Experiment 9: Simulate a Wireless Network using Cisco Packet Tracer

Aim
To simulate a wireless network using Cisco Packet Tracer and analyze the communication between wireless devices.

Objective
1. To understand the working of wireless LANs.
2. To configure wireless routers, access points, and wireless clients.
3. To demonstrate connectivity between wireless devices using simulation tools.

Background Theory
Wireless networks use radio waves instead of cables to transmit data. Cisco Packet Tracer provides devices such as:
- Wireless Routers (WRT300N): act as both router and access point.
- Access Points (APs): allow wireless devices to connect to a wired LAN.
- Wireless End Devices (Laptops, PCs, Smartphones): connect through Wi-Fi adapters.

Key concepts:
- SSID (Service Set Identifier): Network name that identifies a wireless LAN.
- Security Settings (WEP, WPA, WPA2): Used to protect wireless connections.
- IP Addressing: Required for device communication.

Software Required
Cisco Packet Tracer (latest version).

Algorithm
1. Open Cisco Packet Tracer.
2. Place a wireless router and end devices (laptops, smartphones, PCs).
3. Connect devices using Wi-Fi NICs.
4. Configure the router:
   - Set SSID (wireless network name).
   - Configure IP address (DHCP or static).
   - Configure security (e.g., WPA2 key).

5. Configure wireless settings on client devices:
   - Connect to the SSID.
   - Enter the security key.
6. Test connectivity using ping between devices.
7. Verify simulation results.

Step-by-Step Procedure

1. Open Cisco Packet Tracer.
2. From the device menu, select Wireless Router (e.g., WRT300N) and place it on the workspace.
3. Add 2 Laptops and 1 Smartphone with Wi-Fi capability.
4. Click the Wireless Router → go to GUI tab → configure:
   - SSID: MyNetwork
   - Security: WPA2-PSK, Key: 12345
   - Enable DHCP (for automatic IP assignment).
5. On each laptop:
   - Click the device → Desktop tab → PC Wireless → Connect to SSID MyNetwork.
   - Enter password 12345.
   - Verify that IP is assigned automatically (check IP Configuration).
6. On the smartphone:
   - Click → Config → Wireless0 → SSID MyNetwork.
   - Enter security key 12345.
   - Verify IP allocation.
7. Test connectivity:
   - Open Command Prompt in Laptop0 → type ping <IP of Laptop1>.
   - Successful replies confirm wireless connectivity.

Expected Output

Wireless devices successfully connect to the router using SSID MyNetwork.
All devices obtain IP addresses via DHCP.
Devices can successfully ping each other, showing connectivity.

Result

A wireless network was successfully simulated using Cisco Packet Tracer. Laptops and smartphones connected to the wireless router via Wi-Fi and were able to communicate with each other.

Pre-Viva Questions

1. What is SSID in a wireless network?
2. Differentiate between WEP, WPA, and WPA2.
3. What is the role of DHCP in a wireless LAN?
4. Which device acts as an access point in Packet Tracer?

Post-Viva Questions

1. How can you secure a wireless network against unauthorized access?
2. What is the difference between infrastructure and ad-hoc wireless networks?
3. Can a wireless device communicate with a wired PC? Explain.
4. How would you expand this wireless LAN into a larger enterprise network?