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

OBJECTIVES :

- To configure a wireless router and establish a wireless network using Cisco Packet Tracer
- To connect wireless devices to the network and assign IP addresses using DHCP
- To verify secure wireless communication using WPA2 security settings

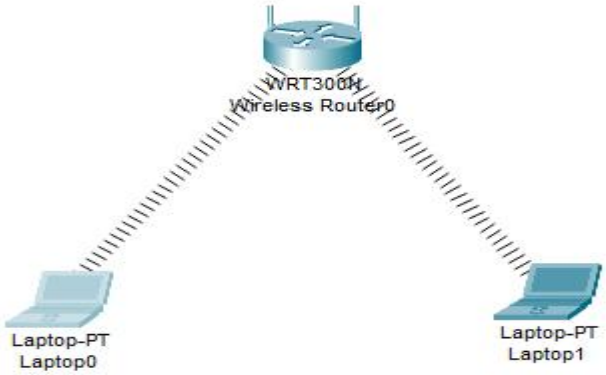
THEORY :

A wireless network enables devices to communicate without physical cables by using radio waves. In this lab, a wireless router is configured to create a Wireless Local Area Network (WLAN) that provides connectivity, automatic IP address assignment using DHCP, and secure access to wireless clients.

The wireless network is identified using a Service Set Identifier (SSID). To ensure security, WPA2-Personal with AES encryption is configured, protecting the network from unauthorized access. Wireless devices connect by selecting the correct SSID and entering the appropriate passphrase.

Packet analysis is used to observe the flow of data between wireless devices and the router. Using the Simulation Mode and packet inspection tools in Cisco Packet Tracer, packets such as DHCP, ARP, and data packets can be analyzed. This helps in understanding IP address allocation, connection establishment, and data transmission in a wireless environment. Packet analysis also plays a vital role in troubleshooting and validating network functionality.

Network Topology :



Procedure :

Wireless Router Configuration :

Step 1 : Basic Setup

1. Click on the Wireless Router.
2. Go to GUI → Setup.
3. Configure the following:
    - IP Address: 192.168.0.1
    - Subnet Mask: 255.255.255.0
    - DHCP Server: Enabled

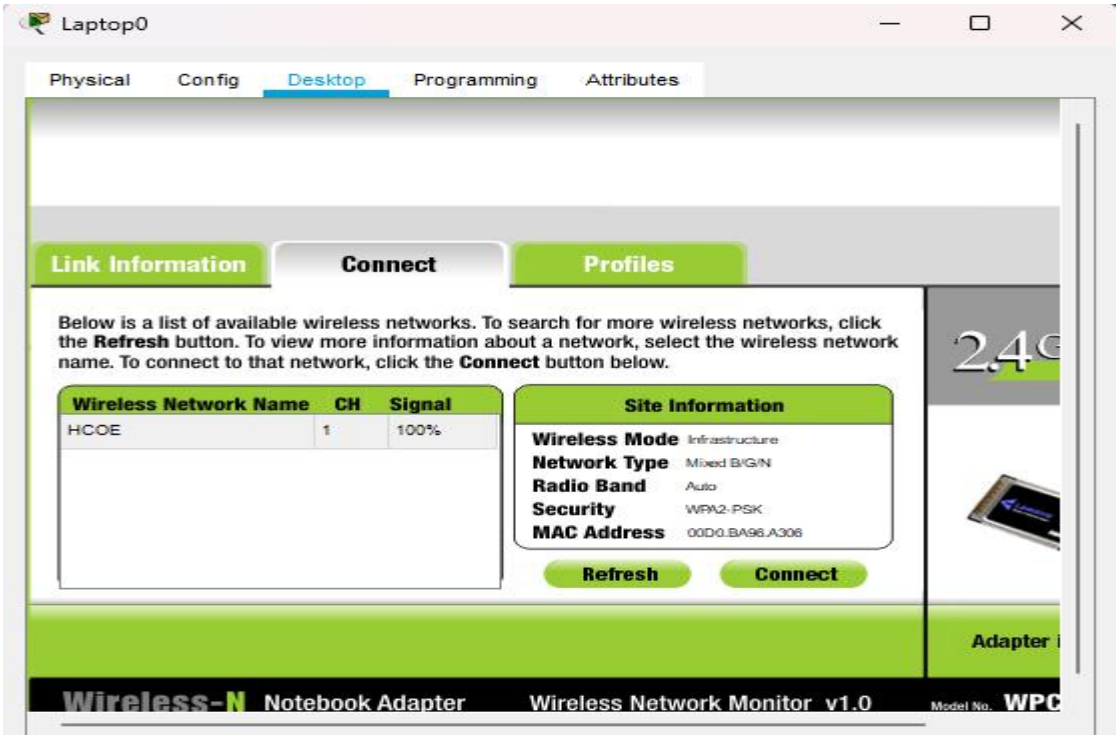
Step 2 : Wireless Configuration

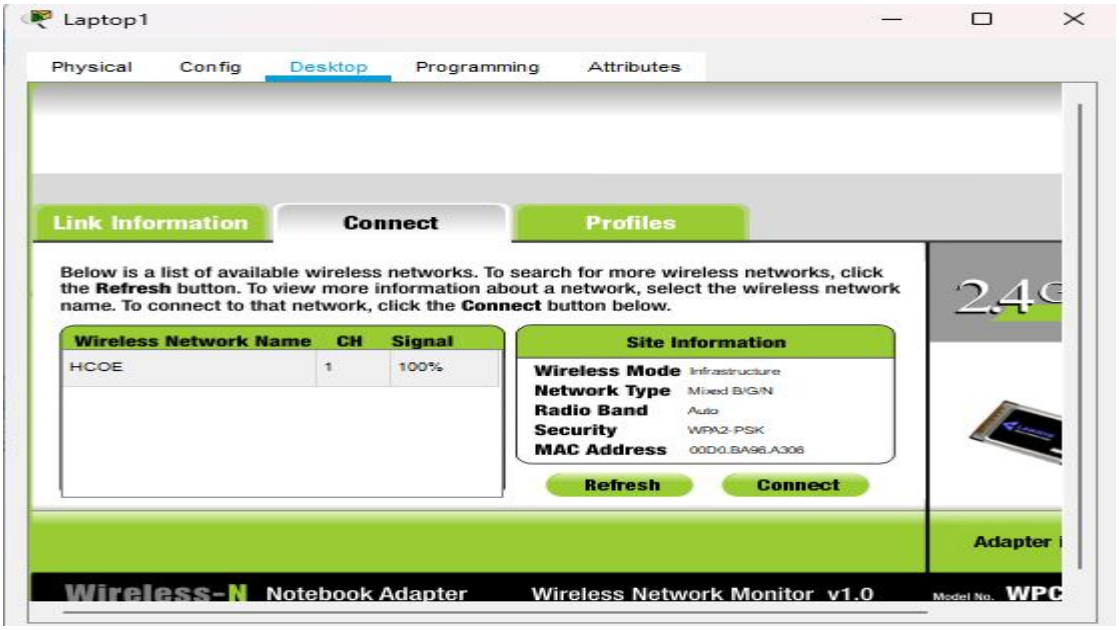
1. Go to Wireless → Basic Wireless Settings.
2. Configure the following parameters:
3. Network Mode: Mixed
    - SSID: HCOE
    - Channel: Auto
4. Click Save Settings.

Step 3 : Wireless Security

1. Go to Wireless → Wireless Security.
2. Configure the following:
    - Security Mode: WPA2-Personal
    - Encryption: AES
    - Passphrase: hcoe@123
3. Save the configuration.

Observation :





RESULT :

A secure wireless network was successfully established using a WRT300N router. The SSID **HCOE** was configured with WPA2-Personal security, and the DHCP service at gateway address 192.168.0.1 assigned IP addresses automatically. Laptop0 and Laptop1 detected the network with full signal strength, authenticated using the configured passphrase, and communicated successfully through the router.

DISCUSSION :

This lab demonstrated the integration of DHCP and WPA2 security in a wireless network environment. DHCP simplified IP address allocation by eliminating manual configuration, while WPA2-Personal with AES encryption ensured secure access by restricting unauthorized connections. Packet analysis helped visualize the connection process and verify successful data transmission, improving understanding of wireless network operations and troubleshooting techniques.

CONCLUSION :

The lab successfully demonstrated the configuration of a secure and functional wireless network using SSID, WPA2 security, and DHCP services. Wireless clients were able to connect securely, obtain IP addresses automatically, and exchange data reliably, fulfilling all lab objectives.