Q3. what is BSS and ESS?

BSS and ESS are used in Wi-Fi network to describe different types of network architectures.

1. Basic Service Set (BSS)

- It is the fundamental building block of a Wi-Fi network.

- A BSS consists of one Access Point and the clients connected to it.

- Each BSS is identified by a BSSID (Basic Service Set Identifier), which is usually the MAC address of the AP.

Types of BSS:

- Infrastructure BSS: Uses an Access Point to connect devices.

- Independent BSS (IBSS): Ad-hoc mode, where devices connect directly without an Access Point.

2. Extended Service Set (ESS)

- It is a network consisting of multiple interconnected BSSs (multiple APs).

- Access Points are connected using a wired distribution system, usually a switch or router.

- The ESS allows seamless roaming between APs while keeping the same SSID (Service Set Identifier).

Differences

In BSS we have 1 Access point + clients , In ESS Multiple AP + clients.

BSS Connectivity is Local, ESS connectivity is extended

Roaming is not possible in BSS , ESS provide seamless possible.

Q4. what are the basic functionalities of Wi-Fi Access point

Wireless Connectivity:

Provides a Wi-Fi network for devices to connect wirelessly. Supports multiple Wi-Fi standards.

SSID Broadcasting:

- Advertises the Wi-Fi network name (SSID) to allow users to discover and connect.

- Can have multiple SSIDs also has option to hide SSID for security.

Authentication & Security:

- Implements security protocols to prevent unauthorized access, such as:

1. WPA2/WPA3 (Most secure)

2. MAC Filtering (Allows only specific devices)

3. Captive Portal (Common in public Wi-Fi for authentication)

Bridging Wireless and Wired Networks:

- Connects wireless clients to a wired network via Ethernet.

- It Can function as:

    1. Standalone AP

    2. Mesh AP

Traffic Management & QoS:

- Manages bandwidth and prioritizes traffic using Quality of Service .

- Ensures smooth streaming, gaming, VoIP, and video conferencing.

Multiple Modes of Operation:

- Access Point Mode – Provides Wi-Fi access to clients.

- Repeater Mode – Extends Wi-Fi coverage by relaying signals.

- Bridge Mode – Connects two wired networks wirelessly.

- Mesh Mode – Part of a Wi-Fi Mesh System for better coverage.

Frequency & Channel Management:

- Operates on 2.4 GHz and 5 GHz bands (Dual-band) or 6 GHz (Wi-Fi 6E).

- Auto-selects the best channel to reduce interference.

Client Isolation & VLAN Support:

- Prevents devices from communicating directly, useful in public Wi-Fi.

- Segments networks (one VLAN for employees, another for guests).