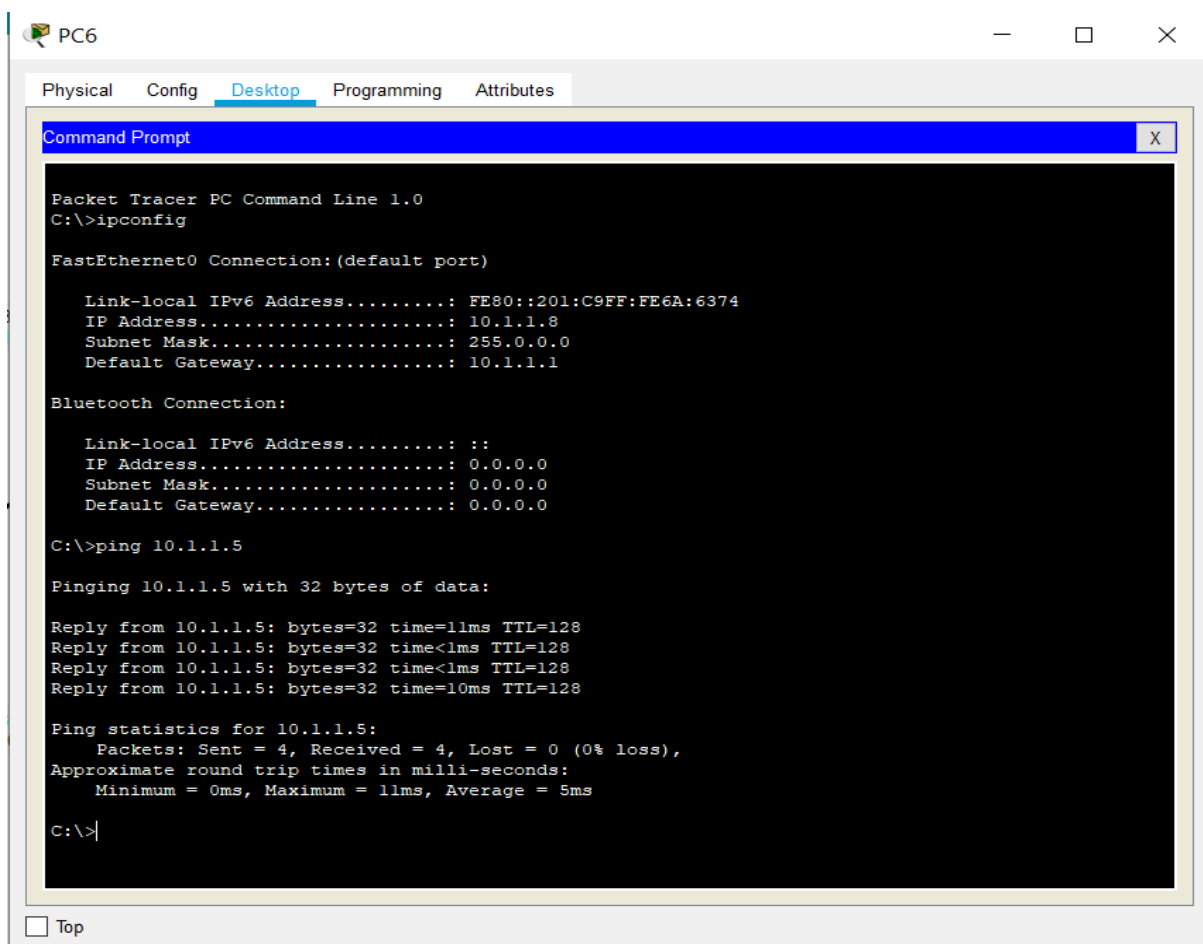
C:\>ping 10.1.1.7

Pinging 10.1.1.7 with 32 bytes of data:

Reply from 10.1.1.7: bytes=32 time=11ms TTL=128
Reply from 10.1.1.7: bytes=32 time<1ms TTL=128
Reply from 10.1.1.7: bytes=32 time=1ms TTL=128
Reply from 10.1.1.7: bytes=32 time=1ms TTL=128

Ping statistics for 10.1.1.7:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 11ms, Average = 3ms

C:\>
```



The screenshot shows the PC6 Desktop window with the Command Prompt open. The Command Prompt displays the output of the 'ipconfig' command, showing the configuration for FastEthernet0 and Bluetooth. It then shows the output of the 'ping 10.1.1.5' command, which is successful with 0% loss.

```
Packet Tracer PC Command Line 1.0
C:\>ipconfig

FastEthernet0 Connection:(default port)

    Link-local IPv6 Address.....: FE80::201:C9FF:FE6A:6374
    IP Address.....: 10.1.1.8
    Subnet Mask.....: 255.0.0.0
    Default Gateway.....: 10.1.1.1

Bluetooth Connection:

    Link-local IPv6 Address.....: ::
    IP Address.....: 0.0.0.0
    Subnet Mask.....: 0.0.0.0
    Default Gateway.....: 0.0.0.0

C:\>ping 10.1.1.5

Pinging 10.1.1.5 with 32 bytes of data:

Reply from 10.1.1.5: bytes=32 time=11ms TTL=128
Reply from 10.1.1.5: bytes=32 time<1ms TTL=128
Reply from 10.1.1.5: bytes=32 time<1ms TTL=128
Reply from 10.1.1.5: bytes=32 time=10ms TTL=128

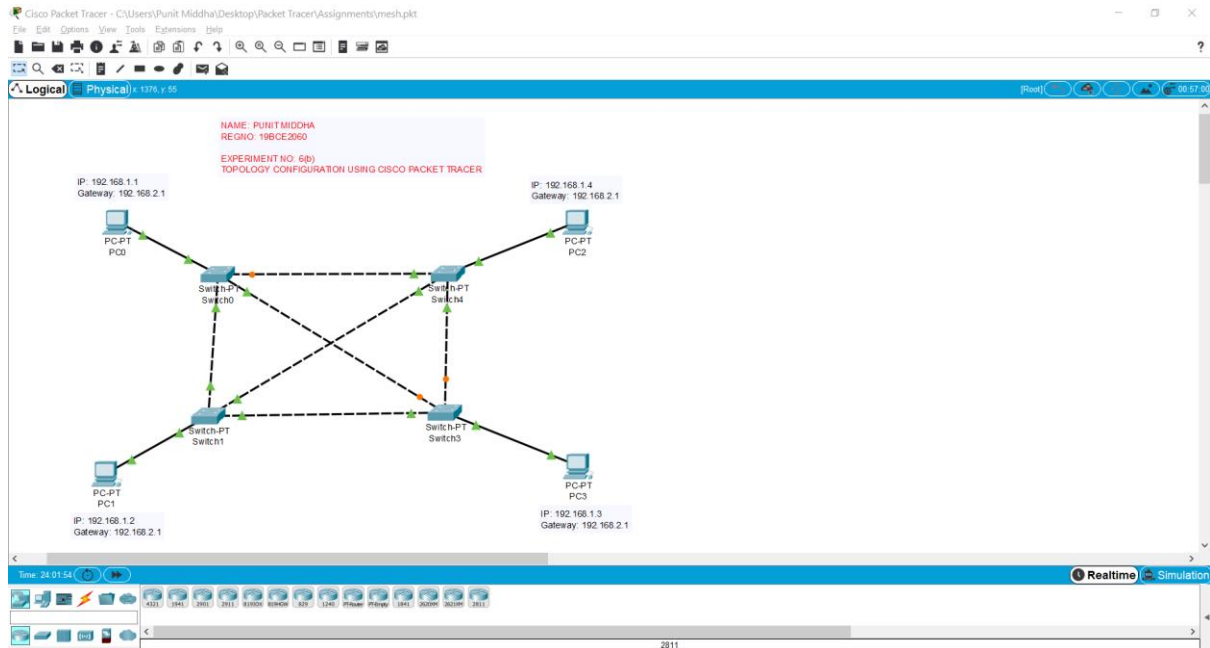
Ping statistics for 10.1.1.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 11ms, Average = 5ms

C:\>
```

IV. Mess Topology

Procedure:

1. Go to end devices and place 4 switch and 4 PC's.
2. Now, go to connections and choose Copper-Straight Through cable and connect as in screenshot given below.
 - Connect one PC with each Switch and all Switches must be connected with each other.



3. After completing the connection procedure, go to **Desktop → IP Configuration** and set the IP Addresses for each and every end device
 - **PC0:**
IPv4 Address – 192.168.1.1
Default Gateway – 192.168.2.1
 - **PC1:**
IPv4 Address – 192.168.1.2
Default Gateway – 192.168.2.1
 - **PC2:**
IPv4 Address – 192.168.1.4
Default Gateway – 192.168.2.1
 - **PC3:**
IPv4 Address – 192.168.1.3
Default Gateway – 192.168.2.1

PC0

Physical Config **Desktop** Programming Attributes

IP Configuration X

Interface: FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IP Address: 192.168.1.1

Subnet Mask: 255.255.255.0

Default Gateway: 192.168.2.1

DNS Server: 0.0.0.0

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address: /

Link Local Address: FE80::2D0:BCFF:FE7E:347B

IPv6 Gateway:

IPv6 DNS Server:

802.1X

☐ Use 802.1X Security

Authentication: MD5

Username:

Password:

☐ Top

PC2

Physical Config **Desktop** Programming Attributes

IP Configuration X

Interface: FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IP Address: 192.168.1.4

Subnet Mask: 255.255.255.0

Default Gateway: 192.168.2.1

DNS Server: 0.0.0.0

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address: /

Link Local Address: FE80::201:C9FF:FE50:5B80

IPv6 Gateway:

IPv6 DNS Server:

802.1X

☐ Use 802.1X Security

Authentication: MD5

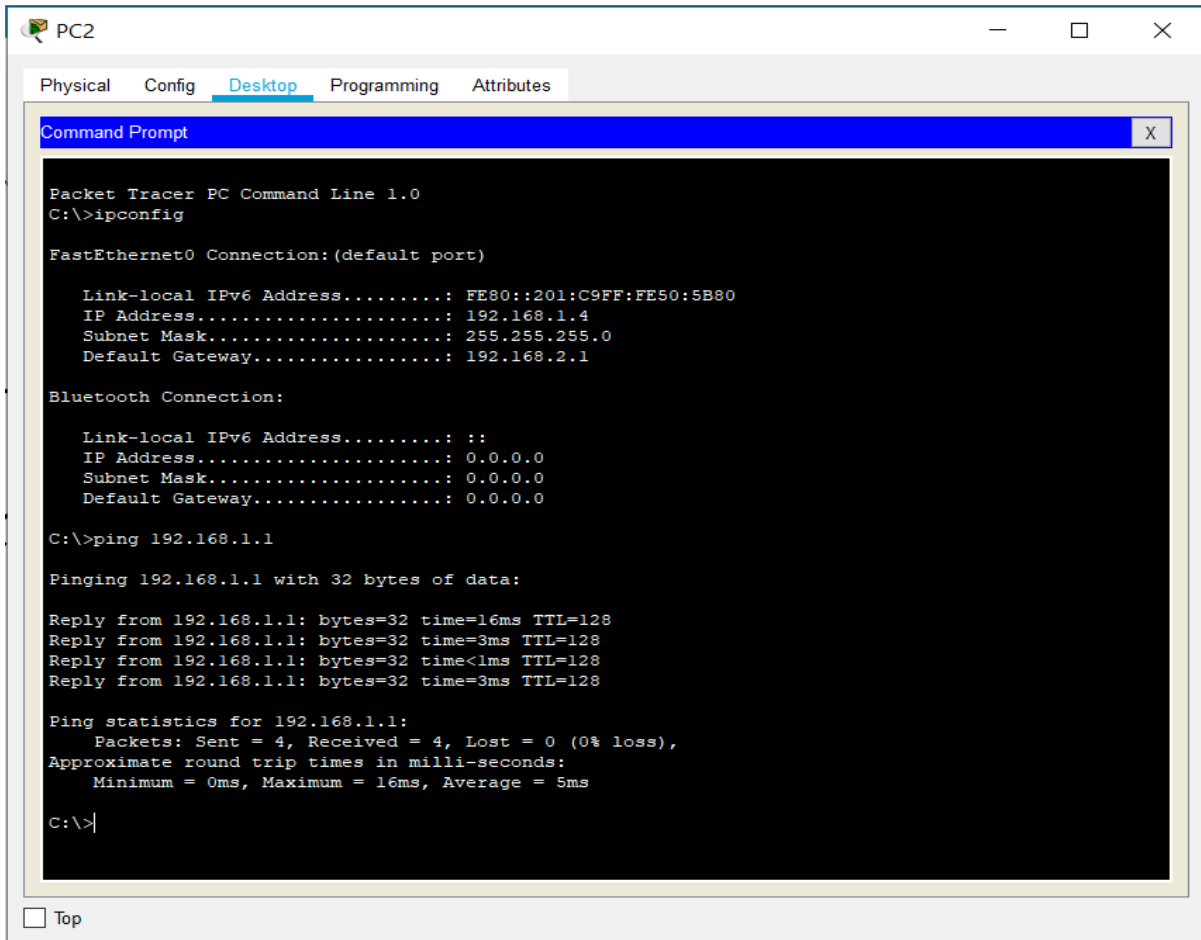
Username:

Password:

☐ Top

Output:

To check the connection, go to **PC → Desktop → Command Prompt** use **ipconfig** and **ping command** as shown in screenshot below. We can see that ping command (**ping 192.168.1.1**, **ping 192.168.1.2**) is executing successfully hence, implementation of mess topology using cisco packet tracer is correct.



The screenshot shows the Command Prompt window for PC2 in Packet Tracer. The window has tabs for Physical, Config, Desktop (selected), Programming, and Attributes. The Command Prompt displays the output of the 'ipconfig' command for the FastEthernet0 interface, showing IPv4 and IPv6 addresses, subnet mask, and default gateway. It then shows the output of the 'ping 192.168.1.1' command, which is successful with 0% loss.

```
Packet Tracer PC Command Line 1.0
C:\>ipconfig

FastEthernet0 Connection:(default port)

    Link-local IPv6 Address . . . . . : FE80::201:C9FF:FE50:5B80
    IP Address. . . . . : 192.168.1.4
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 192.168.2.1

Bluetooth Connection:

    Link-local IPv6 Address . . . . . : ::
    IP Address. . . . . : 0.0.0.0
    Subnet Mask . . . . . : 0.0.0.0
    Default Gateway . . . . . : 0.0.0.0

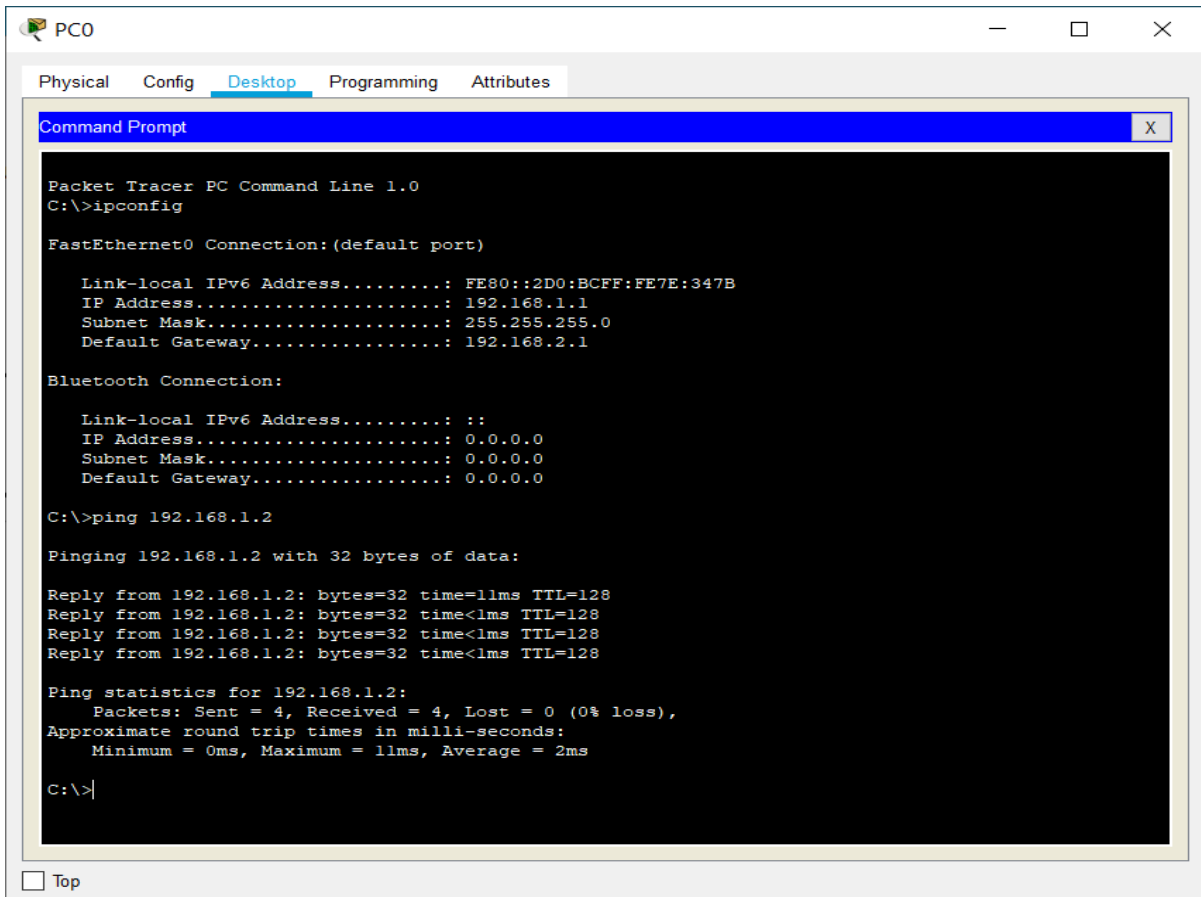
C:\>ping 192.168.1.1

Pinging 192.168.1.1 with 32 bytes of data:

Reply from 192.168.1.1: bytes=32 time=16ms TTL=128
Reply from 192.168.1.1: bytes=32 time=3ms TTL=128
Reply from 192.168.1.1: bytes=32 time<1ms TTL=128
Reply from 192.168.1.1: bytes=32 time=3ms TTL=128

Ping statistics for 192.168.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 16ms, Average = 5ms

C:\>
```



The screenshot shows the Command Prompt window for PC0 in Packet Tracer. The window has tabs for Physical, Config, Desktop (selected), Programming, and Attributes. The Command Prompt displays the output of the 'ipconfig' command for the FastEthernet0 interface, showing IPv4 and IPv6 addresses, subnet mask, and default gateway. It then shows the output of the 'ping 192.168.1.2' command, which is successful with 0% loss.

```
Packet Tracer PC Command Line 1.0
C:\>ipconfig

FastEthernet0 Connection:(default port)

    Link-local IPv6 Address . . . . . : FE80::2D0:BCFF:FE7E:347B
    IP Address. . . . . : 192.168.1.1
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 192.168.2.1

Bluetooth Connection:

    Link-local IPv6 Address . . . . . : ::
    IP Address. . . . . : 0.0.0.0
    Subnet Mask . . . . . : 0.0.0.0
    Default Gateway . . . . . : 0.0.0.0

C:\>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.2: bytes=32 time=11ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128

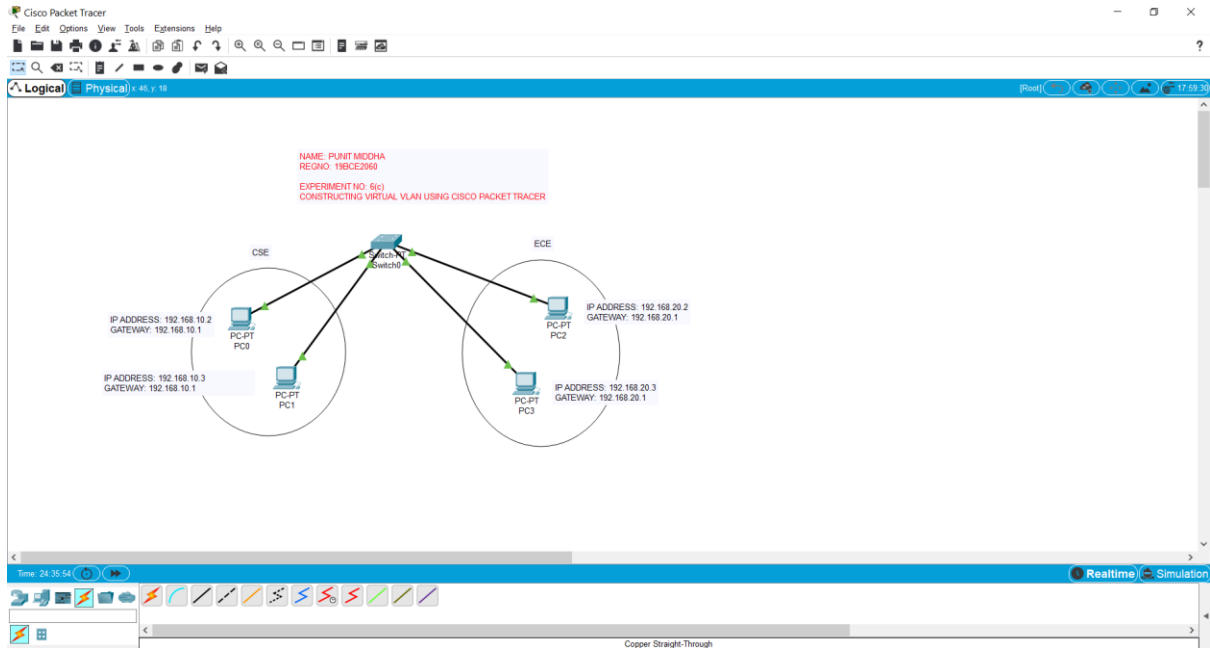
Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 11ms, Average = 2ms

C:\>
```

6(c). Virtual VLAN Using Cisco Packet Tracer

Procedure:

1. Go to end devices and place 1 switch and 4 PC's.
2. Now, go to connections and choose Copper-Straight Through cable and connect as in screenshot given below.
 - Connect 2 PC's i.e., PC0, PC1 in the right side (ECE) with Switch0 and 2 PC's i.e., PC2, PC3 in the left side (CSE).



3. After completing the connection procedure, go to **Desktop → IP Configuration** and set the IP Addresses for each and every end device
 - **PC0:**
IPv4 Address – 192.168.10.2
Default Gateway - 192.168.10.1
 - **PC1:**
IPv4 Address - 192.168.10.3
Default Gateway - 192.168.10.1
 - **PC2:**
IPv4 Address - 192.168.20.2
Default Gateway - 192.168.20.1
 - **PC3:**
IPv4 Address - 192.168.20.3
Default Gateway - 192.168.20.1

PC0

Physical Config **Desktop** Programming Attributes

IP Configuration X

Interface FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IP Address 192.168.10.2

Subnet Mask 255.255.255.0

Default Gateway 192.168.10.1

DNS Server 0.0.0.0

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address /

Link Local Address FE80::20D:BDFE:FE4:DC93

IPv6 Gateway

IPv6 DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

Username

Password

☐ Top

PC1

Physical Config **Desktop** Programming Attributes

IP Configuration X

Interface FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IP Address 192.168.10.3

Subnet Mask 255.255.255.0

Default Gateway 192.168.10.1

DNS Server 0.0.0.0

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address /

Link Local Address FE80::2E0:8FFF:FE3B:104

IPv6 Gateway

IPv6 DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

Username

Password

☐ Top

PC2

Physical Config **Desktop** Programming Attributes

IP Configuration X

Interface FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IP Address 192.168.20.2

Subnet Mask 255.255.255.0

Default Gateway 192.168.20.1

DNS Server 0.0.0.0

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address /

Link Local Address FE80::240:BFF:FE25:EA9C

IPv6 Gateway

IPv6 DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

Username

Password

☐ Top

PC3

Physical Config **Desktop** Programming Attributes

IP Configuration X

Interface FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IP Address 192.168.20.3

Subnet Mask 255.255.255.0

Default Gateway 192.168.20.1

DNS Server 0.0.0.0

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address /

Link Local Address FE80::20D:BDFF:FE50:28CE

IPv6 Gateway

IPv6 DNS Server

802.1X

☐ Use 802.1X Security

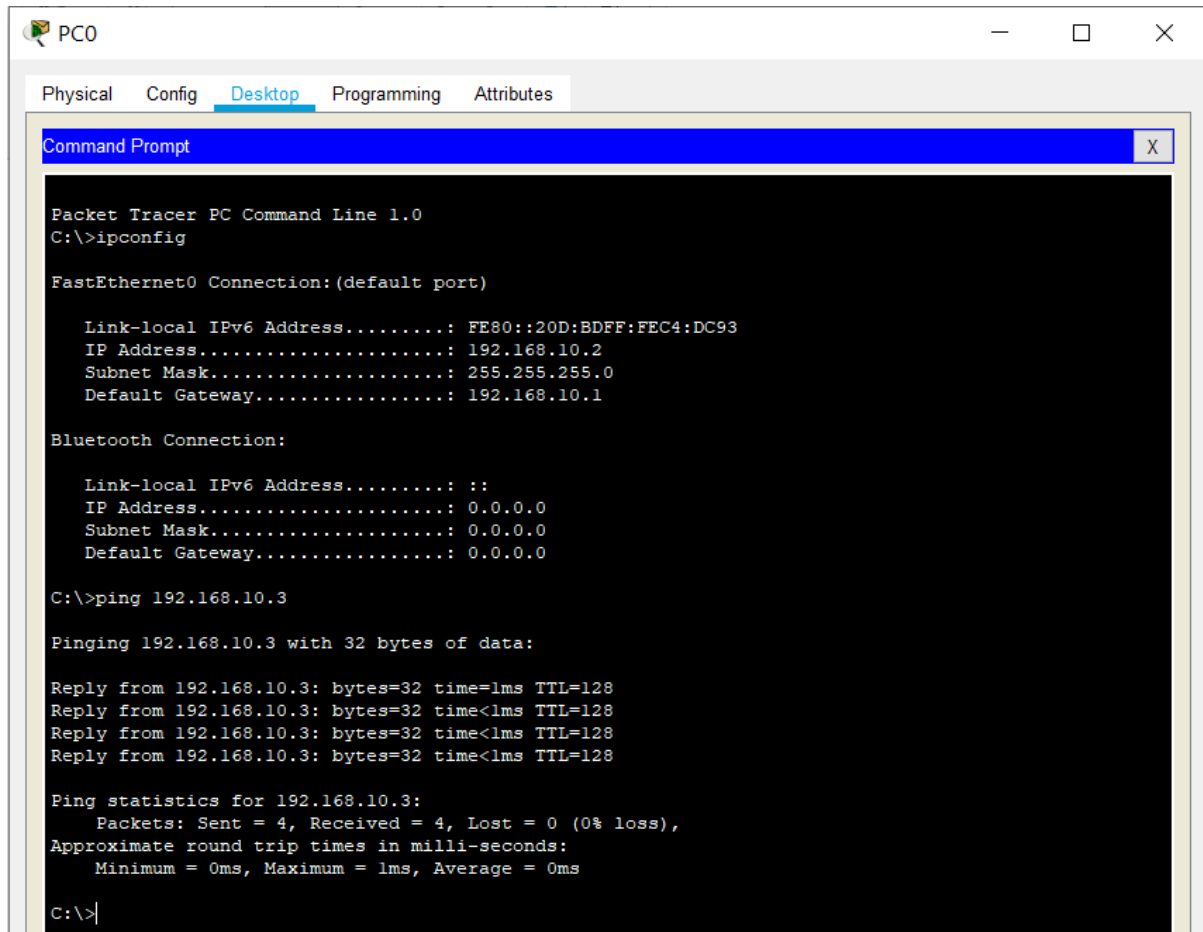
Authentication MD5

Username

Password

☐ Top

4. To check the connections, we will use **ipconfig** and **ping** command from one PC to another. After that we will proceed to configure the Virtual VLAN.



The screenshot shows the 'PC0' window with the 'Desktop' tab selected. A 'Command Prompt' window is open, displaying the output of the 'ipconfig' and 'ping' commands. The 'ipconfig' command shows the configuration for 'FastEthernet0' and 'Bluetooth' connections. The 'ping' command is used to test connectivity to 192.168.10.3, showing successful results with 0% loss.

```
Packet Tracer PC Command Line 1.0
C:\>ipconfig

FastEthernet0 Connection:(default port)

    Link-local IPv6 Address.....: FE80::20D:BDFF:FEC4:DC93
    IP Address.....: 192.168.10.2
    Subnet Mask.....: 255.255.255.0
    Default Gateway.....: 192.168.10.1

Bluetooth Connection:

    Link-local IPv6 Address.....: ::
    IP Address.....: 0.0.0.0
    Subnet Mask.....: 0.0.0.0
    Default Gateway.....: 0.0.0.0

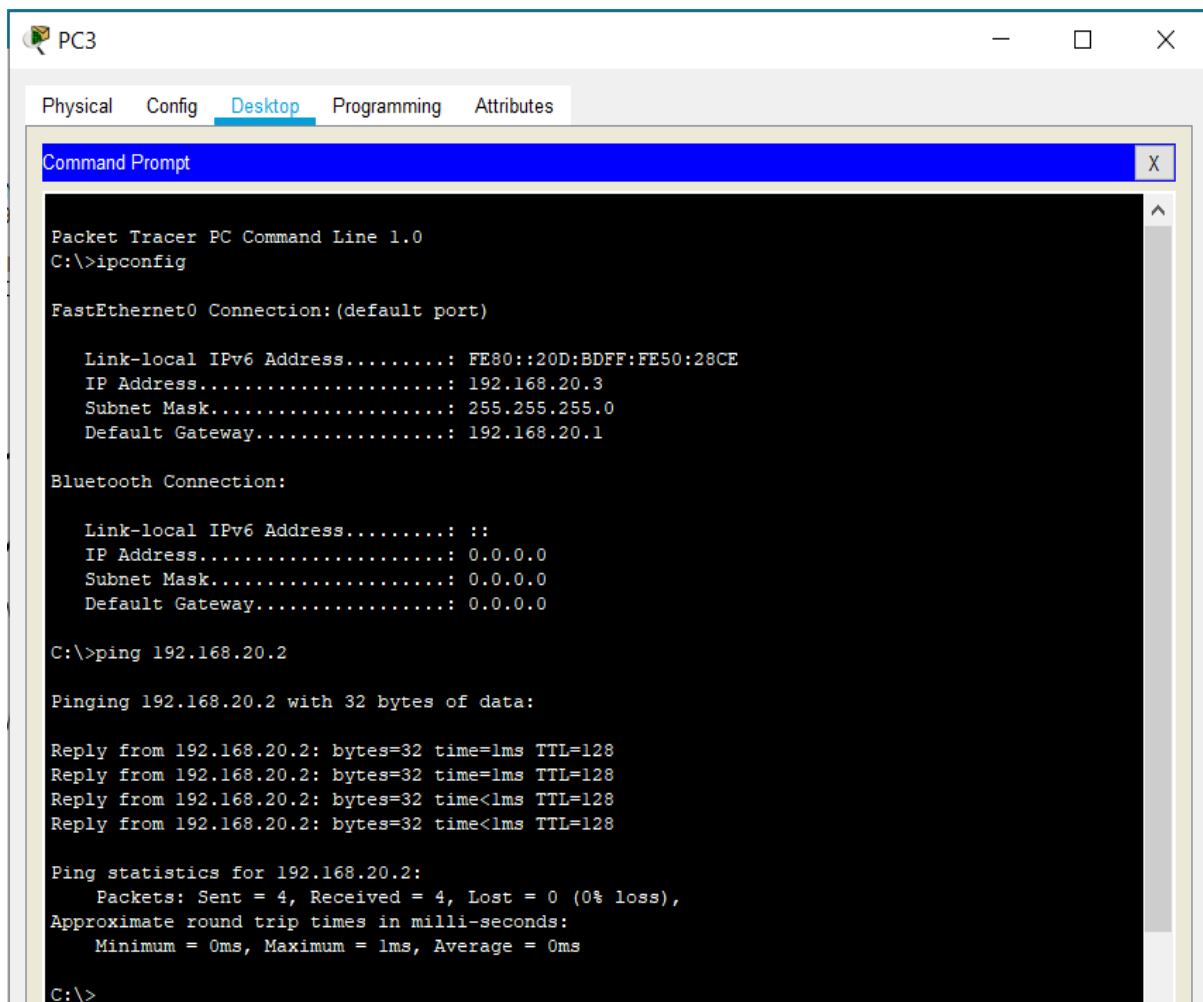
C:\>ping 192.168.10.3

Pinging 192.168.10.3 with 32 bytes of data:

Reply from 192.168.10.3: bytes=32 time=1ms TTL=128
Reply from 192.168.10.3: bytes=32 time<1ms TTL=128
Reply from 192.168.10.3: bytes=32 time<1ms TTL=128
Reply from 192.168.10.3: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.10.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>
```



The screenshot shows the 'PC3' window with the 'Desktop' tab selected. A 'Command Prompt' window is open, displaying the output of the 'ipconfig' and 'ping' commands. The 'ipconfig' command shows the configuration for 'FastEthernet0' and 'Bluetooth' connections. The 'ping' command is used to test connectivity to 192.168.20.2, showing successful results with 0% loss.

```
Packet Tracer PC Command Line 1.0
C:\>ipconfig

FastEthernet0 Connection:(default port)

    Link-local IPv6 Address.....: FE80::20D:BDFF:FE50:28CE
    IP Address.....: 192.168.20.3
    Subnet Mask.....: 255.255.255.0
    Default Gateway.....: 192.168.20.1

Bluetooth Connection:

    Link-local IPv6 Address.....: ::
    IP Address.....: 0.0.0.0
    Subnet Mask.....: 0.0.0.0
    Default Gateway.....: 0.0.0.0

C:\>ping 192.168.20.2

Pinging 192.168.20.2 with 32 bytes of data:

Reply from 192.168.20.2: bytes=32 time=1ms TTL=128
Reply from 192.168.20.2: bytes=32 time=1ms TTL=128
Reply from 192.168.20.2: bytes=32 time<1ms TTL=128
Reply from 192.168.20.2: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.20.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>
```

5. Now, to configure the two vlan's go to **Switch0 → CLI**. Follow the steps given below:
 - i. Use **vlan 10** to enter into vlan.
 - ii. Use **name cse** command for the naming of vlan repeat the steps for vlan 20
 - iii. After exiting, use **show vlan** command to view the available name of vlan i.e., cse, ece
 - iv. Now we have to assign ports according to the vlan. Use **interface f0/1** command to open interface and then use **switchport access vlan 10** command to assign port for vlan 10.
 For example: Switch(config) #interface f0/1
 Switch(config-if) #switchport access vlan 10
 - v. Exit and close the Switch0 window

Switch#confi

Configuring from terminal, memory, or network [terminal]?

Enter configuration commands, one per line. End with CNTL/Z.

Switch(config)#vlan 10

Switch(config-vlan)#name cse

Switch(config-vlan)#exit

Switch(config)#vlan 20

Switch(config-vlan)#name ece

Switch(config-vlan)#exit

Switch(config)#exit

Switch#

%SYS-5-CONFIG_I: Configured from console by console

Switch#show vlan

VLAN Name		Status	Ports
---	-----		-----
1	default	active	Fa0/1, Fa1/1, Fa2/1, Fa3/1 Fa4/1, Fa5/1
10	cse	active	
20	ece	active	
1002	fddi-default	active	
1003	token-ring-default	active	
1004	fddinet-default	active	
1005	trnet-default	active	

VLAN Type SAID MTU Parent RingNo BridgeNo Stp BrdgMode Trans1 Trans2

```

-----
1 enet 100001 1500 - - - - 0 0
10 enet 100010 1500 - - - - 0 0
20 enet 100020 1500 - - - - 0 0
1002 fddi 101002 1500 - - - - 0 0
1003 tr 101003 1500 - - - - 0 0
1004 fdnet 101004 1500 - - - ieee - 0 0
1005 trnet 101005 1500 - - - ibm - 0 0

```

VLAN Type SAID MTU Parent RingNo BridgeNo Stp BrdgMode Trans1 Trans2

Remote SPAN VLANs

Primary Secondary Type Ports

```

Switch#
Switch#
Switch#confi
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#interface f0/1
Switch(config-if)#switchport access vlan 10
Switch(config-if)#exit
Switch(config)#interface f1/1
Switch(config-if)#switchport access vlan 10
Switch(config-if)#exit
Switch(config)#
Switch(config)#interface f2/1
Switch(config-if)#switchport access vlan 20
Switch(config-if)#exit
Switch(config)#interface f3/1
Switch(config-if)#switchport access vlan 20
Switch(config-if)#exit
Switch(config)#exit
Switch#
%SYS-5-CONFIG_I: Configured from console by console

```

```
Switch#show vlan
```

VLAN Name	Status	Ports
----	-----	-----
1 default	active	Fa4/1, Fa5/1
10 cse	active	Fa0/1, Fa1/1
20 ece	active	Fa2/1, Fa3/1
1002 fddi-default	active	
1003 token-ring-default	active	
1004 fddinet-default	active	
1005 trnet-default	active	

```
VLAN Type SAID MTU Parent RingNo BridgeNo Stp BrdgMode Trans1 Trans2
```

```

-----
1 enet 100001 1500 - - - - 0 0
10 enet 100010 1500 - - - - 0 0
20 enet 100020 1500 - - - - 0 0
1002 fddi 101002 1500 - - - - 0 0
1003 tr 101003 1500 - - - - 0 0
1004 fdnet 101004 1500 - - - ieee - 0 0
1005 trnet 101005 1500 - - - ibm - 0 0

```

```
VLAN Type SAID MTU Parent RingNo BridgeNo Stp BrdgMode Trans1 Trans2
```

```
Remote SPAN VLANs
```

```
Primary Secondary Type Ports
```

```

Switch#
Switch#

```


These screenshots related to CLI programming to set names and ports for specific VLAN's.

The screenshot shows a network switch CLI interface with the following content:

Switch0

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Switch>enable
Switch#confi
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#vlan 10
Switch(config-vlan)#name cse
Switch(config-vlan)#exit
Switch(config)#vlan 20
Switch(config-vlan)#name ece
Switch(config-vlan)#exit
Switch(config)#exit
Switch#
%SYS-S-CONFIG_I: Configured from console by console

Switch#show vlan
```

VLAN	Name	Status	Ports
1	default	active	Fa0/1, Fa1/1, Fa2/1, Fa3/1, Fa4/1, Fa5/1
10	cse	active	
20	ece	active	
1002	fddi-default	active	
1003	token-ring-default	active	
1004	fddinet-default	active	
1005	trnet-default	active	

VLAN	Type	SAID	MTU	Parent	RingNo	BridgeNo	Stp	BrdgMode	Trans1	Trans2
1	enet	100001	1500	-	-	-	-	-	0	0
10	enet	100010	1500	-	-	-	-	-	0	0
20	enet	100020	1500	-	-	-	-	-	0	0
1002	fddi	101002	1500	-	-	-	-	-	0	0
1003	tr	101003	1500	-	-	-	-	-	0	0
1004	fdnet	101004	1500	-	-	-	ieee	-	0	0
1005	trnet	101005	1500	-	-	-	ibm	-	0	0

VLAN	Type	SAID	MTU	Parent	RingNo	BridgeNo	Stp	BrdgMode	Trans1	Trans2
1	enet	100001	1500	-	-	-	-	-	0	0
10	enet	100010	1500	-	-	-	-	-	0	0
20	enet	100020	1500	-	-	-	-	-	0	0
1002	fddi	101002	1500	-	-	-	-	-	0	0
1003	tr	101003	1500	-	-	-	-	-	0	0
1004	fdnet	101004	1500	-	-	-	ieee	-	0	0
1005	trnet	101005	1500	-	-	-	ibm	-	0	0

Remote SPAN VLANs

Primary	Secondary	Type	Ports

```
Switch#
Switch#
Switch#confi
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#interface f0/1
```

Ctrl+F6 to exit CLI focus

Copy Paste

☐ Top

Switch0

Physical

Config

CLI

Attributes

IOS Command Line Interface

```

Switch#confi
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#interface f0/1
Switch(config-if)#switchport access vlan 10
Switch(config-if)#exit
Switch(config)#interface f1/1
Switch(config-if)#switchport access vlan 10
Switch(config-if)#exit
Switch(config)#
Switch(config)#interface f2/1
Switch(config-if)#switchport access vlan 20
Switch(config-if)#exit
Switch(config)#interface f3/1
Switch(config-if)#switchport access vlan 20
Switch(config-if)#exit
Switch(config)#exit
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#show vlan

VLAN Name                Status    Ports
-----
1    default                active    Fa4/1, Fa5/1
10   cse                     active    Fa0/1, Fa1/1
20   ece                     active    Fa2/1, Fa3/1
1002 fddi-default            active
1003 token-ring-default    active
1004 fddinet-default       active
1005 trnet-default         active

VLAN Type  SAID      MTU   Parent RingNo BridgeNo Stp  BrdgMode Trans1 Trans2
-----
1    enet    100001    1500  -      -      -      -    -      0      0
10   enet    100010    1500  -      -      -      -    -      0      0
20   enet    100020    1500  -      -      -      -    -      0      0
1002 fddi    101002    1500  -      -      -      -    -      0      0
1003 tr     101003    1500  -      -      -      -    -      0      0
1004 fdnet 101004    1500  -      -      -      -    ieee  0      0
1005 trnet 101005    1500  -      -      -      -    ibm   0      0

VLAN Type  SAID      MTU   Parent RingNo BridgeNo Stp  BrdgMode Trans1 Trans2
-----

Remote SPAN VLANs
-----

Primary Secondary Type      Ports
-----

Switch#

```

Ctrl+F6 to exit CLI focus

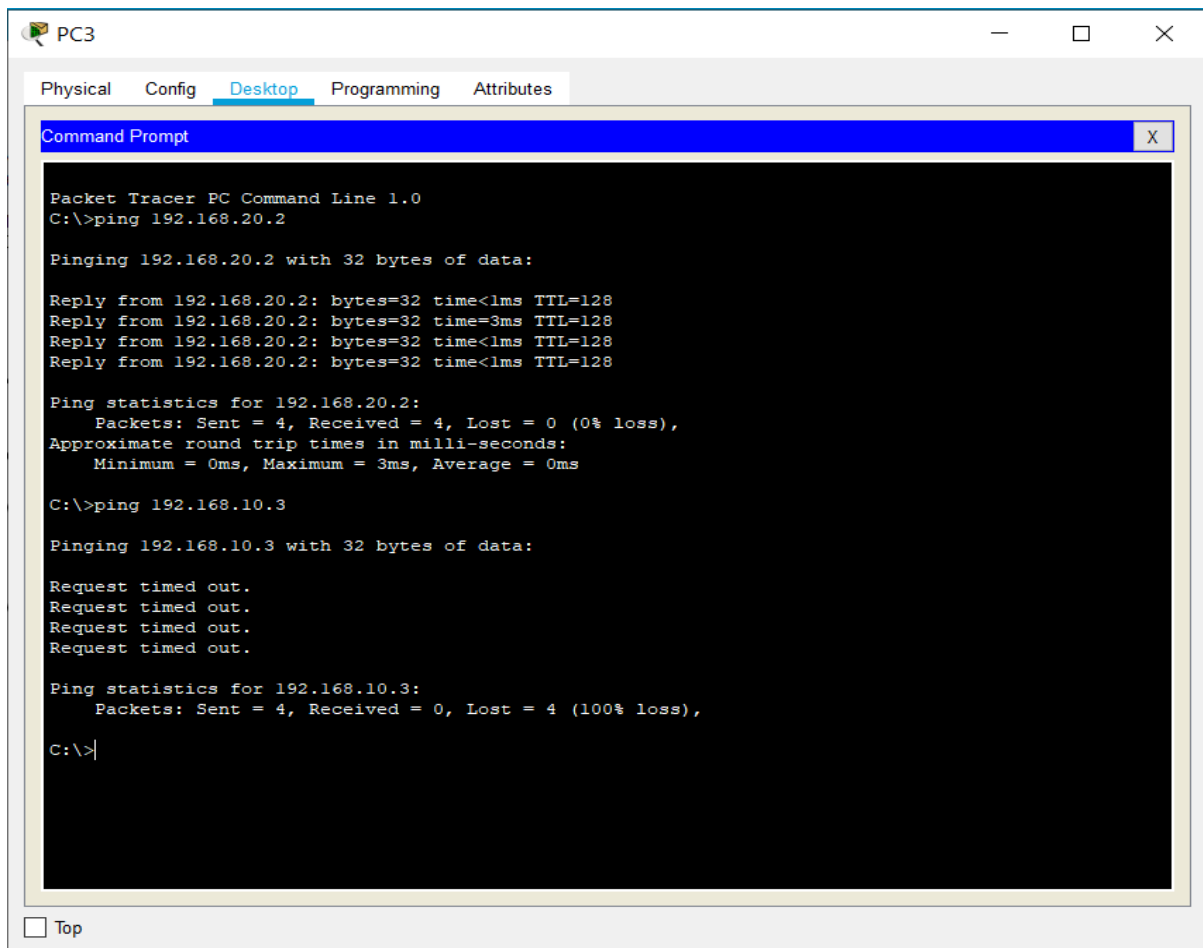
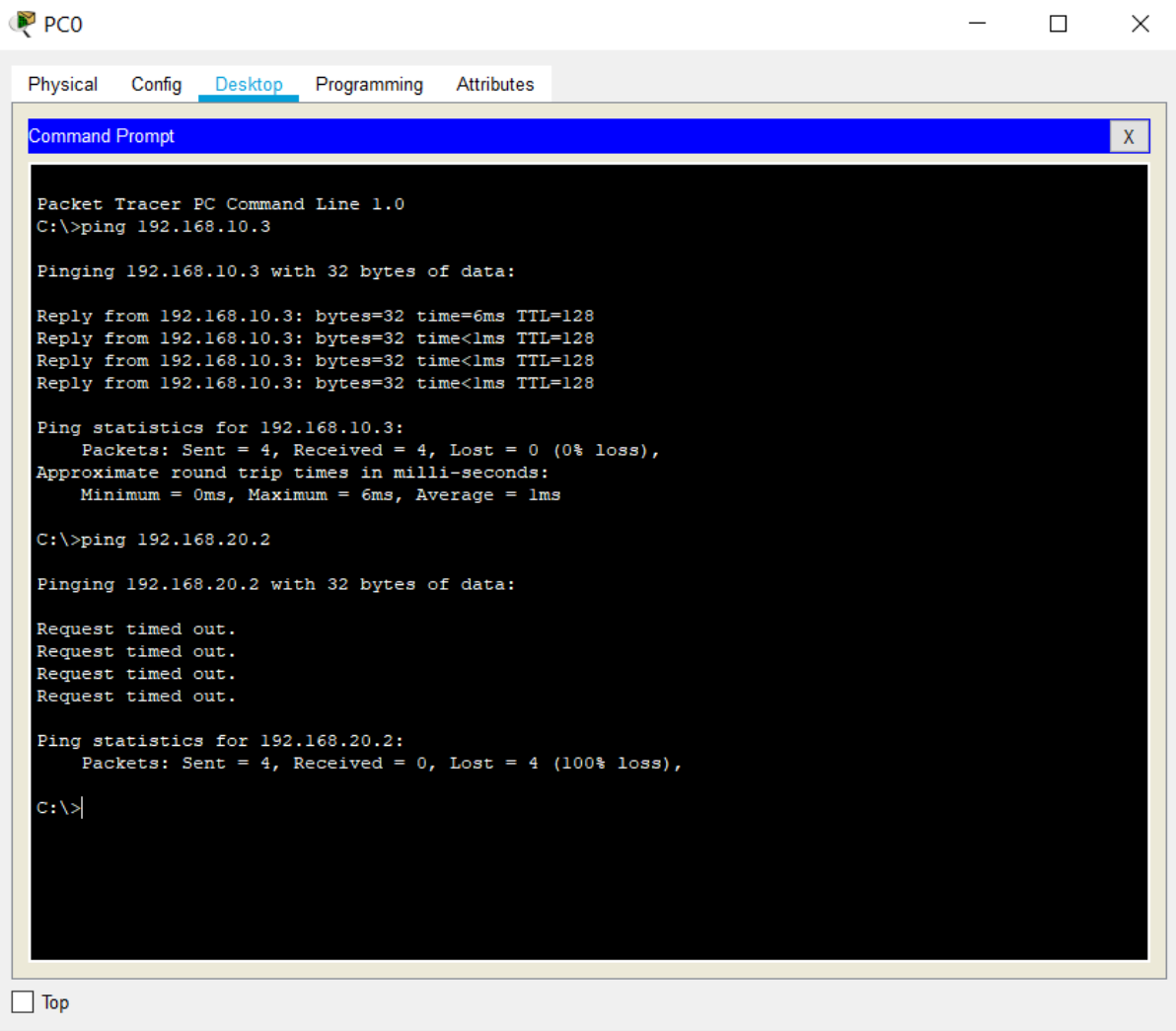
Copy

Paste

☐ Top

Output:

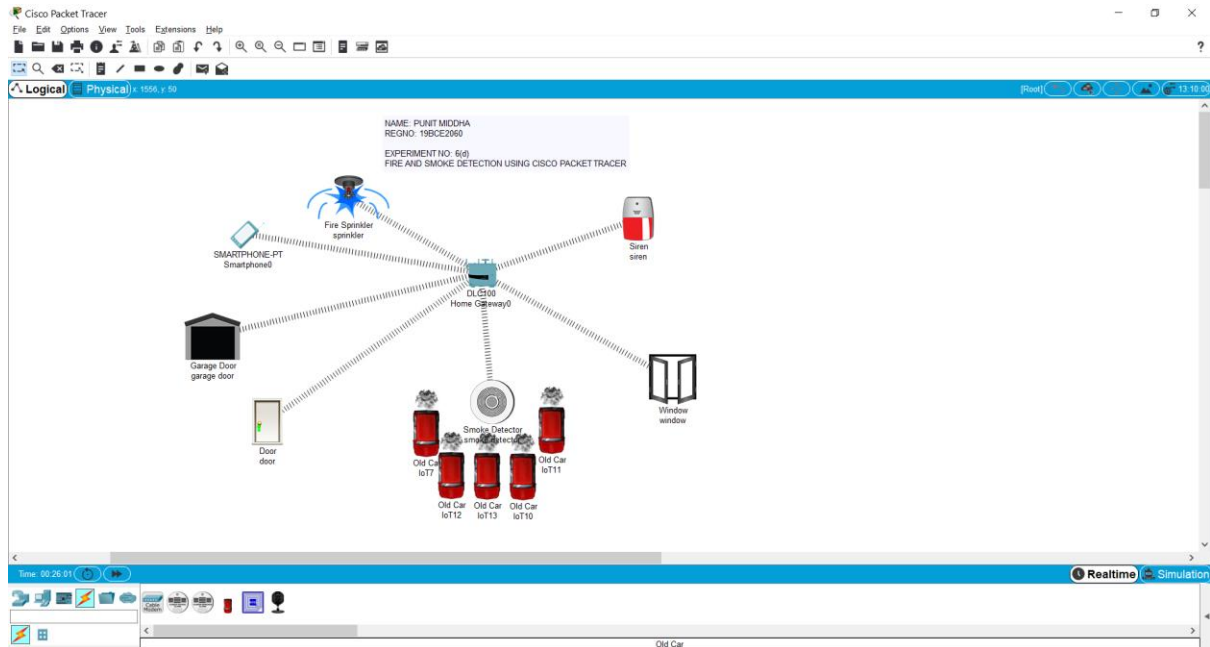
We can see that before configuring the Virtual VLAN ping command was working successfully but after configuring the Virtual VLAN, we are not able to ping from one device to another device as shown below.



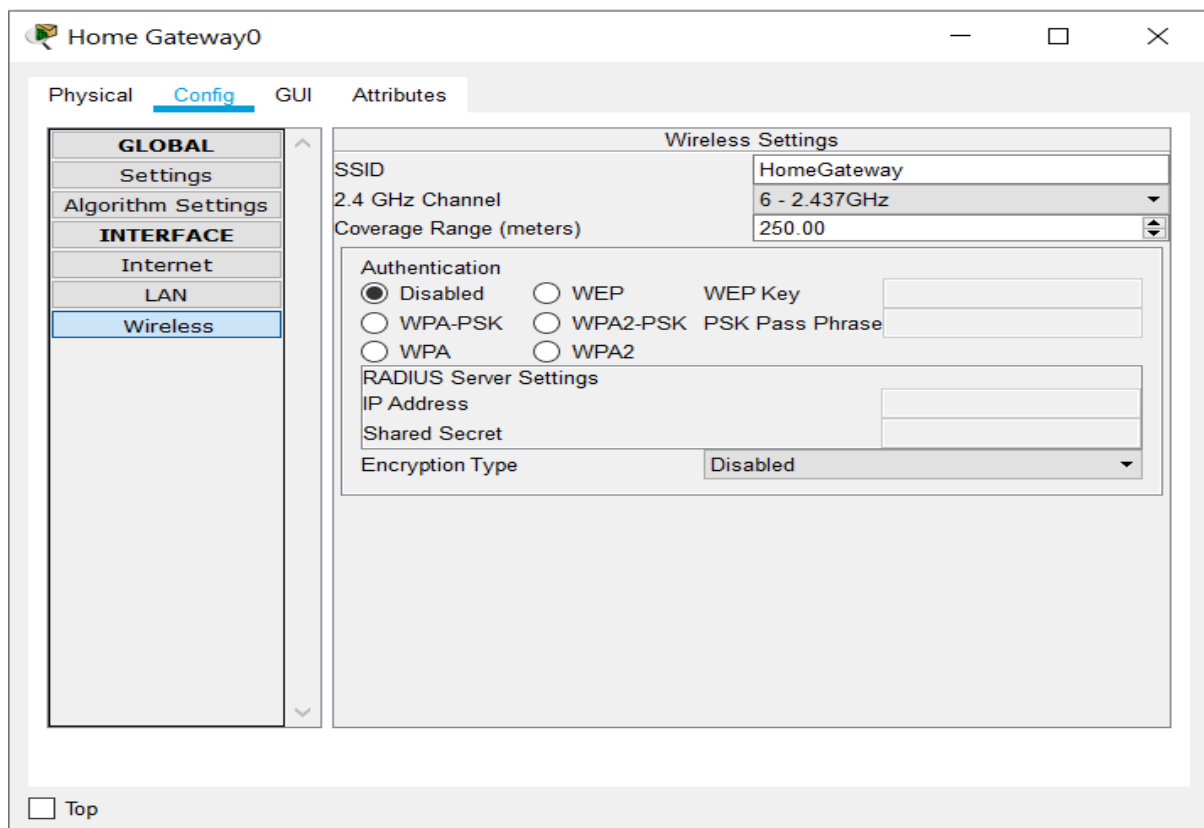
6(d). Fire and Smoke Detection Using Cisco Packet Tracer

Procedure:

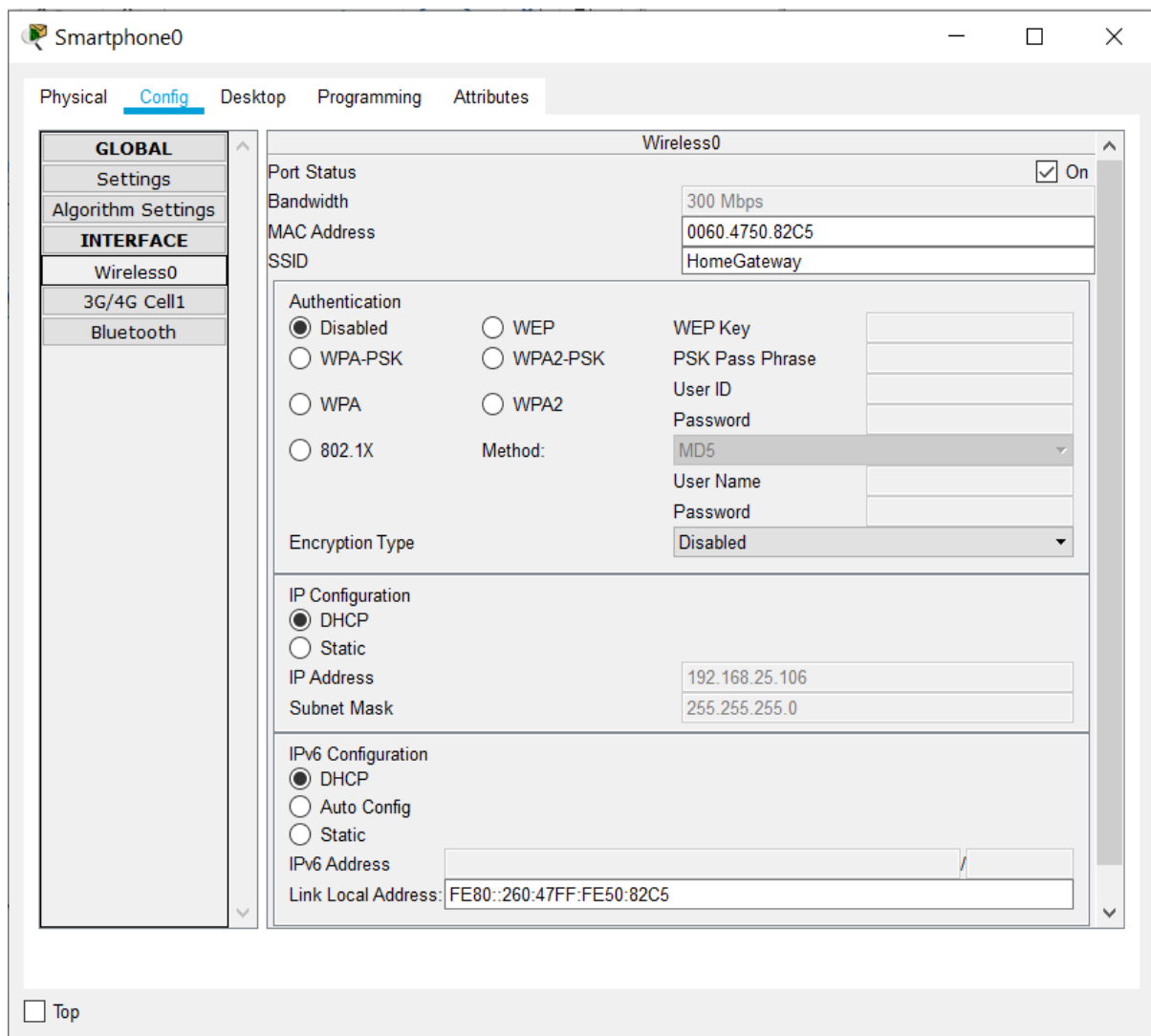
1. Go to end devices and place 1 Home Gateway, 1 Smartphone, 1 Siren, 1 Smoke Detector, 1 Fire Sprinkler, 1 Door, 1 Window, 1 Garage Door and 5 Old Cars as in screenshot given below.
2. Since, we are going to connect all the devices wirelessly with Home Gateway.



3. For the connection, go to **Home Gateway0** → **Config** → **Wireless**. Select the following:
SSID → **HomeGateway**
Authentication → **Disabled**

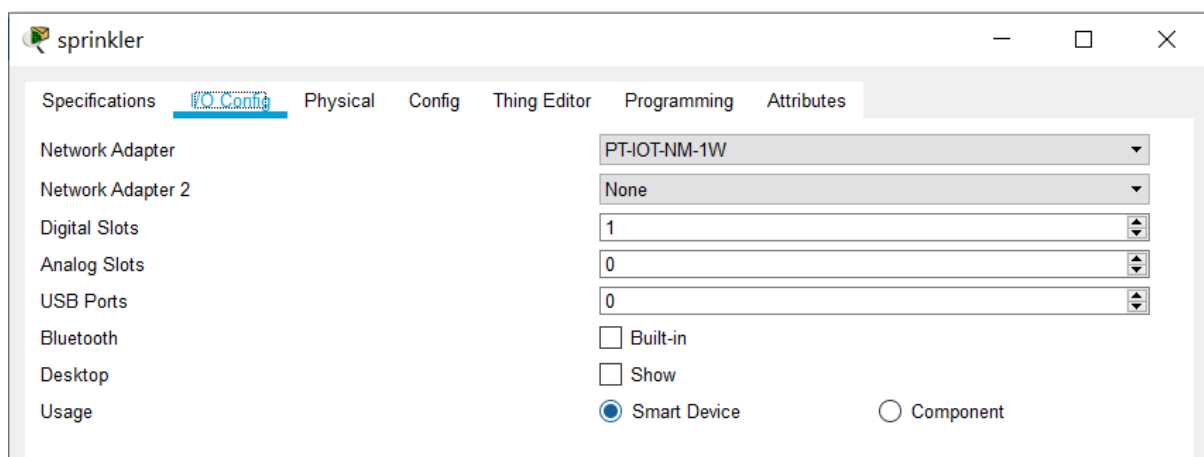


- To connect Smartphone0 with Home Gateway0, go to **Smartphone0 → Config → Wireless0**. Set the **port status to be 'ON'** with same SSID → HomeGateway, Authentication → Disabled, IP Configuration → DHCP, IPv6 Configuration → DHCP. Now, the connection will be successfully established.



- In next step we have to connect end devices wirelessly i.e., Sprinkler, Smoke Detector, Siren, Door, Window, Garage Door. I have shown this process for two devices (sprinkler, smoke detector).

Go to **sprinkler → advanced (button at right bottom) → I/O Config**. For the wireless connection, we have to change the **Network Adapter to PT-IOT-NM-1W**.



6. We have to connect all devices with Home Gateway. Go to **Sprinkler → Config**, change the Display Name, Gateway/DNS IPv4 and Gateway/DNS IPv6 to be DHCP and the IoT server to be Home Gateway. Click on ‘**Connect**’.

The screenshot shows the 'sprinkler' configuration window with the 'Config' tab selected. The left sidebar contains a tree view with 'GLOBAL' (Settings, Algorithm Settings, Files) and 'INTERFACE' (Wireless0). The main area is titled 'Global Settings' and contains the following fields:

- Display Name:
- Serial Number:
- Gateway/DNS IPv4:
 - ☒ DHCP
 - ☐ Static
 - Gateway:
 - DNS Server:
- Gateway/DNS IPv6:
 - ☒ DHCP
 - ☐ Auto Config
 - ☐ Static
 - IPv6 Gateway:
 - IPv6 DNS Server:
- IoT Server:
 - ☐ None
 - ☒ Home Gateway
 - ☐ Remote Server
 - Server Address:

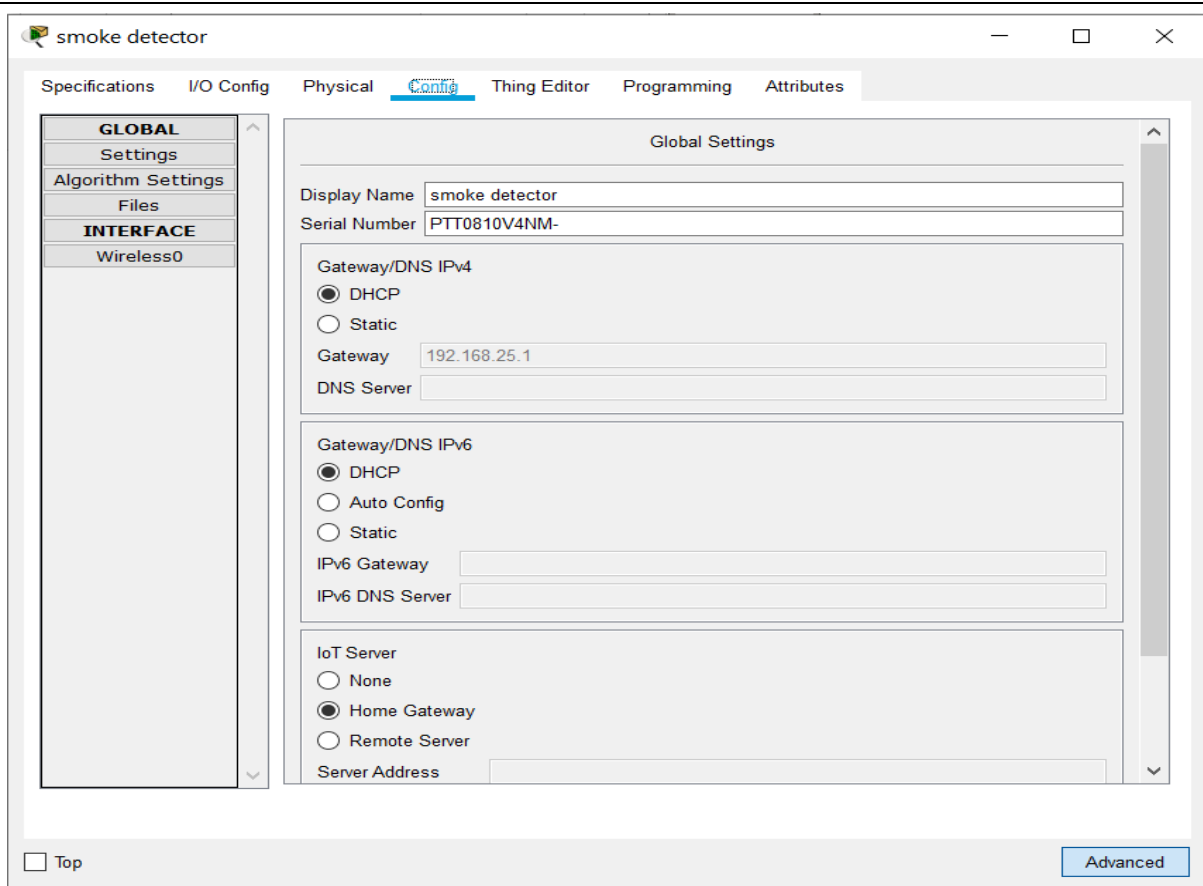
At the bottom, there is a 'Top' button on the left and an 'Advanced' button on the right.

7. Repeat the step 4 and 5 for Smoke Detector and all the respective devices.

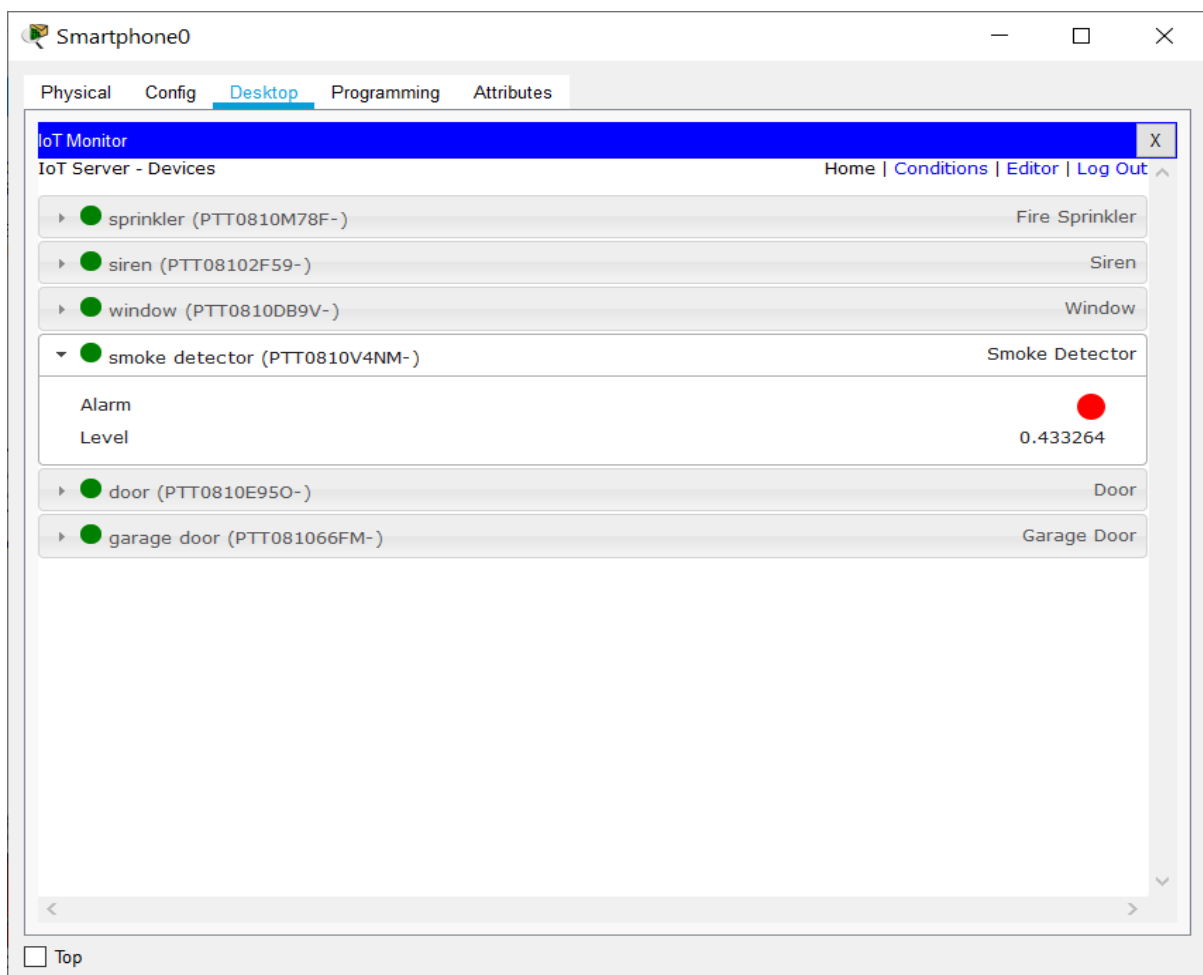
The screenshot shows the 'smoke detector' configuration window with the 'I/O Config' tab selected. The left sidebar contains a tree view with 'I/O Config' and 'Usage'. The main area contains the following fields:

- Network Adapter:
- Network Adapter 2:
- Digital Slots:
- Analog Slots:
- USB Ports:
- Bluetooth: ☐ Built-in
- Desktop: ☐ Show
- Usage: ☒ Smart Device ☐ Component

At the bottom, there is a 'Top' button on the left and an 'Advanced' button on the right.



8. We have to give some conditions on which our Fire and Smoke Detector model works. For the same go to **Smartphone0** → **Desktop** → **IoT Monitor**, in IoT Monitor go to Conditions given in top Right of given window.



9. Now, click on 'Add' to add some conditions. Give the name (**smoke detector - on**) for your **condition1**, in 'if' block select Smoke Detector and level to be greater than or equals to 0.3 (**smoke detector Level >= 0.3**) then set the actions for another devices as follow:

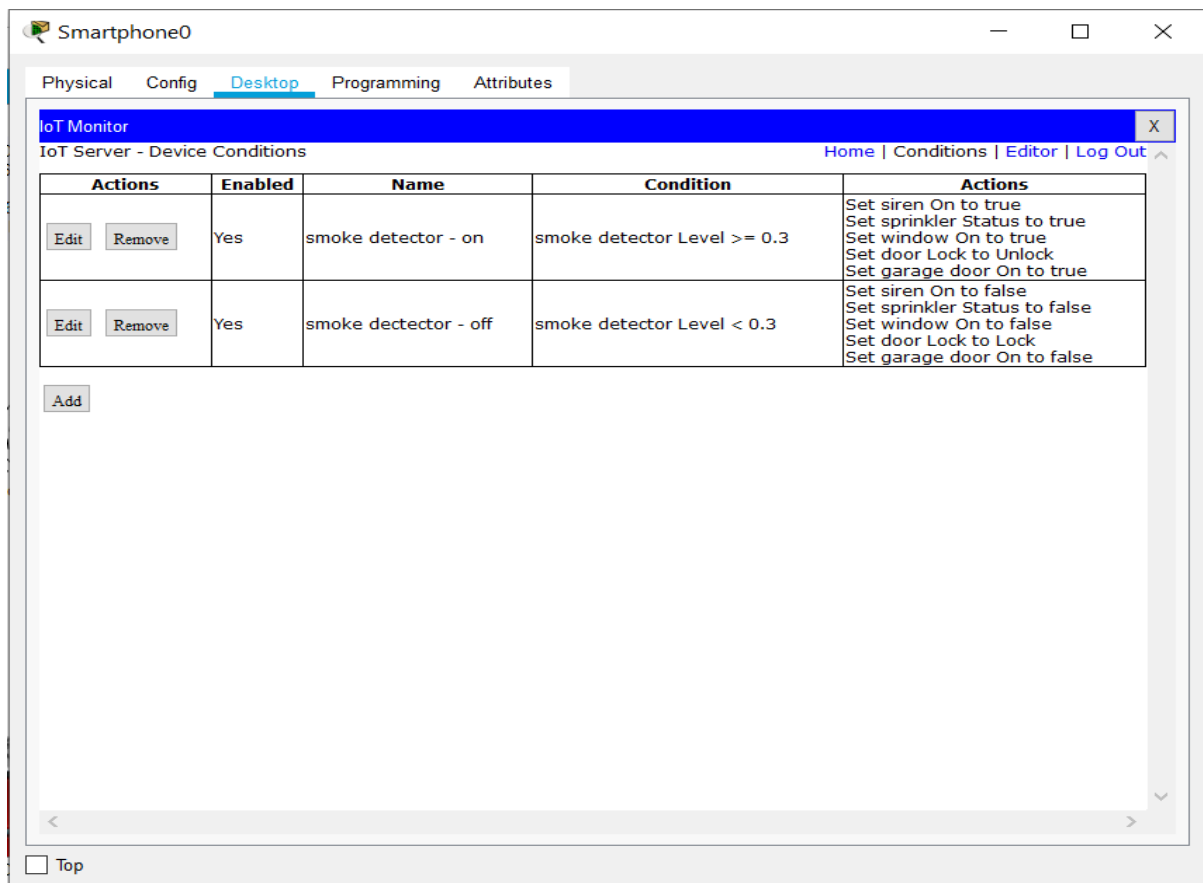
- Set siren On to true
- Set sprinkler Status to true
- Set window On to true
- Set door Lock to Unlock
- Set garage door On to true

Click "OK" to save Condition.

Give the name (**smoke detector - off**) for your **condition2**, in 'if' block select Smoke Detector and level to be less than 0.3 (**smoke detector Level < 0.3**) then set the actions for another devices as follow:

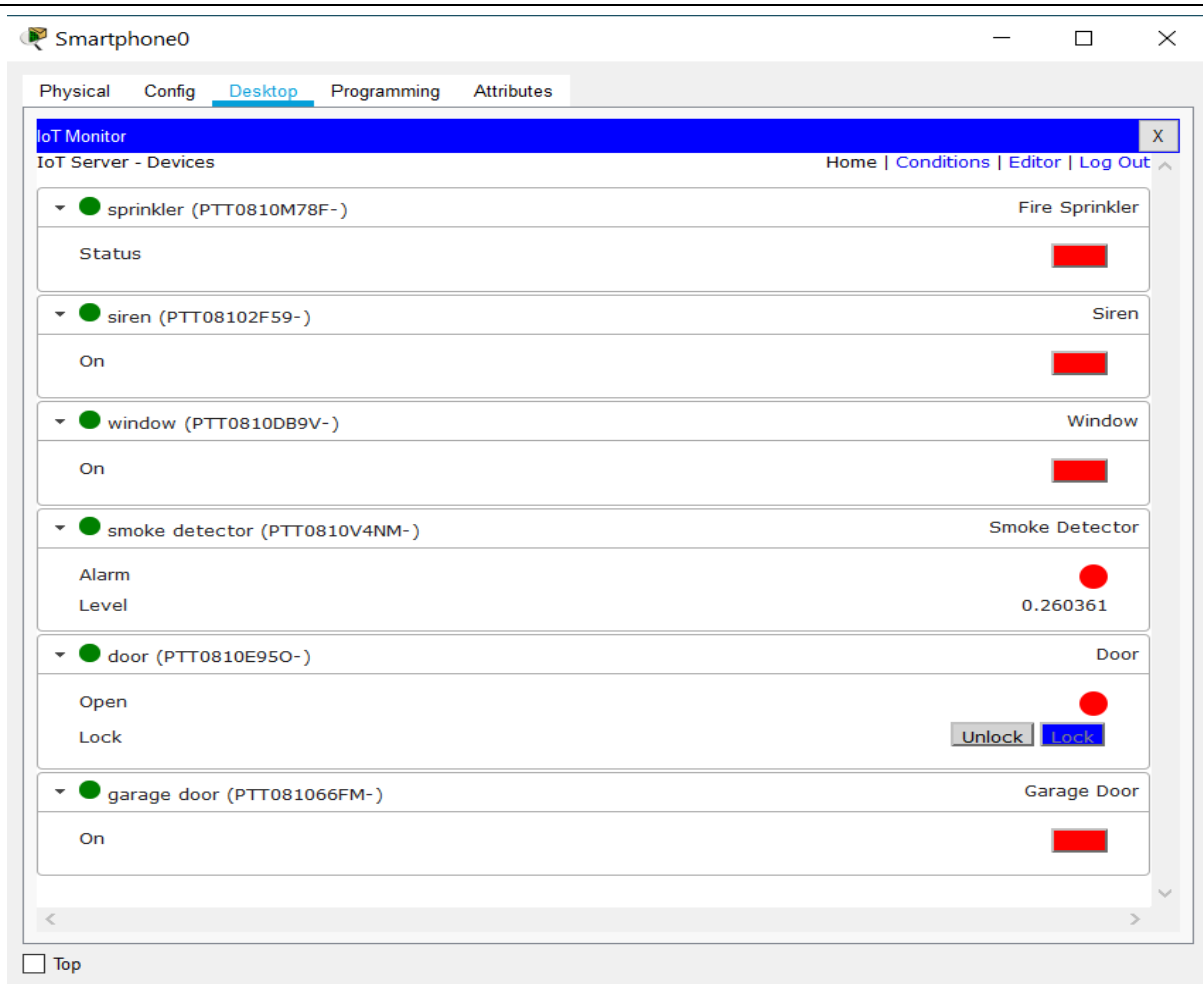
- Set siren On to false
- Set sprinkler Status to false
- Set window On to false
- Set door Lock to Lock
- Set garage door On to false

Click "OK" to save Condition.

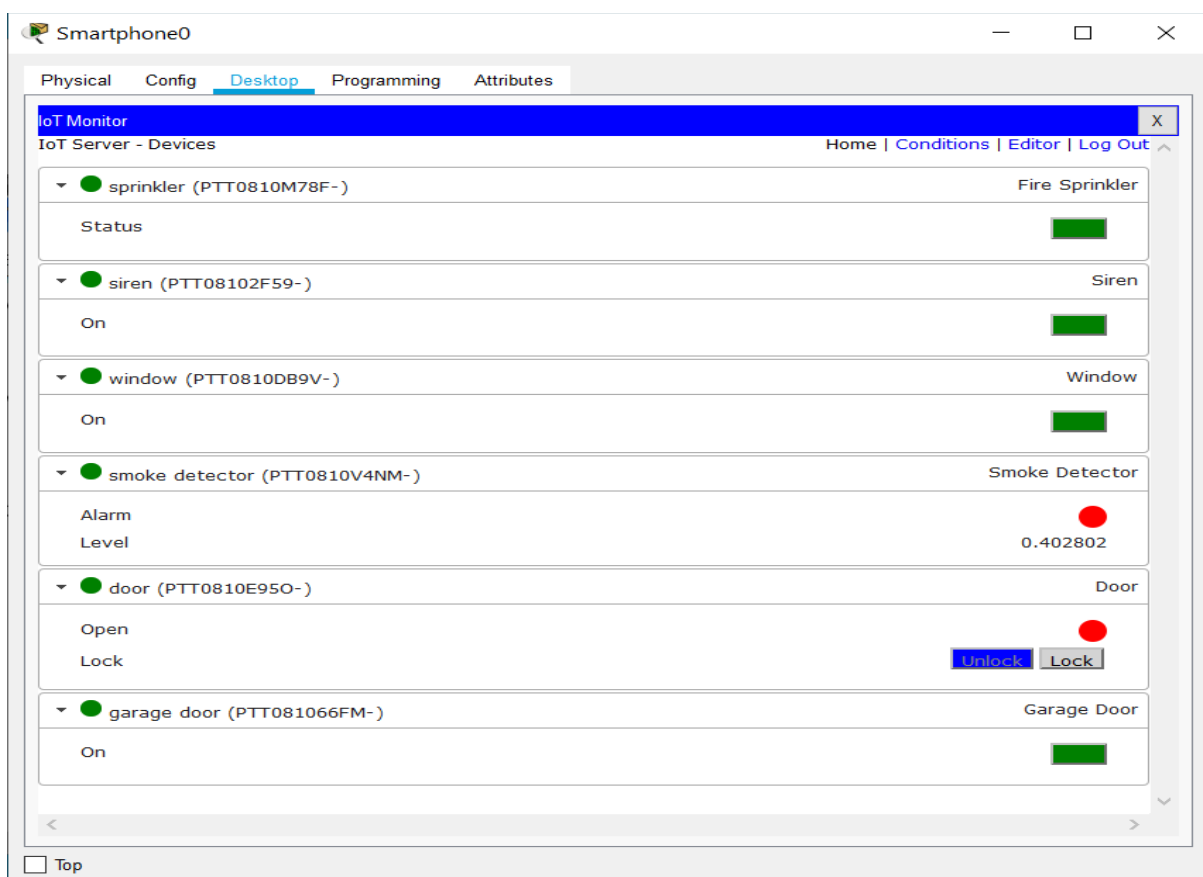


Output:

In output screenshot 1, We can see that whenever the level of Smoke Detector level is less than 0.3 (**smoke detector Level < 0.3**) then condition2 came to an action i.e., siren on to false, sprinkler Status to false, window on to false, door Lock to Lock, garage door on to false



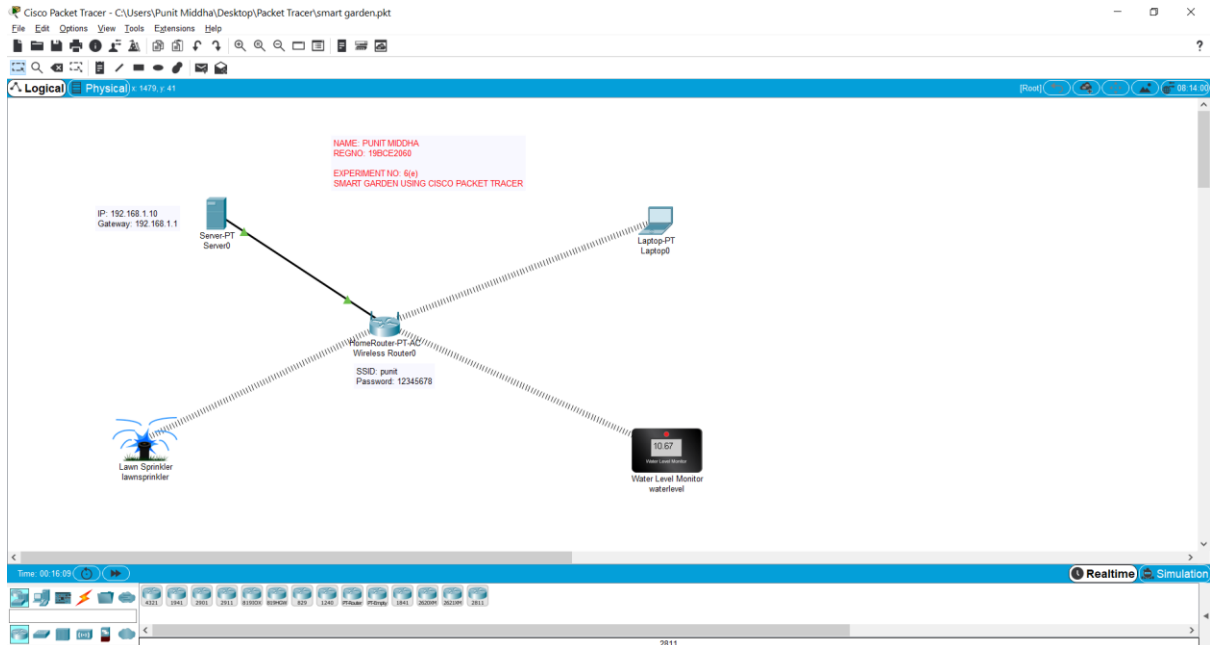
In output screenshot 2, We can see that whenever the level of Smoke Detector level is greater than or equals to 0.3 (**smoke detector Level ≥ 0.3**) then condition1 came to an action i.e., siren on to true, sprinkler Status to true, window on to true, door Lock to Unlock, garage door on to true.



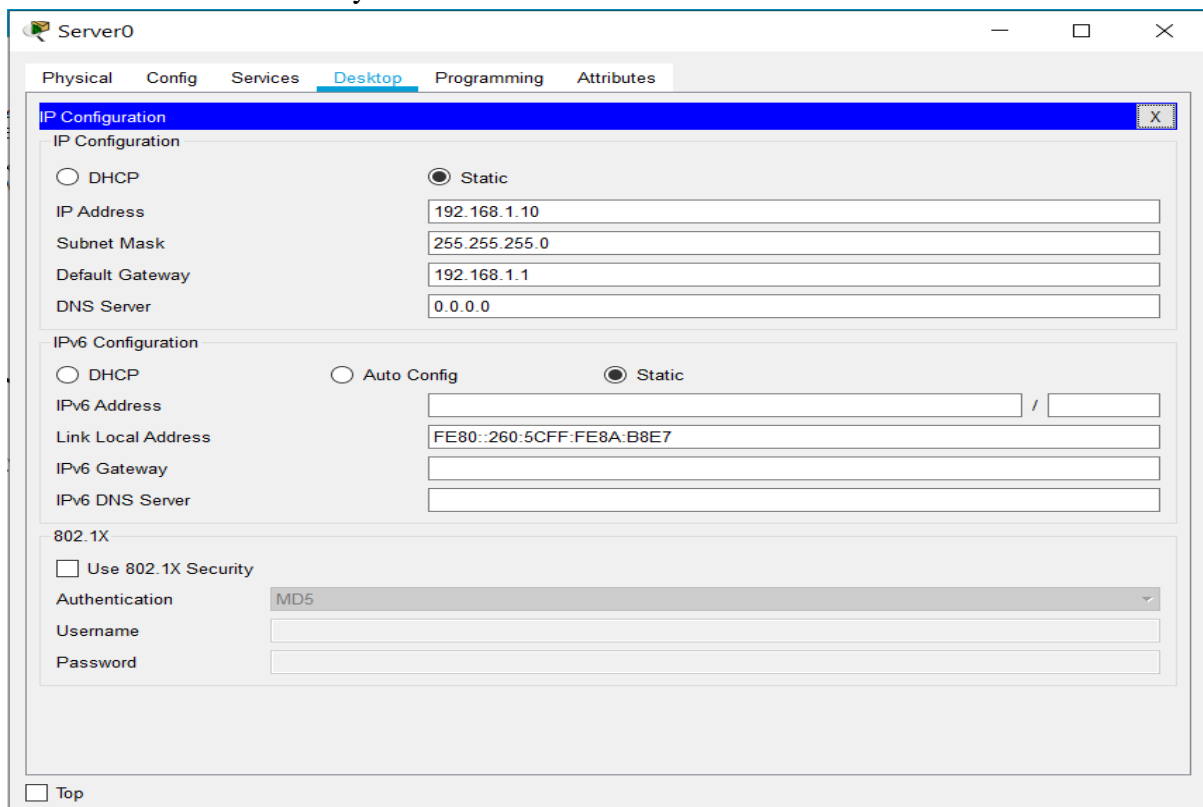
6(e). Smart Garden Using Cisco Packet Tracer

Procedure:

1. Go to end devices and place 1 Wireless Router, 1 server, 1 Water Level Monitor, 1 Lawn Sprinkler and 1 Laptop.
2. Now, go to connections and choose Copper-Straight Through cable and connect as in screenshot given below.
 - Connect Server0 with Wireless Router.



3. After completing the connection procedure, go to **Desktop → IP Configuration** and set the IP Addresses for each and every end device
 - **Server0:**
IPv4 Address – 192.168.1.10
Default Gateway – 192.168.1.1



4. Now, we have to configure the Wireless Router0. Go to **Wireless Router0 → GUI → Setup → Network Setup**, in IP Router set the IP Address same as **Default Gateway (192.168.1.1)** of Server0 and save the settings.

The screenshot shows the 'Wireless Router0' GUI with the 'Setup' tab selected. The 'Network Setup' section is active, displaying the following configuration:

- Internet Setup:** Internet Connection type is set to 'Automatic Configuration - DHCP'.
- Optional Settings:** Host Name, Domain Name, and MTU (Size: 1500) are visible.
- Network Setup:** Router IP is set to 192.168.1.1, and Subnet Mask is 255.255.255.0.
- DHCP Server Settings:** DHCP Server is set to 'Enabled'.

The 'Help...' button is visible on the right side of the page.

5. Go to **Wireless Router0 → GUI → Wireless → Basic Wireless Settings**, set the following:

Network Name (SSID) → punit

SSID Broadcast → Enabled

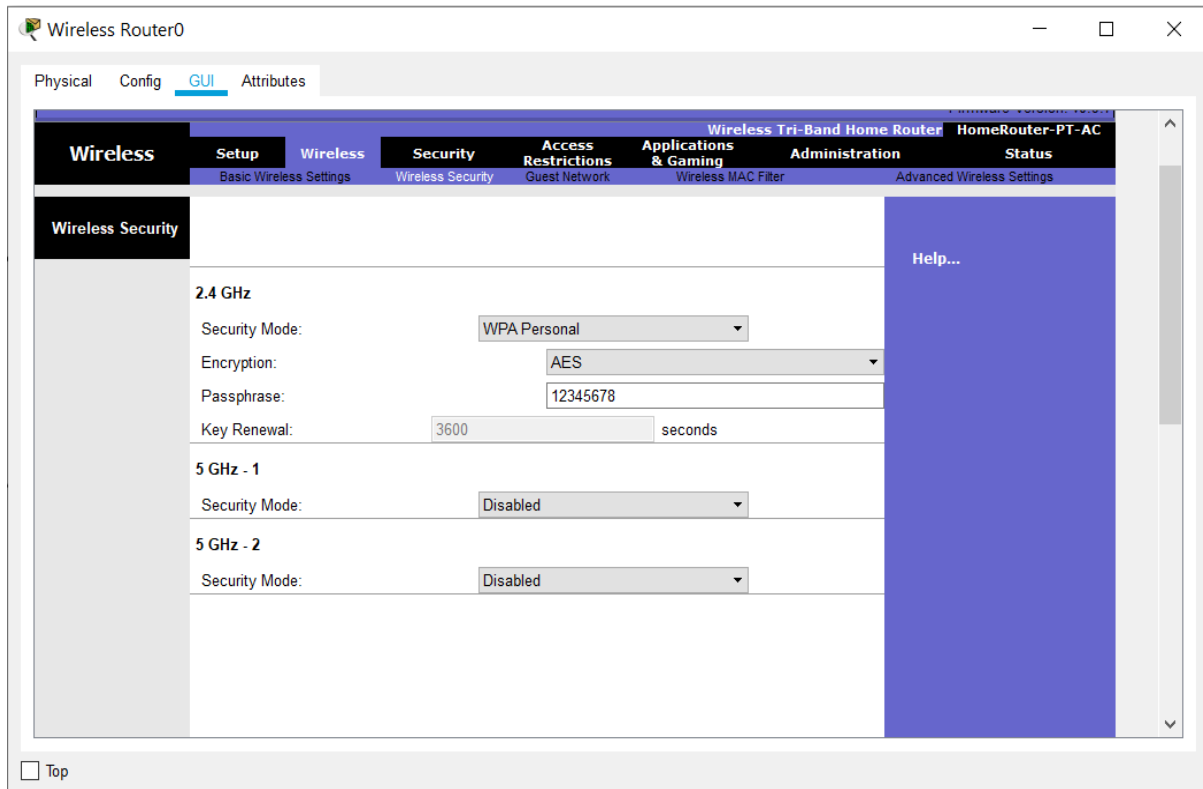
Save the Settings.

The screenshot shows the 'Wireless Router0' GUI with the 'Wireless' tab selected. The 'Basic Wireless Settings' section is active, displaying the following configuration:

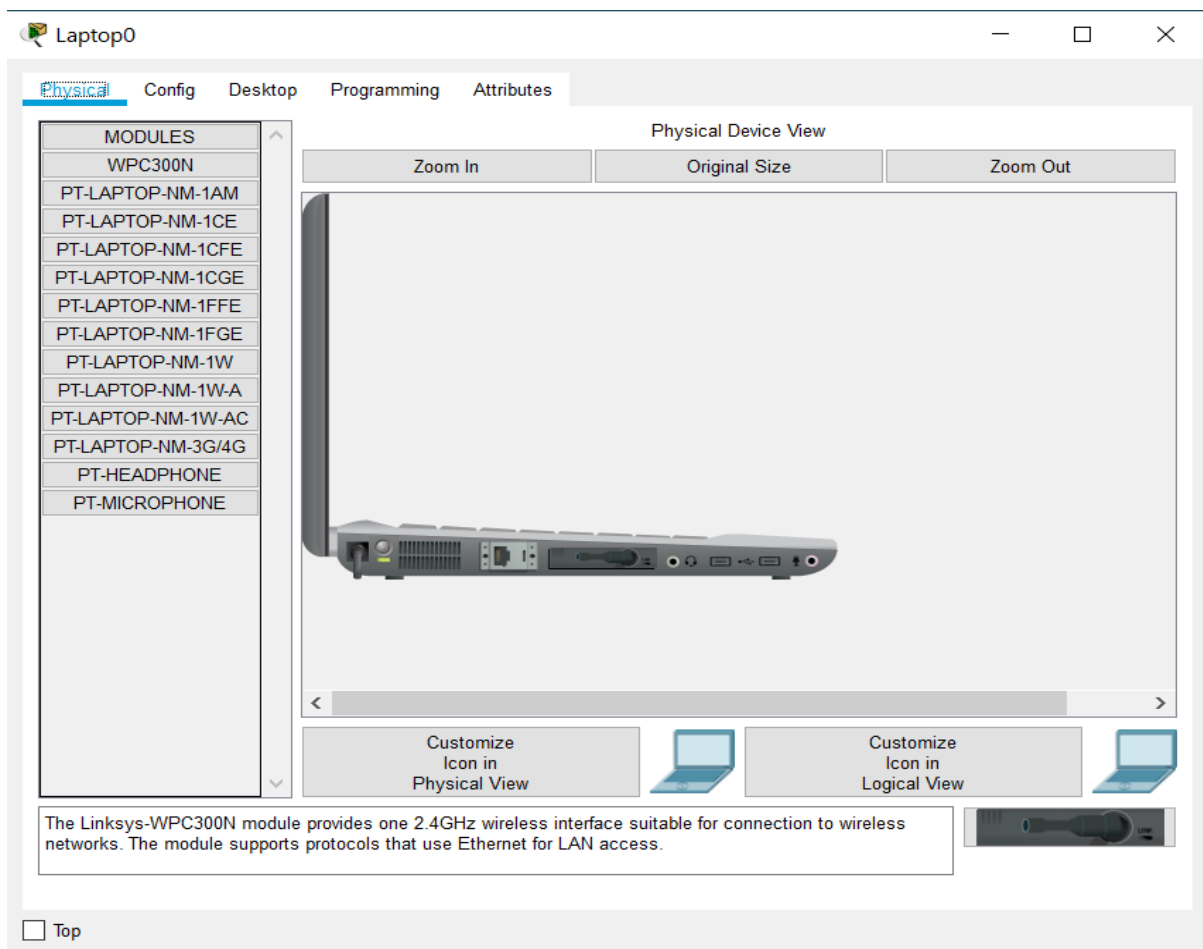
- 2.4 GHz:** Network Mode is set to 'Auto', Network Name (SSID) is 'punit', SSID Broadcast is 'Enabled', Standard Channel is '1 - 2.412GHz', and Channel Bandwidth is 'Auto'.
- 5 GHz - 2:** Network Mode is set to 'Auto', Network Name (SSID) is 'Default', SSID Broadcast is 'Enabled', Standard Channel is 'Auto', and Channel Bandwidth is 'Auto'.

The 'Help...' button is visible on the right side of the page.

6. Go to **Wireless Router0** → **GUI** → **Wireless** → **Wireless Security**, set the following:
Security Mode → WPA Personal, Encryption → AES, Passphrase → 12345678



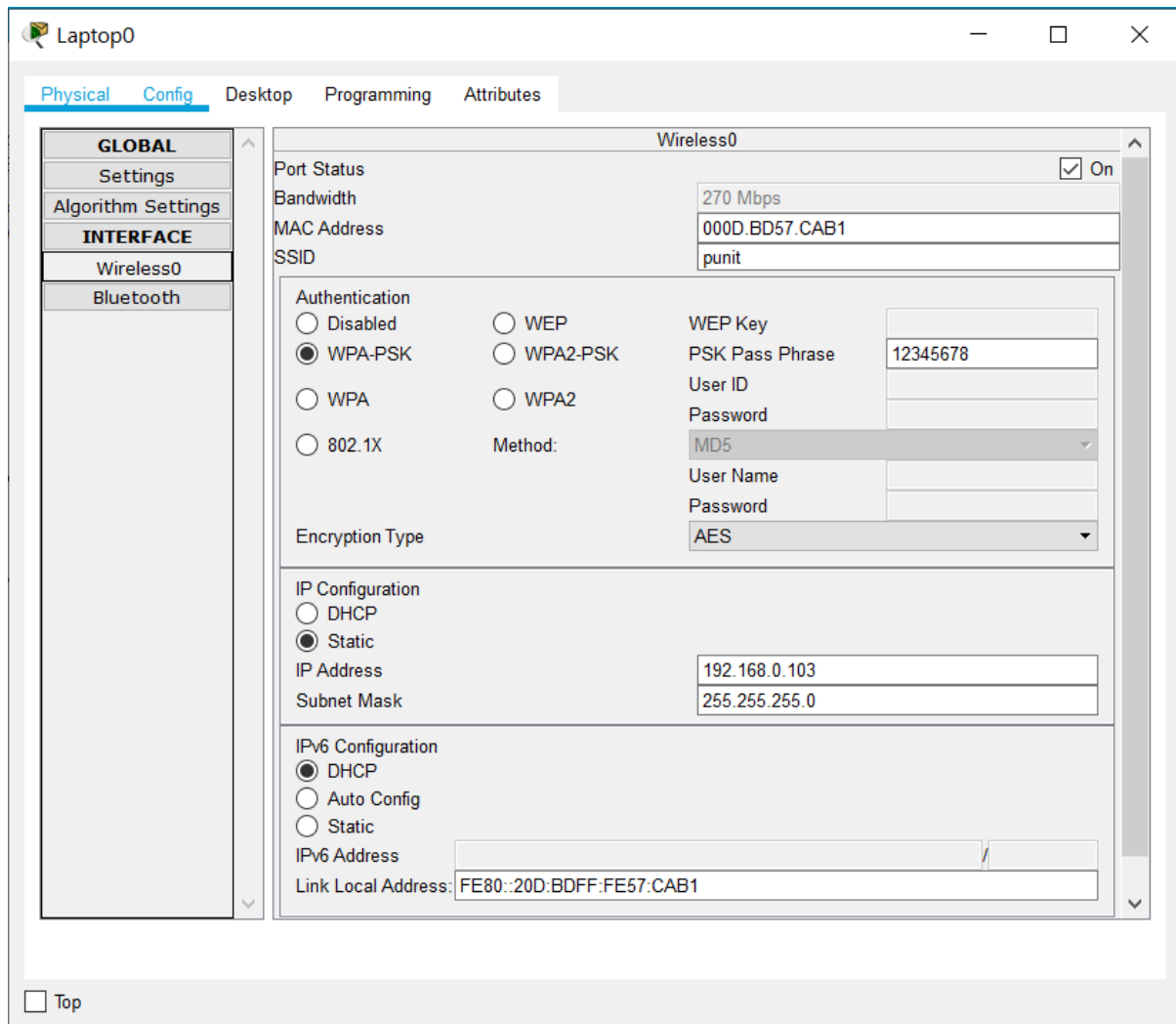
7. After the configuration of Wireless Router1, we have to connect Laptop0 wirelessly. For the same go to **Laptop0** → **Physical**, turn off the Laptop0 and drag drop the Ethernet port and put the wireless port. Turn On the Laptop0 again.



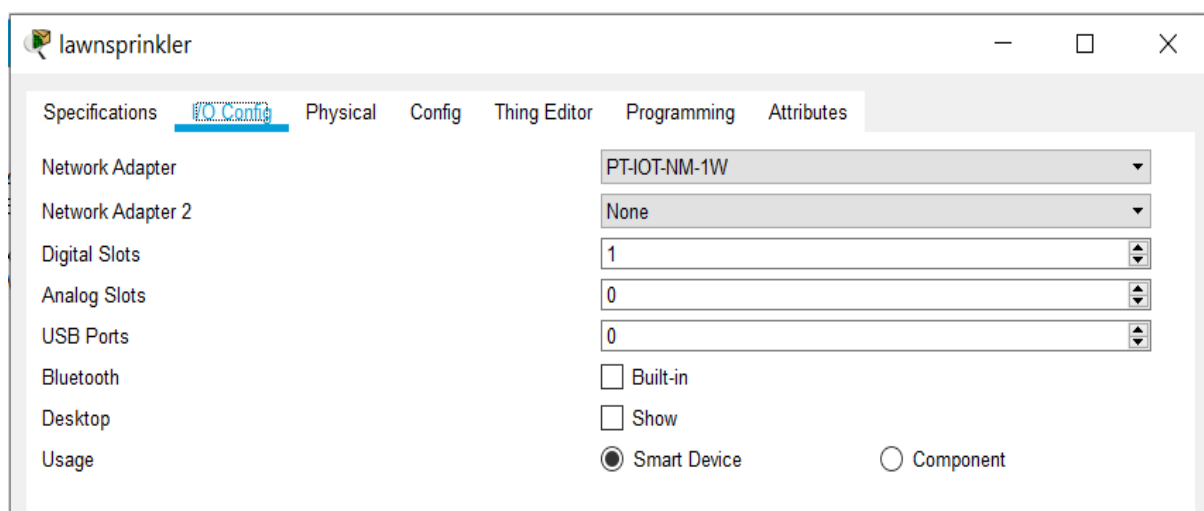
8. After successfully connecting the wireless port, go to **Laptop0** → **Config** → **Interface** → **Wireless0**. Set the following settings given in **STEP 5, 6**:

Port Status → 'ON', SSID → punit, Authentication → WPA-PSK,
PSK Pass Phrase → 12345678, Encryption Type → AES

Laptop0 will now successfully connected



9. Go to **Lawnsprinkler** → **Advanced** → **I/O Config**, Select the **Network Adapter** as **PT-IOT-NM-1W**



10. Again, to connect Lawnsprinkler wirelessly go to **Lawnsprinkler → Config → Interface → Wireless0**. Set the following settings given in **STEP 5, 6**:

Port Status → 'ON', SSID → punit, Authentication → WPA-PSK,
PSK Pass Phrase → 12345678, Encryption Type → AES

Lawnsprinkler will now successfully connected

The screenshot shows the 'Lawnsprinkler' configuration window with the 'Config' tab selected. The left sidebar shows a tree view with 'GLOBAL' and 'INTERFACE' sections. Under 'INTERFACE', 'Wireless0' is selected. The main area displays the 'Wireless0' configuration. The 'Port Status' is checked 'On'. 'Bandwidth' is set to '270 Mbps'. 'MAC Address' is '0001.638E.276C'. 'SSID' is 'punit'. Under 'Authentication', 'WPA-PSK' is selected. 'WEP Key' is empty. 'PSK Pass Phrase' is '12345678'. 'User ID' and 'Password' are empty. 'Method' is 'MD5'. 'Encryption Type' is 'AES'. Under 'IP Configuration', 'DHCP' is selected. 'IP Address' is '192.168.1.102'. 'Subnet Mask' is '255.255.255.0'. Under 'IPv6 Configuration', 'DHCP' is selected. 'IPv6 Address' is empty. 'Link Local Address' is 'FE80::201:63FF:FE8E:276C'. At the bottom, there is a 'Top' button and an 'Advanced' button.

11. Repeat **STEP 9 & 10** to connect the Water Level Monitor (Waterlevel) wirelessly.

The screenshot shows the 'Waterlevel' configuration window with the 'I/O Config' tab selected. The left sidebar shows a tree view with 'Specifications', 'I/O Config', 'Physical', 'Config', 'Thing Editor', 'Programming', and 'Attributes'. Under 'I/O Config', 'Network Adapter' is selected. The main area displays the 'Network Adapter' configuration. 'Network Adapter' is set to 'PT-IOT-NM-1W'. 'Network Adapter 2' is set to 'None'. 'Digital Slots' is '0'. 'Analog Slots' is '0'. 'USB Ports' is '0'. 'Bluetooth' is 'Built-in'. 'Desktop' is 'Show'. 'Usage' is 'Smart Device'. At the bottom, there is a 'Component' button.

waterlevel

Specifications I/O Config Physical **Config** Thing Editor Programming Attributes

GLOBAL

Settings

Algorithm Settings

Files

INTERFACE

Wireless0

Wireless0

Port Status ☒ On

Bandwidth 300 Mbps

MAC Address 000C.CF1A.8CEA

SSID punit

Authentication

☐ Disabled ☐ WEP ☒ WPA-PSK ☐ WPA2-PSK

WEP Key

PSK Pass Phrase 12345678

User ID

Password

Method: MD5

User Name

Password

Encryption Type AES

IP Configuration

☒ DHCP ☐ Static

IP Address 192.168.1.100

Subnet Mask 255.255.255.0

IPv6 Configuration

☒ DHCP ☐ Auto Config ☐ Static

IPv6 Address

Link Local Address: FE80::20C:CFFF:FE1A:8CEA

☐ Top Advanced

12. Now, we have enable the IoT servives in Server0, go to **Server0** → **Services** → **IoT** and click ‘on’ button to start the services.

Server0

Physical Config **Services** Desktop Programming Attributes

SERVICES

HTTP

DHCP

DHCPv6

TFTP

DNS

SYSLOG

AAA

NTP

EMAIL

FTP

IoT

VM Management

Radius EAP

Registration Server

Service ☒ On ☐ Off

	Username	Password
1	admin	admin

Delete

☐ Top

13. We have to set Username and Password for the IoT services, go to **Server0 → Desktop → IoT Monitor**. There fill the **IoT Server Address as IP Address of Server0 (192.168.1.10)**, Username and Password. It will ask you to first Signup, click on Signup button and fill the Username and Password. In my case, **Username is 'admin'** and **Password is also 'admin'** as shown in above screenshot.
14. After Signup with specific Username and Password, go to **Lawnsprinkler → Config → Settings**. Set Display Name, Gateway/DNS IPv4 and Gateway/DNS IPv6 to be DHCP and in IoT Server select the Remote Server, Server Address will be same as IP Address of Server0 and use same Username & Password as in STEP above. Lastly click on **'Connect'** to get successful connection.

The screenshot shows the 'lawnsprinkler' application window. The 'Config' tab is selected, and the 'Global Settings' section is active. The left sidebar shows a tree view with 'GLOBAL' expanded, containing 'Settings', 'Algorithm Settings', and 'Files'. Under 'INTERFACE', 'Wireless0' is selected. The main area contains the following settings:

- Display Name:** lawnsprinkler
- Serial Number:** PTT081010V6-
- Gateway/DNS IPv4:**
 - ☒ DHCP
 - ☐ Static
 - Gateway:** 192.168.1.1
 - DNS Server:** 0.0.0.0
- Gateway/DNS IPv6:**
 - ☒ DHCP
 - ☐ Auto Config
 - ☐ Static
 - IPv6 Gateway:** (empty)
 - IPv6 DNS Server:** (empty)
- IoT Server:**
 - ☐ None
 - ☐ Home Gateway
 - ☒ Remote Server
 - Server Address:** 192.168.1.10
 - User Name:** admin
 - Password:** admin
 - Refresh** button

At the bottom left, there is a 'Top' button. At the bottom right, there is an 'Advanced' button.

15. Repeat the same **STEP 14** to get successful connection for Water Level Monitor (Waterlevel).

The screenshot shows the 'waterlevel' configuration window with the 'Config' tab selected. The left sidebar contains a tree view with 'GLOBAL' (Settings, Algorithm Settings, Files) and 'INTERFACE' (Wireless0). The main area is titled 'Global Settings' and contains the following fields:

- Display Name: waterlevel
- Serial Number: PTT0810JG98-
- Gateway/DNS IPv4:
 - ☒ DHCP
 - ☐ Static
 - Gateway: 192.168.1.1
 - DNS Server: 0.0.0.0
- Gateway/DNS IPv6:
 - ☒ DHCP
 - ☐ Auto Config
 - ☐ Static
 - IPv6 Gateway:
 - IPv6 DNS Server:
- IoT Server:
 - ☐ None
 - ☐ Home Gateway
 - ☒ Remote Server
 - Server Address: 192.168.1.10
 - User Name: admin
 - Password: admin
 - Refresh button

At the bottom, there is a 'Top' button and an 'Advanced' button.

16. To check that both Lawnsprinkler and Waterlevel is connected, go to **Server0** → **Desktop** → **IoT Monitor**. Fill out the IoT Server Address, Username, Password and click on 'Login'. There you can see both the devices.

The screenshot shows the 'Server0' configuration window with the 'Desktop' tab selected. The 'IoT Monitor' window is open, displaying a list of connected devices under the heading 'IoT Server - Devices'. The list includes:

- lawnsprinkler (PTT0810OV6-) Lawn Sprinkler
- waterlevel (PTT0810JG98-) Water Level Monitor

The 'IoT Monitor' window has a blue header bar with a close button (X) and a navigation bar with links: Home | Conditions | Editor | Log Out.

17. Now, go to Server0 → Desktop → IoT Monitor → conditions.

Now, click on 'Add' to add some conditions. Give the name (**TURN ON**) for your **condition1**, in 'if' block select waterlevel and Water level to be less than or equals to 9.0cm (**waterlevel Water Level <= 9.0 cm**) then set the actions for another devices as follow:

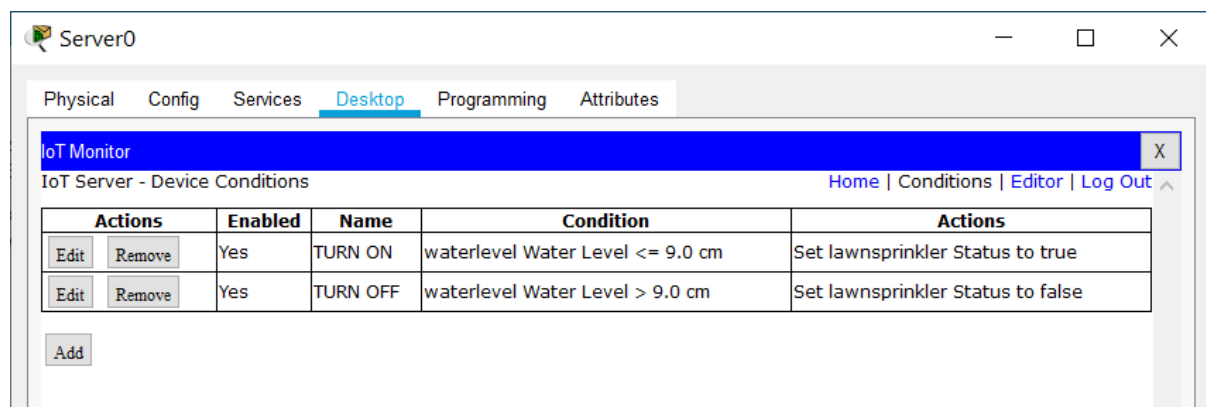
- Set lawnsprinkler Status to true

Click "OK" to save Condition.

Give the name (**TURN OFF**) for your **condition2**, in 'if' block select Smoke Detector and level to be greater than 9.0cm (**waterlevel Water Level > 9.0 cm**) then set the actions for another devices as follow:

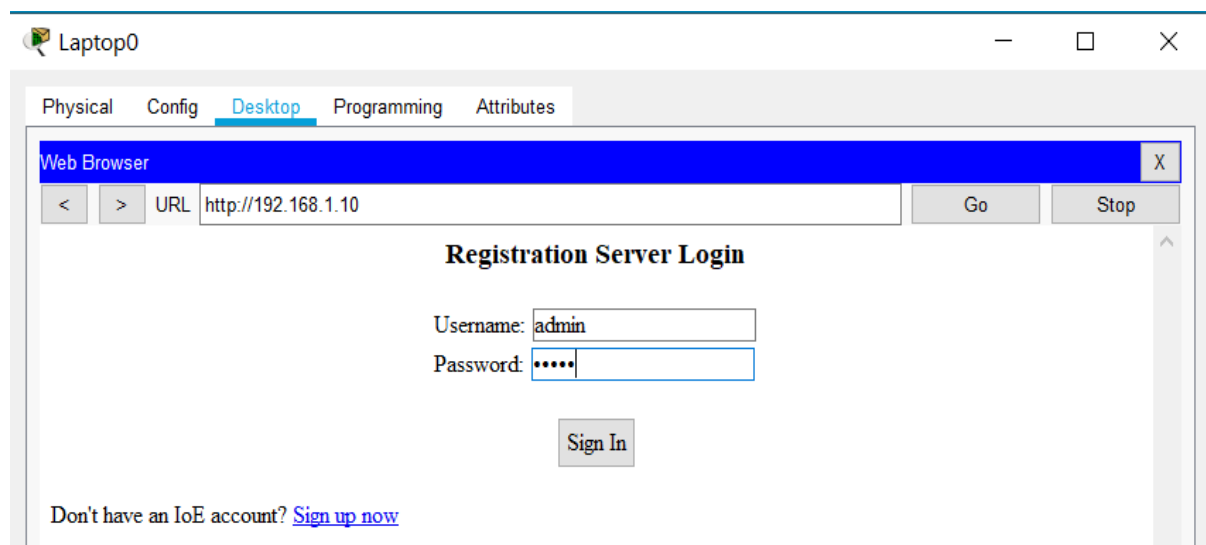
- Set lawnsprinkler Status to false

Click "OK" to save Condition.

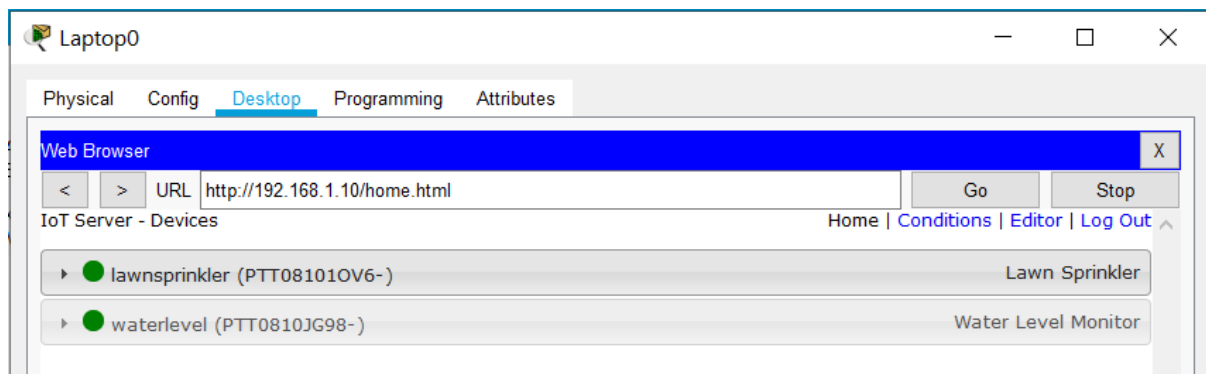


Output:

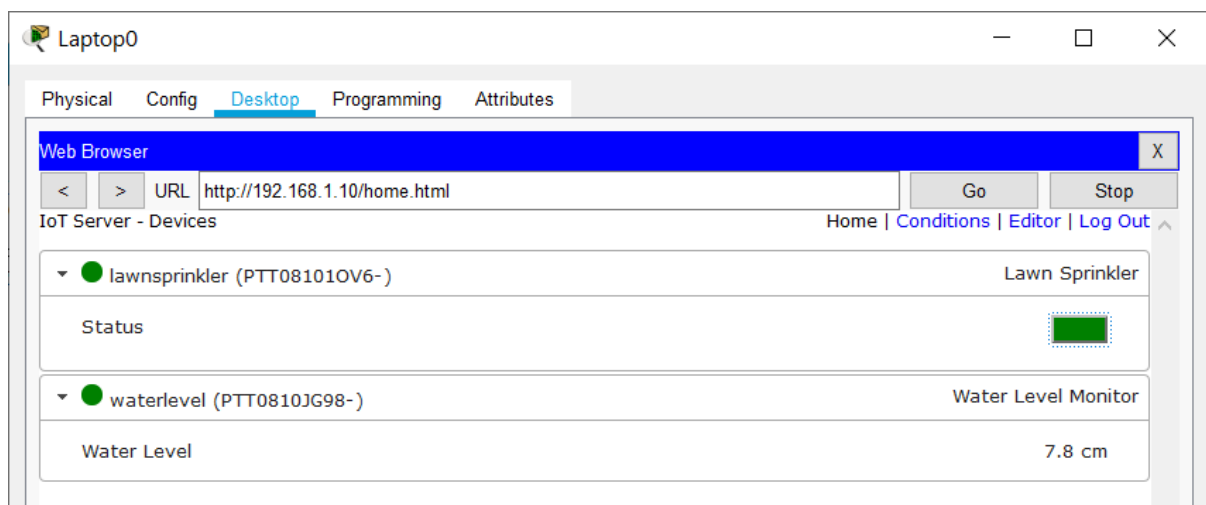
To see the output of IoT Devices, go to **Laptop0 → Desktop → Web Browser**. Fill out the **URL that is your IP Address of Server0 (192.168.1.10)** and click on 'Go'. You can see a Web Page Asking about Username & Password, fill out the same **Username (admin) & Password (admin)**. Click on 'Sign In'.



After successful Sign In, you can see your IoT Devices with the URL.



In output screenshot 1, We can see that whenever the level of Waterlevel is less than or equals to 9.0cm (**waterlevel Water Level \leq 9.0 cm**) then condition1 came to an action i.e., **lawnsprinkler Status to true**



In output screenshot 2, We can see that whenever the level of Waterlevel is greater than 9.0cm (**waterlevel Water Level $>$ 9.0 cm**) then condition2 came to an action i.e., **lawnsprinkler Status to false**

