

## WiFi Training Program 2025

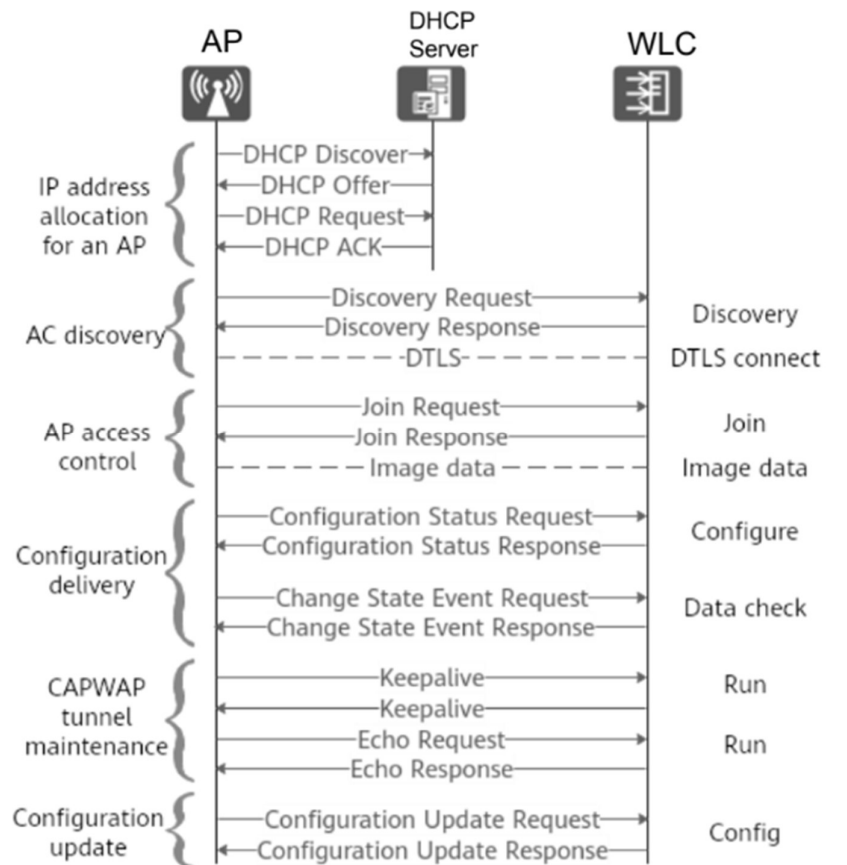
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### Question-2:

Describe about CAPWAP, explain the flow between AP and Controller

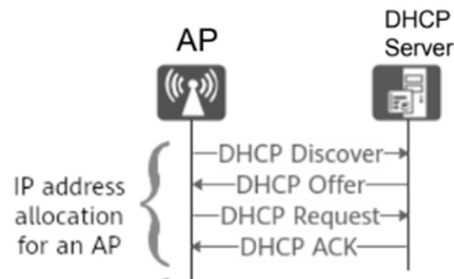


CAPWAP is a standard protocol defined by RFC 5415 and RFC 5416 designed for communication between Access Points (APs) and Wireless LAN Controllers (WLCs). It provides a secure and scalable way to manage and configure APs in large-scale wireless networks using the SplitMAC architecture.

- **Standardization:** Ensures interoperability between APs and controllers from different vendors.
- **Security:** Uses DTLS (Datagram Transport Layer Security) for secure control messages between AP and Controller.
- **Management:** Supports centralized management, monitoring, and firmware upgrades.
- **Encapsulation:** Both control and data packets can be encapsulated for communication between AP and Controller.

**Flow between the AP and controller :**

1. The Access Point gets the IP address from the DHCP server



2. Discovery Phase

The AP sends Discovery Request messages to identify potential controllers in the network.

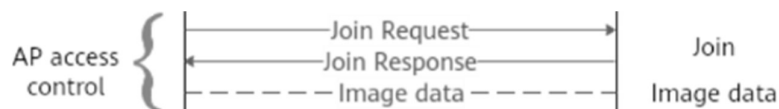
**Methods for discovering controllers:**

- **DHCP:** Option 43 provides controller IP addresses.
- **DNS:** AP queries a DNS server for controller FQDN.
- **Static Configuration:** APs may have pre-configured controller IPs.



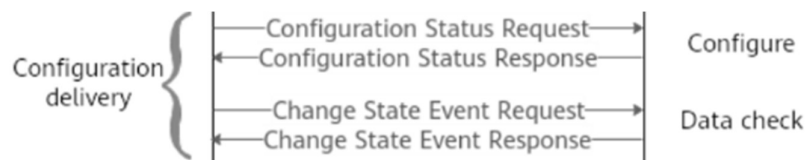
3. Join Phase

After discovering the controller, the AP sends a Join Request message. The controller responds with a Join Response. Mutual authentication is performed using DTLS for secure communication.



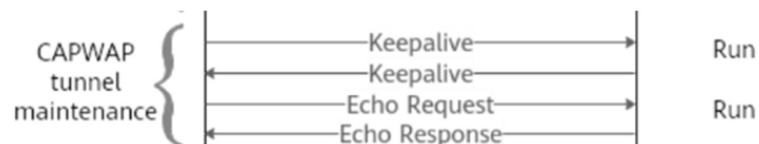
4. Configuration Phase

The controller pushes configuration settings to the AP (e.g., SSIDs, security policies, QoS parameters). AP applies the configurations and prepares to handle client data traffic.



5. Data Plane Communication

In SplitMAC architecture, the AP can locally handle data traffic (Local Mode), or forward it to the controller (Tunnel Mode) using CAPWAP encapsulation



## 6. Management Phase

Continuous exchange of control messages for monitoring, firmware upgrades, and status reporting. Heartbeat messages ensure the controller is aware of the AP's status.

