

WiFi Training Program 2025

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Question-3:

Where this CAPWAP fits in OSI model , what are the two tunnels in CAPWAP and its purpose.

CAPWAP works mostly at the Application Layer (Layer 7) of the OSI Model but depends on lower layers for communication. This is how it fits:

1. **Application Layer (Layer 7):** CAPWAP protocol itself, managing, configuring, and controlling APs.
2. **Transport Layer (Layer 4):** Implements UDP for both control and data channels.
 - **Control Channel:** UDP port 5246 (Usually encrypted using DTLS for security)
 - **Data Channel:** UDP port 5247 (Can be encrypted or plain)
3. **Network Layer (Layer 3):** IP addressing for routing messages between Controllers and APs.
4. **Data Link & Physical Layers (Layers 2 & 1):** Infrastructure beneath, wired or wireless, used for communication.

Two Tunnels in CAPWAP:

1. **Control Tunnel (Control Plane)**
 - **Purpose:** To transport management and control messages between the AP and the Controller.
 - **Transport:** UDP port 5246
 - **Security:** DTLS (Datagram Transport Layer Security) is applied to encrypt and authenticate control messages, providing data integrity and confidentiality.
 - **Examples of Control Messages:**
 - Discovery and Join Requests/Responses
 - Configuration exchange (SSID, security policies, etc.)
 - Firmware updates
 - Monitoring and statistics reporting
2. **Data Tunnel (Data Plane)**
 - **Purpose:** To forward user data traffic (e.g., internet browsing, video streaming) between the AP and Controller when operating in Tunnel Mode.
 - **Transport:** UDP port 5247
 - **Security:** May be encrypted or unencrypted based on network configuration.
 - **Modes of Operation:**
 - **Local Mode (SplitMAC):** AP processes data traffic locally and only sends control messages to the controller.
 - **Tunnel Mode (Centralized Data Forwarding):** User data traffic is encapsulated and tunneled to the controller for processing, useful for guest networks or environments requiring centralized security policies.