Achievable

CCNA DUMP SHEET

Wireless LANs

802.11 standards, bands, and RF

	802.11-1997	802.11b	802.11a	802.11g	802.11n	802.11ac	802.11ax
Band (GHz)	2.4	2.4	5	2.4	2.4, 5	5	2.4, 5, 6
Top speed	2 Mbps	11 Mbps	54 Mbps	54 Mbps	600 Mbps	6.93 Gbps	9.6 Gbps

- **2.4 GHz:** nonoverlapping 1, 6, 11. Far reach, more interference
- **5 GHz:** many: 36, 40, 44, 48. Shorter range. **6 GHz:** even more
- **RF:** frequency in Hz. **Attenuation:** weakening through surfaces
- **Half duplex (CSMA/CA):** one sender per channel, checks first

SSIDs and service sets

- **SSID:** network name, 32 characters max. Clear text in beacons
- **Hidden SSID:** not in beacons, still in other frames: not security
- **BSS:** one AP and its clients. **BSSID:** MAC-style ID of that BSS
- **ESS:** one SSID on many APs: clients roam. **IBSS:** no AP
- **Multiple SSIDs:** each maps to a VLAN; all share the AP's airtime

Split-MAC and CAPWAP

- **AP keeps:** 802.11 encryption, ACKs, beacons, transmit, receive
- **WLC takes:** authentication, RF, roaming, security policy
- **CAPWAP:** Layer 3 tunnels, so IP reachability, no shared VLAN
- **Control:** UDP 5246, always DTLS encrypted
- **Data:** UDP 5247, DTLS off by default, on for OfficeExtend

AP modes

Mode	Clients	Job
Local	Yes	Default. Scans channels when idle
FlexConnect	Yes	CAPWAP or local; survives WLC loss
Bridge, Flex+Bridge	Yes	AP-to-AP wireless link (mesh)
Monitor	No	Sensor, no transmit: rogues, IDS
Rogue Detector	No	Radios off: wired vs wireless MACs
Sniffer	No	Captures traffic for an analyzer
SE-Connect	No	CleanAir spectrum analysis

Architectures and switch connections

- **Autonomous AP:** managed one by one; wireless router in a SOHO. Trunk port: a VLAN per SSID, plus management
- **Lightweight AP:** run by the WLC. Access port: SSID VLANs ride in CAPWAP
- **Meraki (cloud):** Dashboard over the Internet, zero-touch. User data stays local
- **WLC:** trunk for management and client VLANs. LAG (EtherChannel) adds bandwidth, redundancy
- **AireOS LAG:** no LACP or PAgP: `channel-group 1 mode on`

WPA, WPA2, and WPA3

	WPA	WPA2	WPA3
Encryption	TKIP	AES, CCMP	AES (GCMP256 in 192-bit)
Personal	PSK	PSK	SAE
Enterprise	802.1X	802.1X	802.1X, optional 192-bit

- **WPA:** replaced WEP, deprecated. **Transition:** WPA2+WPA3
- **PSK:** 8-63 ASCII characters or 64 hex digits
- **SAE:** resists offline dictionary attacks; forward secrecy
- **WPA3:** PMF mandatory; required on 6 GHz

WLC ports and interfaces

Port or interface	Use
Console port	Initial setup, troubleshooting
Service port	Out-of-band management: SSH, GUI
Redundancy port	HA (SSO) with the standby WLC
Data port	CAPWAP, in-band. AireOS: distribution system
Management	WMI: in-band management; ends CAPWAP
Dynamic	VLAN to WLAN. IP on AireOS, not IOS-XE
Virtual	DHCP relay, mobility. Non-routable IP

WPA2 PSK WLAN in the GUI: IOS-XE, Configuration > Tags & Profiles

- **1. WLANs, +Add.** General: Profile Name, SSID, WLAN ID, Status, Broadcast SSID. Security, Layer 2: WPA+WPA2, WPA2 Policy, AES(CCMP128), PSK checked, 802.1x unchecked, pre-shared key
- **2. Policy, +Add.** Name, Status. Access Policies: VLAN. QoS and AVC: Platinum voice, Gold video, Silver best effort, Bronze background
- **3. Tags, Policy, +Add.** Map WLAN to policy profile. **4. Tags, AP, Static, +Add.** Policy Tag Name, Site Tag, RF Tag. Each: Apply to Device
- **Advanced:** Max Client Connections (0 unlimited), Load Balance, Band Select; policy profile: Session Timeout, Client Exclusion
- **AireOS:** Controller > Interfaces > New, then WLANs > Create New > Go; tabs General, Security (WPA2 Policy, AES, PSK), QoS
- **Verify:** green up arrow in the WLAN list, SSID and security correct, a client connects. **Limit:** 16 WLANs per AP; aim for five or fewer