

LAB 9: Wireless Network Setup and Packet Analysis using Cisco Packet Tracer

Objectives

1. To understand the working mechanism of a Wireless Local Area Network (WLAN) and the configuration of a Wireless Router.
2. To configure Service Set Identifier (SSID) and WPA2 security protocols to secure the wireless network.
3. To establish connectivity between client Laptops and the Wireless Router and verify the connection using packet analysis tools (Ping).

Theory

1. WLAN (Wireless Local Area Network)

A WLAN is a wireless computer network that links two or more devices using wireless communication to form a local area network (LAN) within a limited area such as a home, school, or computer laboratory.

Operation: It uses high-frequency radio waves (typically 2.4GHz or 5GHz) to transmit data between devices and a wireless router or access point, eliminating the need for physical cables.

2. SSID (Service Set Identifier)

The SSID is the primary name associated with an 802.11 wireless local area network (WLAN).

Operation: It acts as a unique identifier that distinguishes one WLAN from another. Client devices scan for the SSID to identify and connect to the correct network.

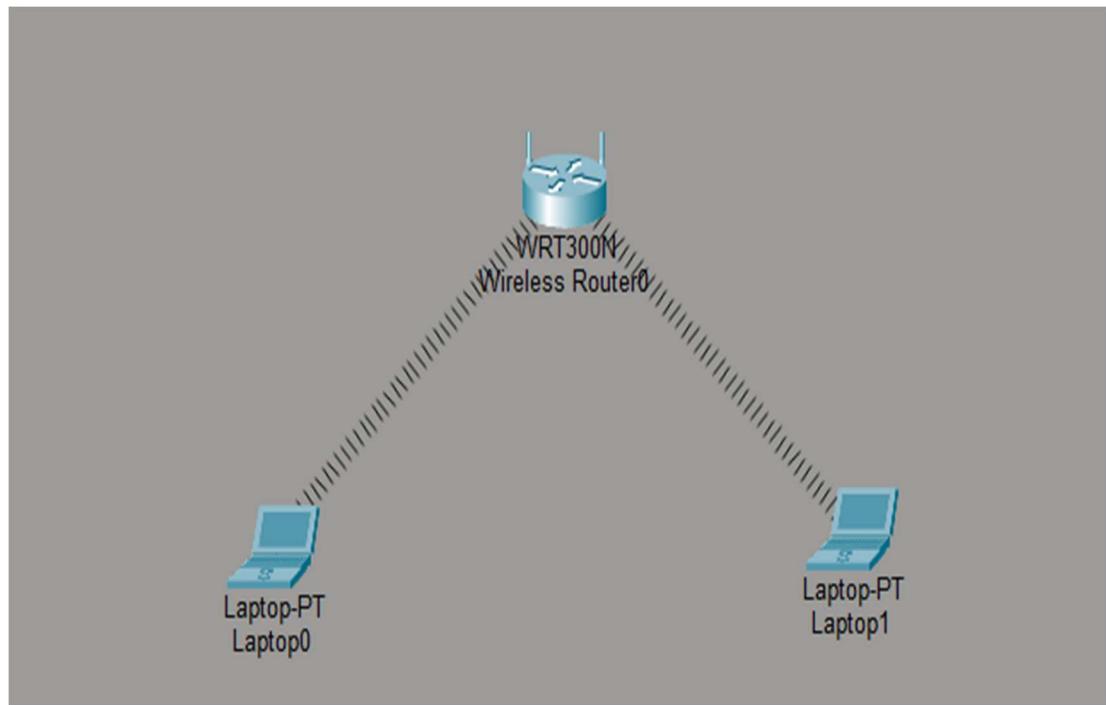
3. WPA2 (Wi-Fi Protected Access 2)

WPA2 is a security method and encryption protocol for wireless networks.

Operation: It uses the Advanced Encryption Standard (AES) to secure data. WPA2-PSK (Pre-Shared Key) requires users to enter a passphrase to authenticate with the network, preventing unauthorized access.

Network Topology

A topology was created using one Wireless Router (WRT300N named "Wireless Router0") and two client devices (Laptop-PT named "Laptop0" and "Laptop1"). The Wireless Router acts as the central access point, broadcasting the signal to the laptops.



Configuration

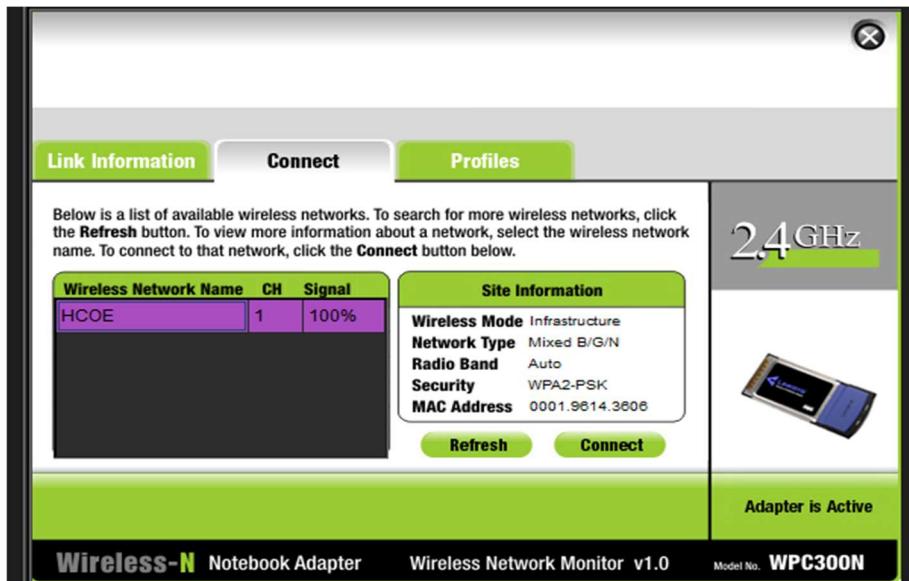
The Wireless Router was configured to act as a DHCP server, automatically assigning IP addresses to connected clients.

IP Configuration Table

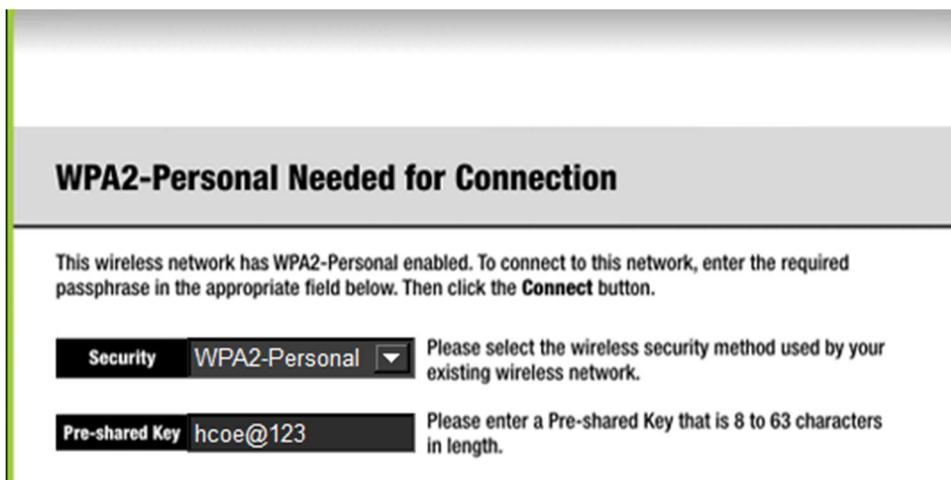
Device	Interface	IP Address	Subnet Mask	Default Gateway	Allocation Method
Wireless Router0	LAN / Wireless	192.168.0.1	255.255.255.0	-	Static
Laptop0	Wireless0	192.168.0.102	255.255.255.0	192.168.0.1	DHCP
Laptop1	Wireless0	192.168.0.103	255.255.255.0	192.168.0.1	DHCP

Procedure

1. Router Setup: We accessed the GUI tab of the Wireless Router. Under "Wireless Settings," the SSID was set to "HCOE". Under "Wireless Security," WPA2-Personal was selected, and the passphrase 'hcoe@123' was entered.
2. Client Connection: On Laptop0, we opened the "PC Wireless" software application and navigated to the "Connect" tab. The system scanned for available wireless networks. The network "HCOE" was detected with 100% signal strength on Channel 1.



3. Authentication: We selected the "HCOE" network and clicked "Connect". The security prompt appeared, requiring the Pre-shared Key. We entered 'hcoe@123' to authenticate the connection.



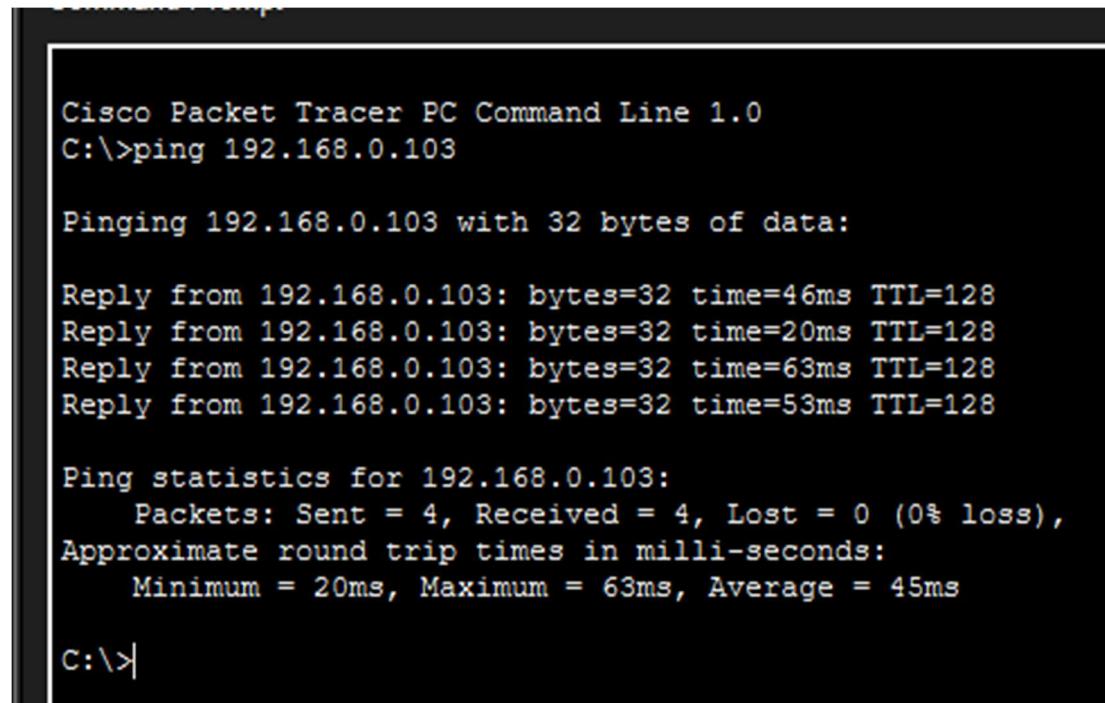
4. IP Assignment: Once connected, the laptops automatically requested and received IP addresses from the router via DHCP.

Testing

Connectivity Verification:

To verify the network connection and packet flow, a ping command was issued from Laptop0 to Laptop1. Laptop1 was assigned the IP address 192.168.0.103.

We opened the Command Prompt on Laptop0 and typed `ping 192.168.0.103`.



```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.0.103

Pinging 192.168.0.103 with 32 bytes of data:

Reply from 192.168.0.103: bytes=32 time=46ms TTL=128
Reply from 192.168.0.103: bytes=32 time=20ms TTL=128
Reply from 192.168.0.103: bytes=32 time=63ms TTL=128
Reply from 192.168.0.103: bytes=32 time=53ms TTL=128

Ping statistics for 192.168.0.103:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 20ms, Maximum = 63ms, Average = 45ms

C:\>
```

Discussion and Conclusion

During the lab session, we successfully set up a wireless network using a WRT300N router. We configured the SSID as "HCOE" and secured the network using WPA2-Personal encryption with a pre-shared key. We observed that the client laptops were able to detect the broadcasted SSID and authenticate using the correct credentials. Upon connection, the devices obtained dynamic IP addresses. The connectivity was verified using the ping command, which showed 0% packet loss. Hence, the lab was completed with a proper knowledge and implementation of Wireless Network Setup and Packet Analysis using Cisco Packet Tracer.