



Project Title

Setting Up a Small Network and Configuring Network Devices

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Tool Used: Cisco Packet Tracer

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1. Introduction

In today's interconnected world, reliable and efficient computer networks are crucial for seamless communication, data sharing, and business operations. Networking plays a vital role across various sectors such as education, healthcare, finance, and governance. This project provides a comprehensive demonstration of setting up a small Local Area Network (LAN) using Cisco Packet Tracer, focusing on both wired and wireless connectivity.

The network simulated in this project includes essential components: a router, switch, two desktop computers (PC0 and PC1), a printer, a wireless access point (AP), and a wireless-enabled laptop. Each device is assigned a static IP address, configured appropriately, and tested for connectivity through ICMP-based ping operations.

Cisco Packet Tracer, developed by Cisco Systems, is an excellent simulation tool that provides a virtual environment for designing, configuring, and troubleshooting network topologies. The practical experience gained through this simulation aids in understanding fundamental networking concepts like IP addressing, routing, switching, wireless communication, and device configuration.

2. Objective

- To plan and design a small computer network using Cisco Packet Tracer.
 - To understand and apply static IP addressing across multiple devices.
 - To configure wired connections via routers, switches, and Ethernet ports.
 - To establish and secure wireless connections through an access point.
 - To test connectivity using tools such as ping commands and troubleshoot any issues.
 - To document the implementation process with appropriate screenshots.
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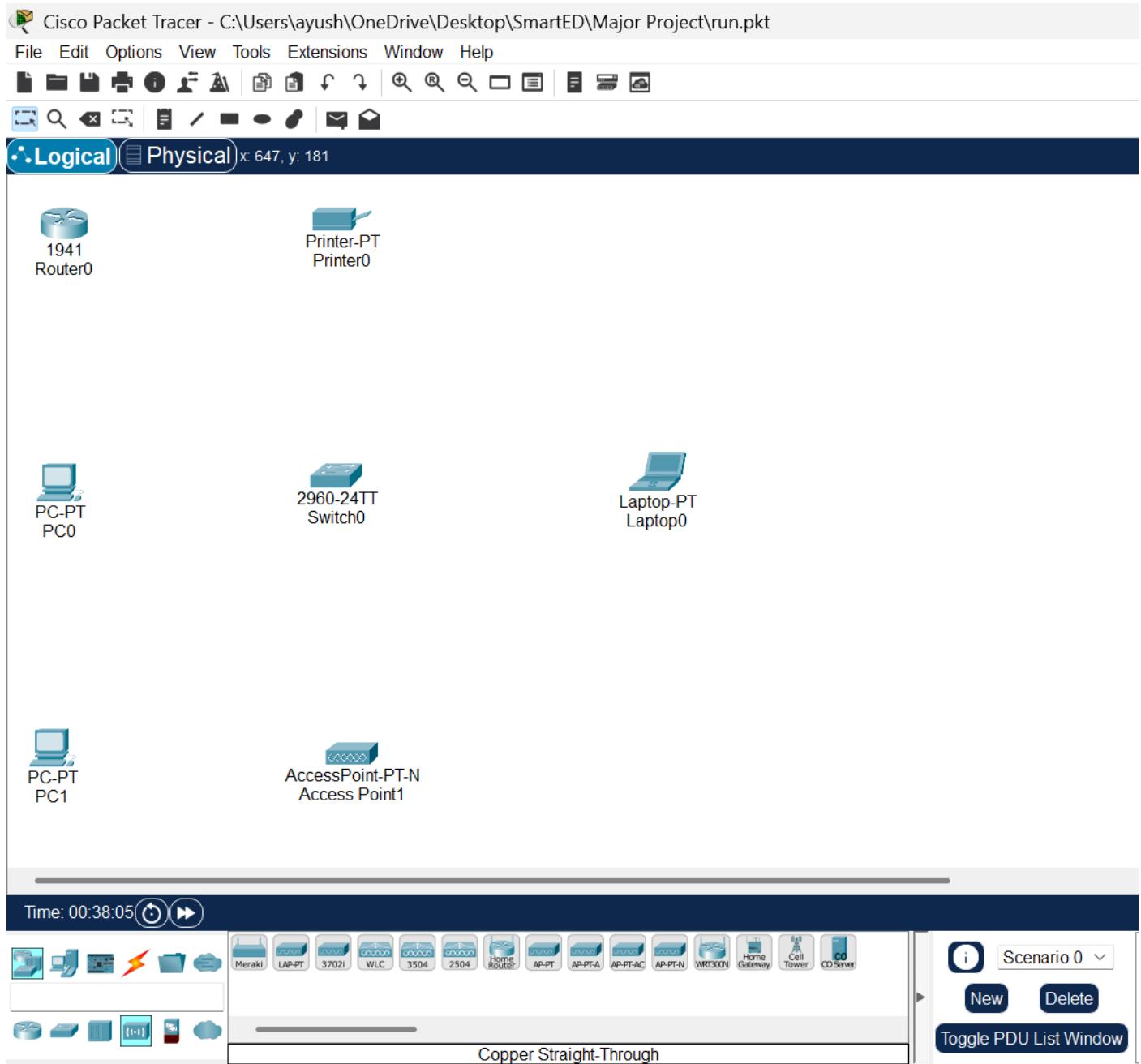
3. Network Planning and Design

IP Addressing Scheme:

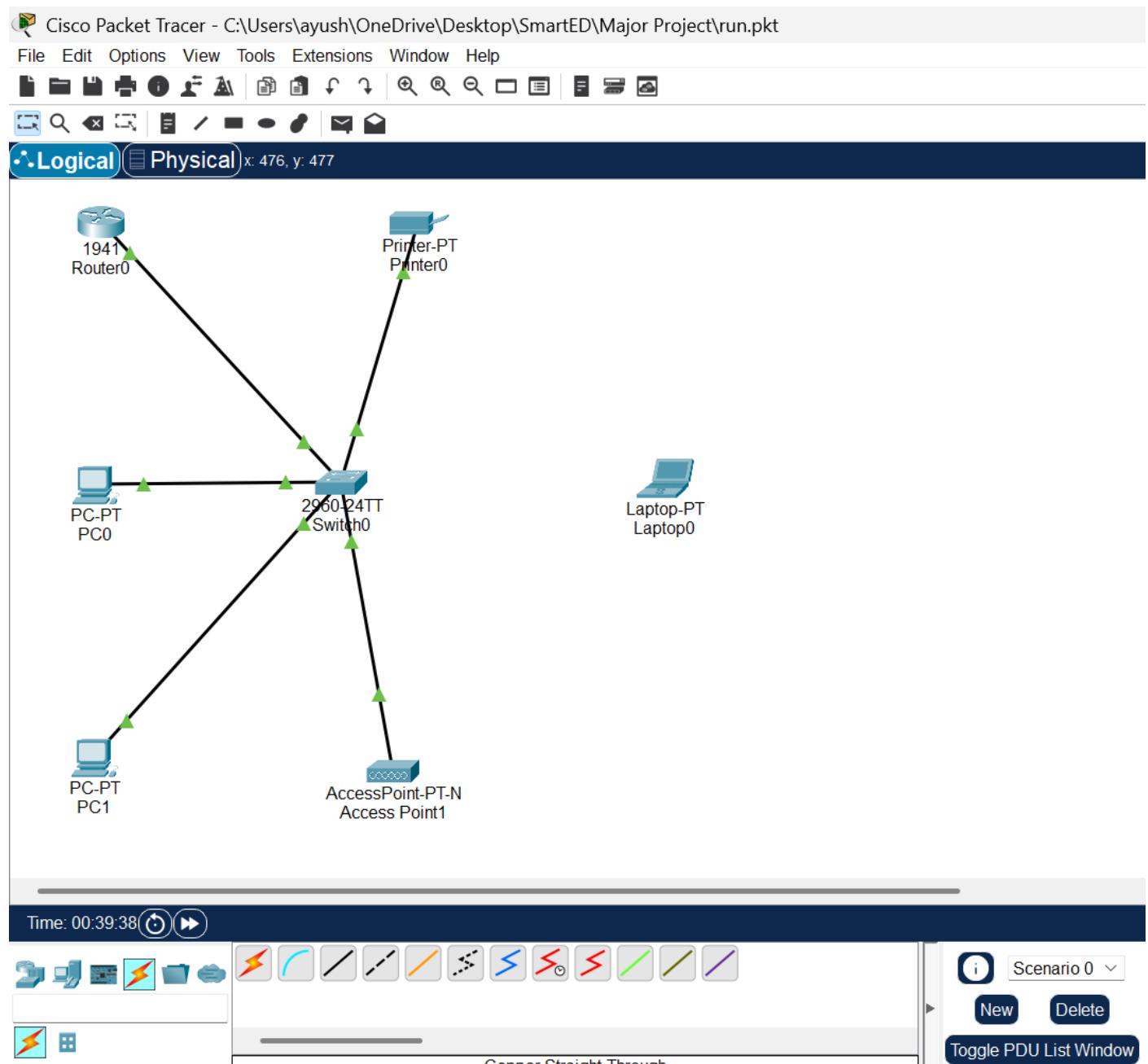
Device	Interface	IP Address	Subnet Mask	Gateway
Router	GigabitEthernet0/0	192.168.1.1	255.255.255.0	-
PC0	FastEthernet0	192.168.1.2	255.255.255.0	192.168.1.1
PC1	FastEthernet0	192.168.1.3	255.255.255.0	192.168.1.1
Printer	FastEthernet0	192.168.1.4	255.255.255.0	192.168.1.1
Laptop	Wireless0	192.168.1.5	255.255.255.0	192.168.1.1
Access Point	FastEthernet0	192.168.1.10	255.255.255.0	192.168.1.1

Network Topology:

A star topology was used, where all devices are connected to a central switch, simplifying data flow and network management. The switch connects to the router, and the access point connects to the switch, enabling wireless connectivity.



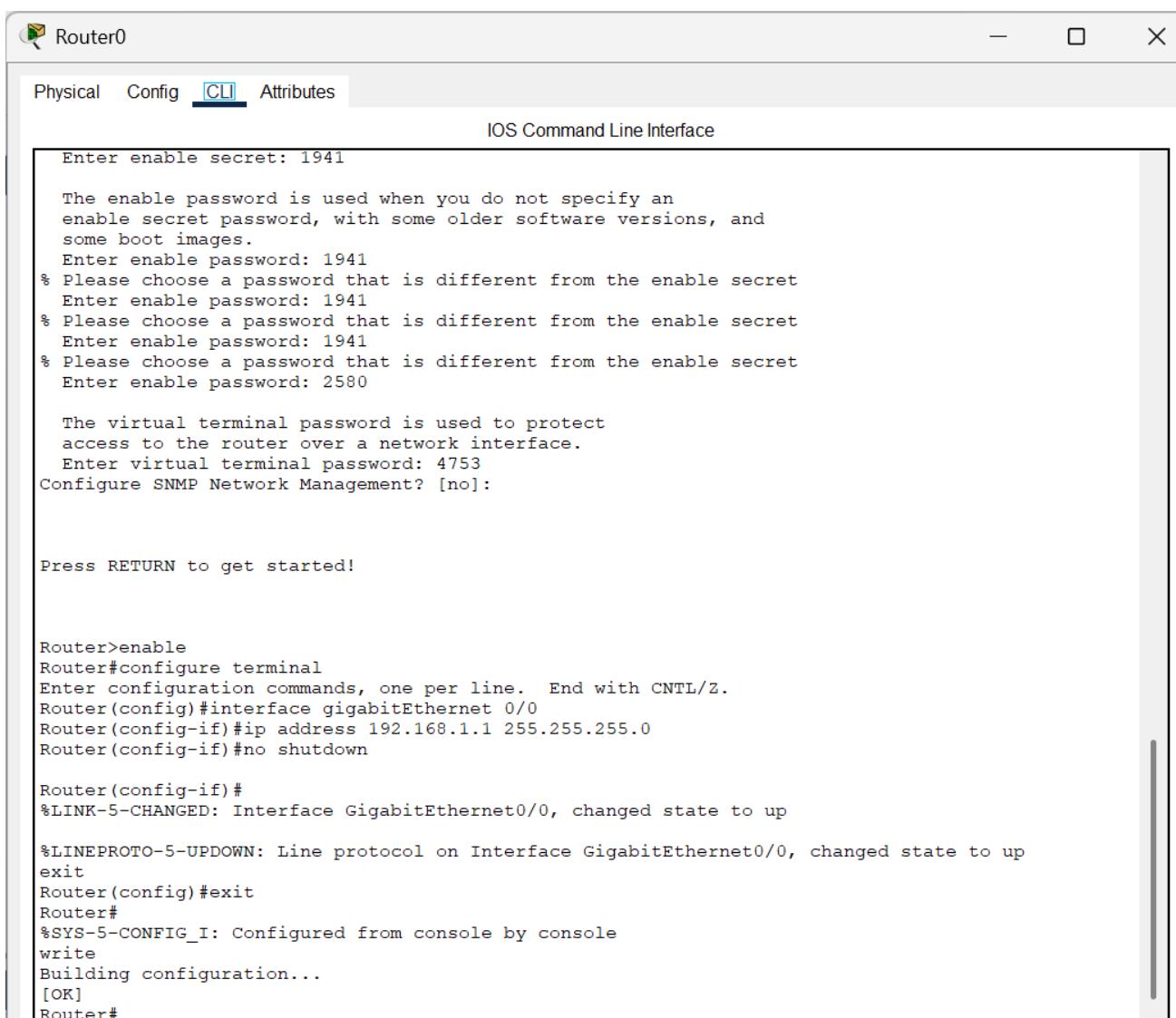
After Cable Connecting :-



4. Implementation Steps

Router Configuration:

```
enable  
configure terminal  
interface gigabitEthernet 0/0  
ip address 192.168.1.1 255.255.255.0  
no shutdown  
exit
```



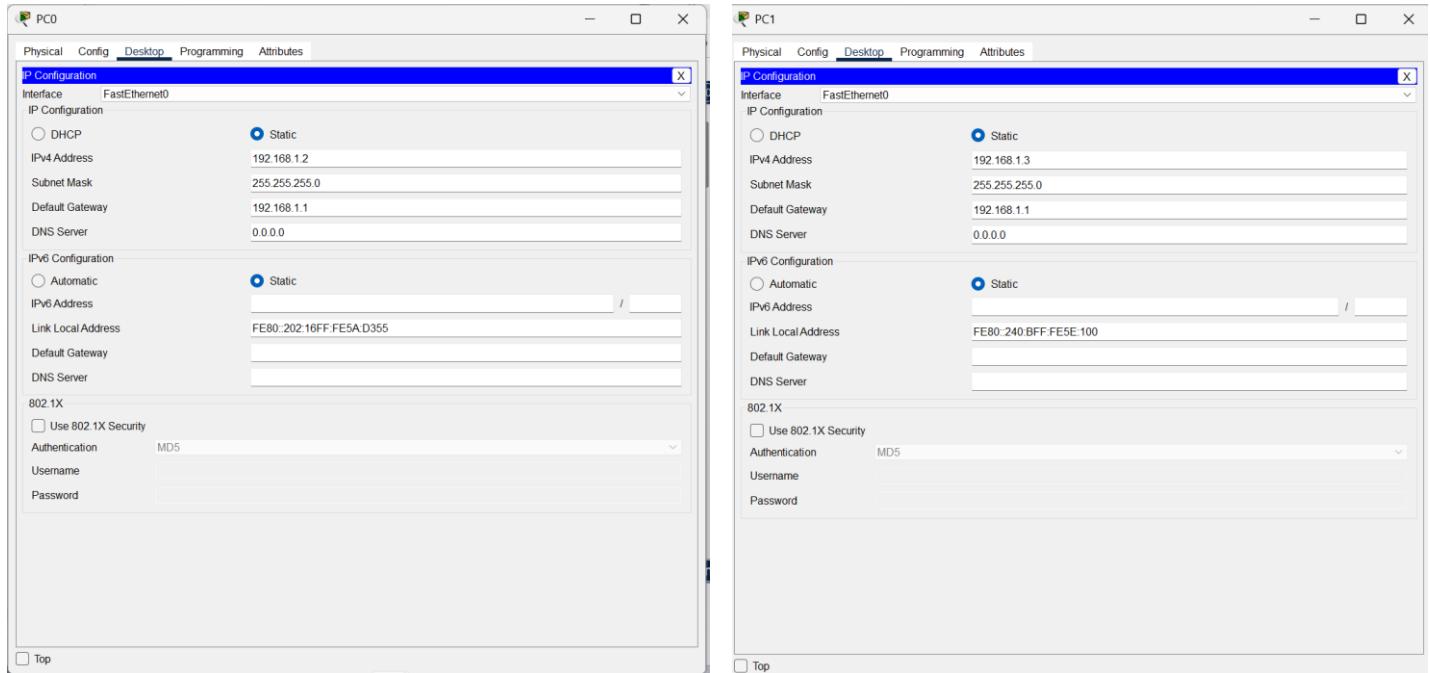
The screenshot shows a window titled "Router0" with a toolbar at the top featuring icons for Physical, Config, and CLI (which is highlighted), and Attributes. Below the toolbar is a title bar "IOS Command Line Interface". The main area contains the configuration commands listed above, followed by a message "Press RETURN to get started!". Below this, the router's configuration history is displayed in a scrollable text area, showing the execution of various commands like enable, configure terminal, and interface configuration. At the bottom right of the window are "Copy" and "Paste" buttons. At the very bottom of the screen is a navigation bar with a "Top" button.

```
Enter enable secret: 1941  
  
The enable password is used when you do not specify an  
enable secret password, with some older software versions, and  
some boot images.  
Enter enable password: 1941  
% Please choose a password that is different from the enable secret  
Enter enable password: 1941  
% Please choose a password that is different from the enable secret  
Enter enable password: 1941  
% Please choose a password that is different from the enable secret  
Enter enable password: 2580  
  
The virtual terminal password is used to protect  
access to the router over a network interface.  
Enter virtual terminal password: 4753  
Configure SNMP Network Management? [no]:  
  
Press RETURN to get started!  
  
Router>enable  
Router#configure terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
Router(config)#interface gigabitEthernet 0/0  
Router(config-if)#ip address 192.168.1.1 255.255.255.0  
Router(config-if)#no shutdown  
  
Router(config-if)#  
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up  
  
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up  
exit  
Router(config)#exit  
Router#  
%SYS-5-CONFIG_I: Configured from console by console  
write  
Building configuration...  
[OK]  
Router#
```

Top Copy Paste

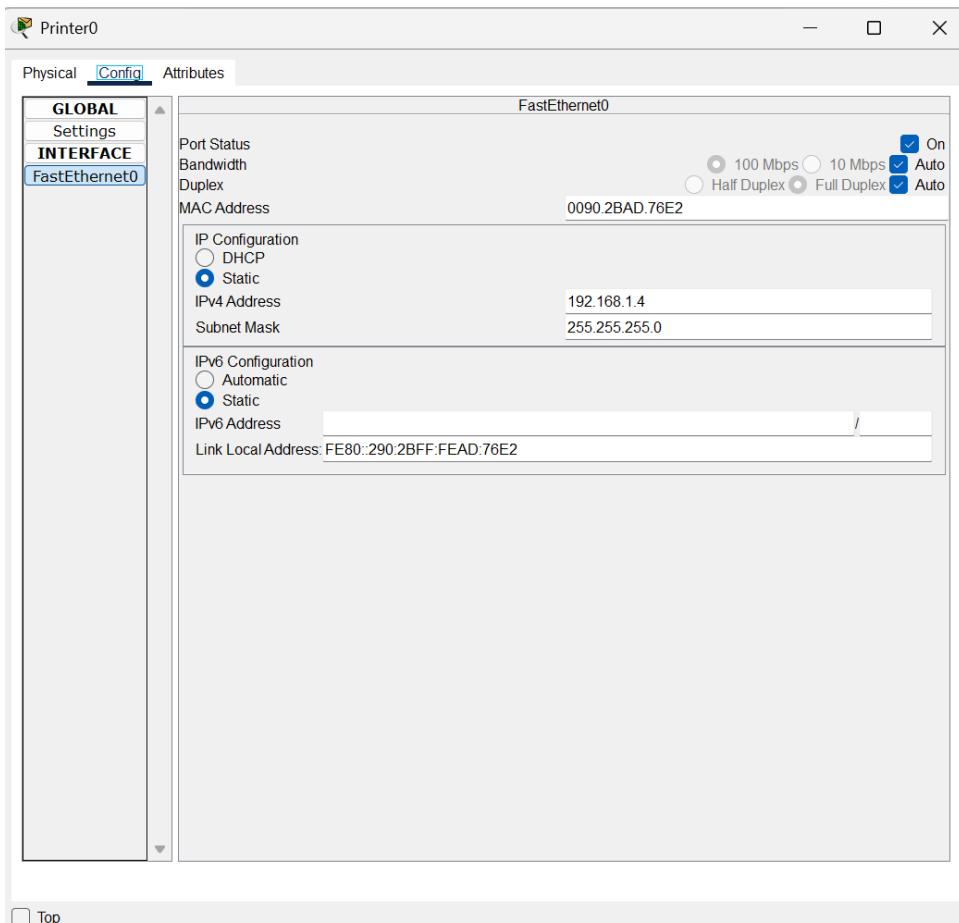
PC0 and PC1 Configuration:

- Assign IP address, subnet, and gateway manually.



Printer Configuration:

- Under Config tab, assign static IP.



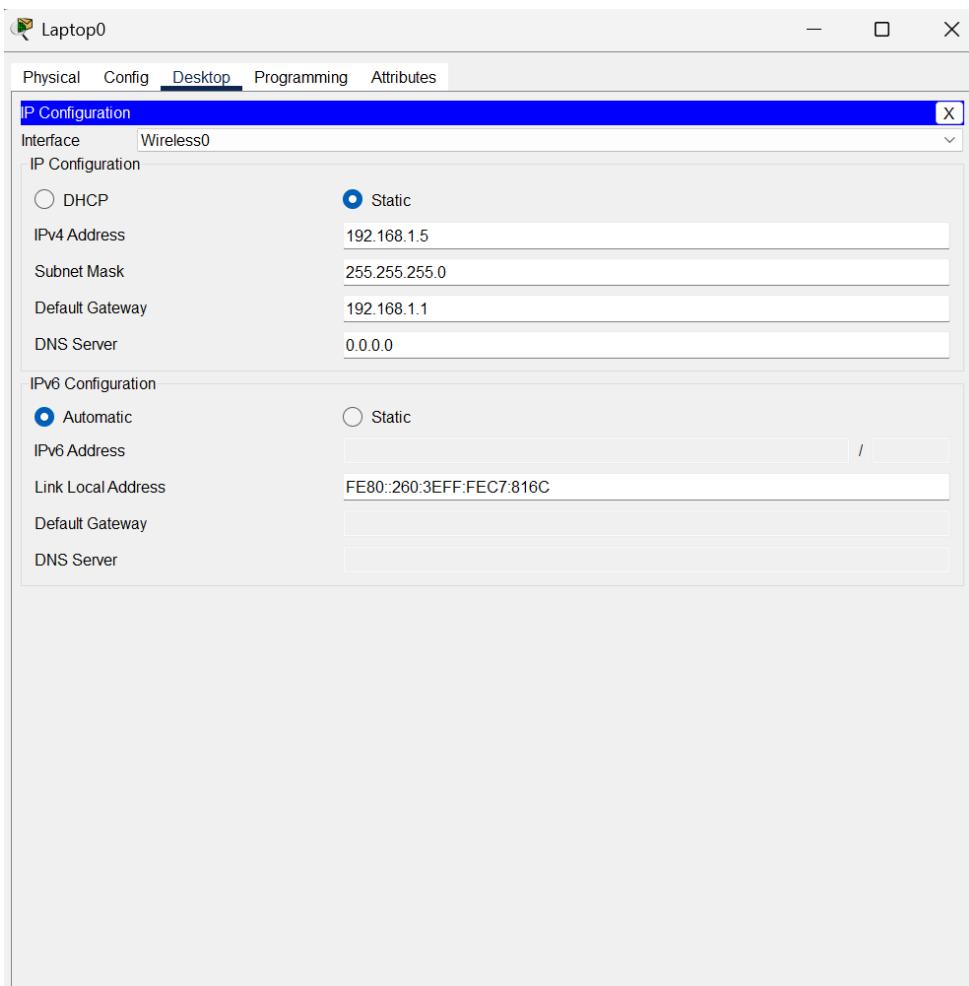
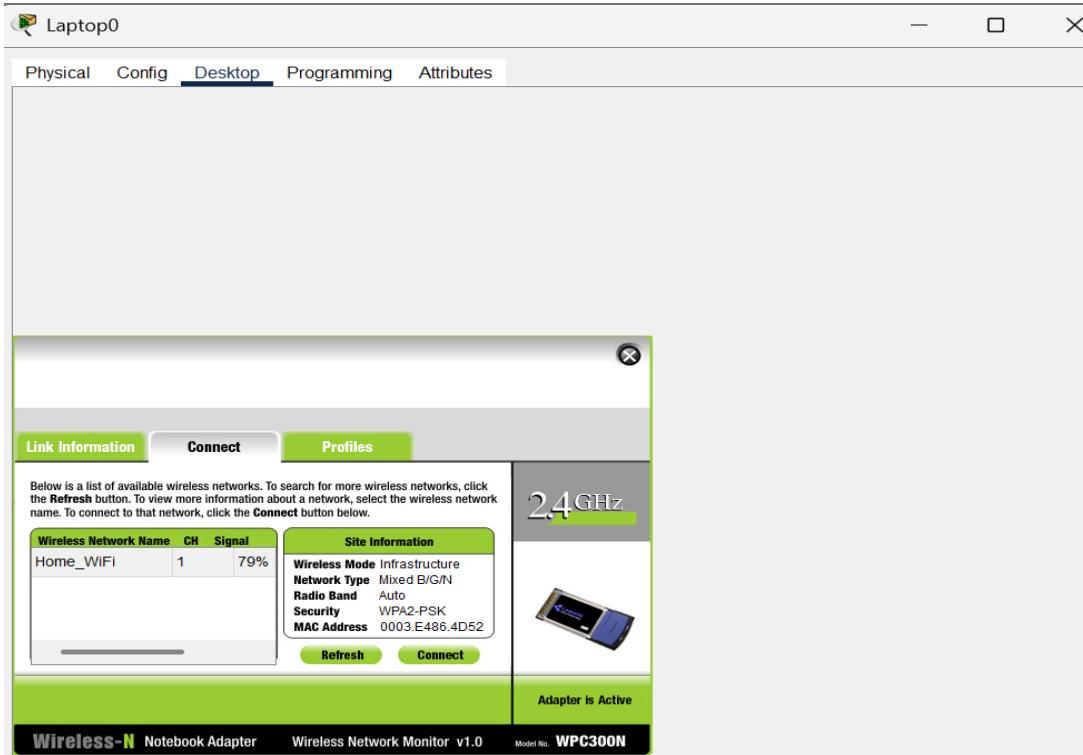
Access Point Configuration:

- SSID: Home_WiFi
- WPA2-PSK, Password: StrongPass123

The screenshot shows the configuration interface for an Access Point named "Access Point1". The "Config" tab is selected. On the left, a sidebar lists "GLOBAL", "Settings", "INTERFACE", "Port 0", and "Port 1", with "Port 1" currently selected. The main panel displays "Port 1" settings. Under "Port Status", the "On" checkbox is checked. The "SSID" is set to "Home_WiFi". For the "2.4 GHz Channel" and "5 GHz Channel", the value "6" is selected. The "Coverage Range (meters)" is set to "250.00". In the "Authentication" section, the "WPA2-PSK" radio button is selected. The "Encryption Type" dropdown is set to "AES". To the right, there are fields for "WEP Key", "PSK Pass Phrase" (containing "Strongpass123"), "User ID", and "Password". A "Top" button is located at the bottom left of the configuration window.

Laptop Configuration:

- Connect to SSID: Home_WiFi
- Password: StrongPass123
- Static IP manually set



5. Testing and Verification

Ping Test - Wired Devices:

- All wired devices successfully communicated.

```
PC0
Physical Config Desktop Programming Attributes
Command Prompt X
Pinging 192.168.1.1 with 32 bytes of data:
Reply from 192.168.1.1: bytes=32 time<1ms TTL=255

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 = 0ms, Average = 0ms

C:\>ping 192.168.1.3

Pinging 192.168.1.3 with 32 bytes of data:
Reply from 192.168.1.3: bytes=32 time<1ms TTL=128
Reply from 192.168.1.3: bytes=32 time=11ms TTL=128
Reply from 192.168.1.3: bytes=32 time<1ms TTL=128
Reply from 192.168.1.3: bytes=32 time=1ms TTL=128

Ping statistics for 192.168.1.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 11ms, Average = 3ms

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

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 = 0ms, Average = 0ms

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=40ms TTL=128
Reply from 192.168.1.5: bytes=32 time=12ms TTL=128
Reply from 192.168.1.5: bytes=32 time=25ms TTL=128
Reply from 192.168.1.5: bytes=32 time=27ms TTL=128

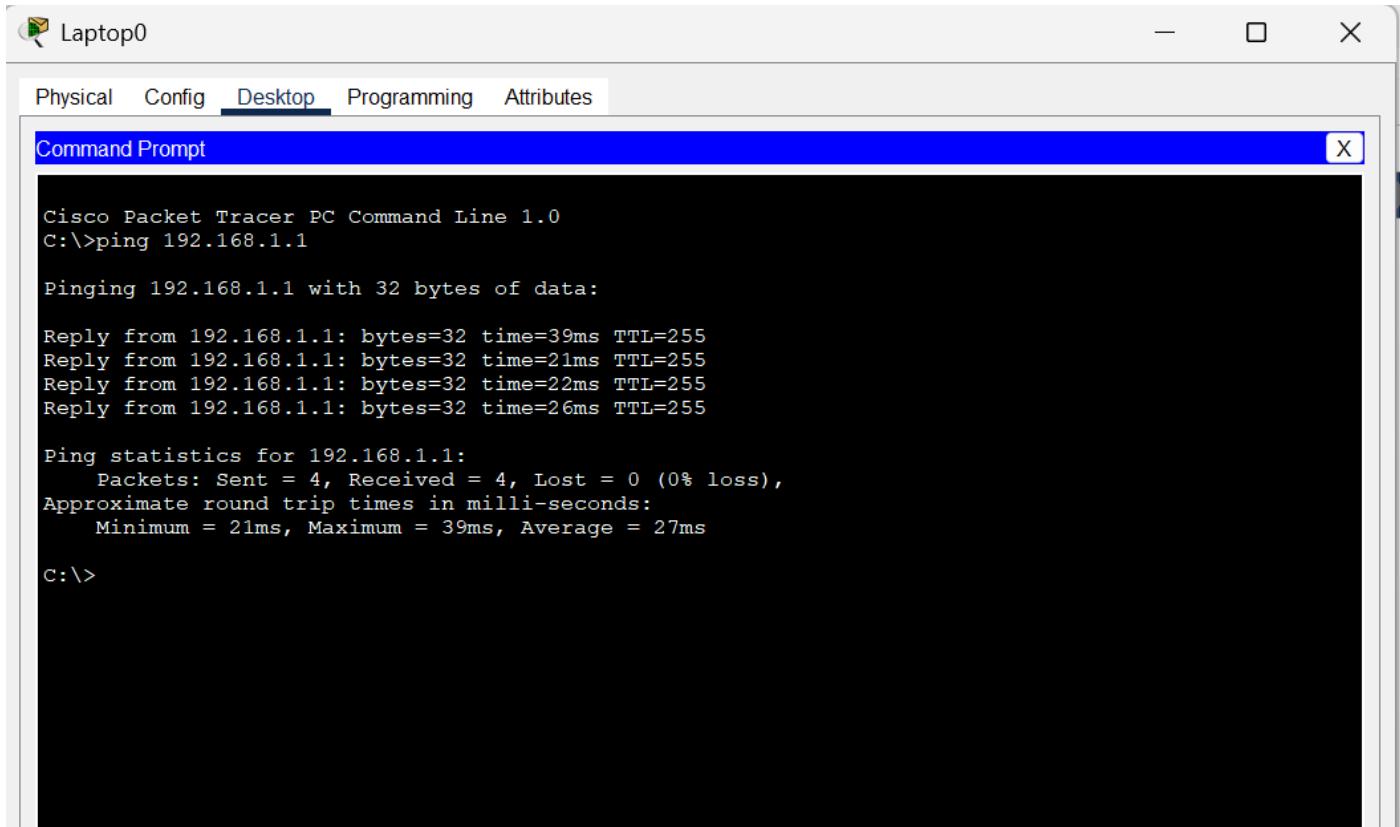
Ping statistics for 192.168.1.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 12ms, Maximum = 40ms, Average = 26ms

c:\>
```

Top

Ping Test - Wireless Device:

- Laptop successfully pinged router.



Laptop0

Physical Config Desktop Programming Attributes

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
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=39ms TTL=255
Reply from 192.168.1.1: bytes=32 time=21ms TTL=255
Reply from 192.168.1.1: bytes=32 time=22ms TTL=255
Reply from 192.168.1.1: bytes=32 time=26ms TTL=255

Ping statistics for 192.168.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 21ms, Maximum = 39ms, Average = 27ms

C:\>
```

6. Results and Observations

- All devices received correct IPs.
- Router and Access Point provided successful connectivity.
- All ping tests completed with 0% packet loss.
- Demonstrates understanding of basic networking.

7. Conclusion

The project successfully demonstrates the design and implementation of a small-scale wired and wireless network using Cisco Packet Tracer. A star topology was implemented using static IP addressing. Wired and wireless communications were verified through ping tests. All components were configured and functioned as expected, making the simulation realistic and valuable.

8. References

- Cisco Networking Academy Resources
 - Cisco Packet Tracer Tutorials
 - CCNA Course Material
 - Official Cisco Documentation
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