Wi-Fi 7 is Here. Are you ready?

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BRKEWN-2025

Webex App

Questions?

Use the Webex app to chat with the speaker after the session

How

1. Find this session in the Cisco Events mobile app
2. Click “Join the Discussion”
3. Install the Webex app or go directly to the Webex space
4. Enter messages/questions in the Webex space

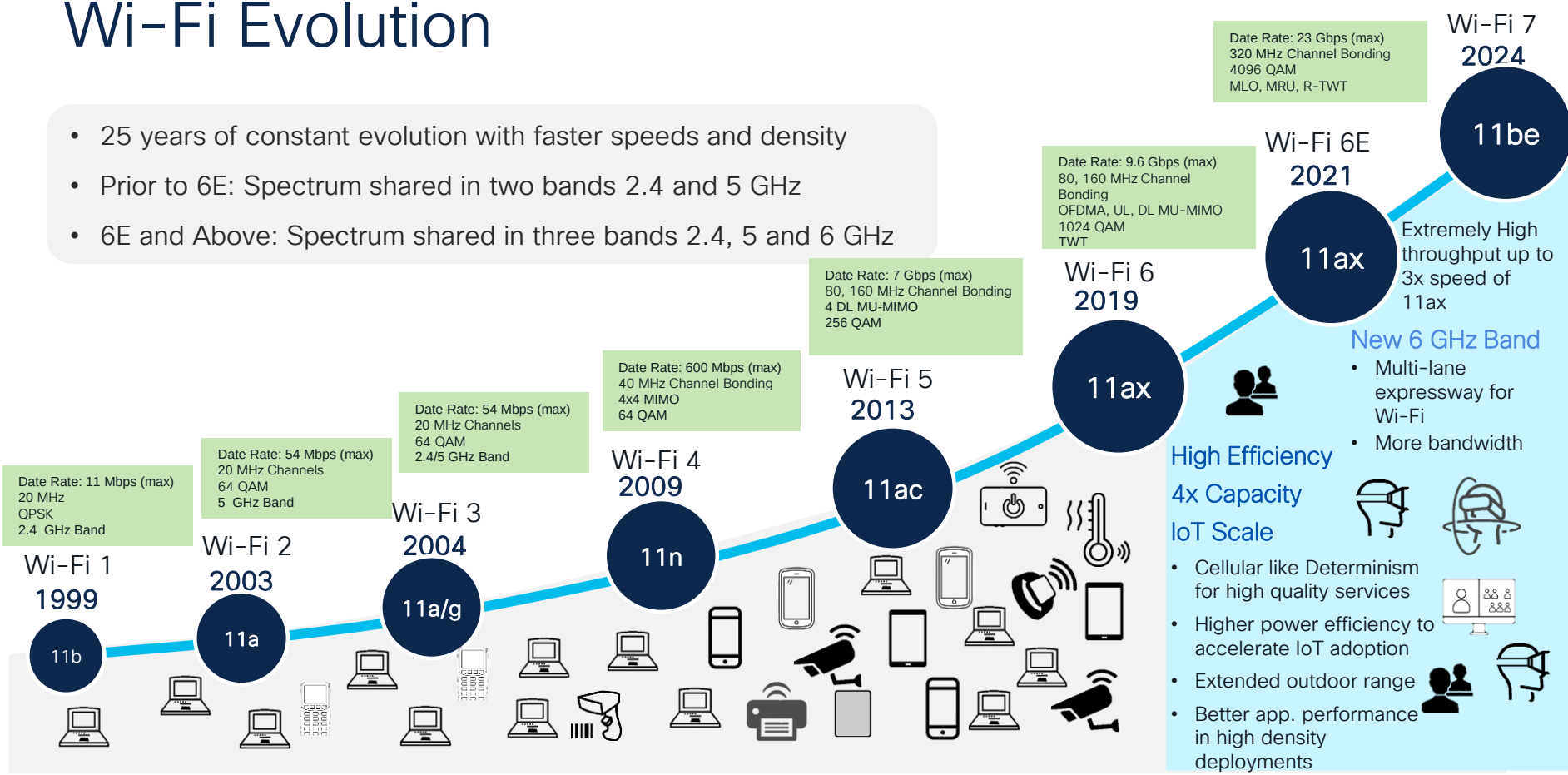
Webex spaces will be moderated by the speaker until February 28, 2025.

Agenda

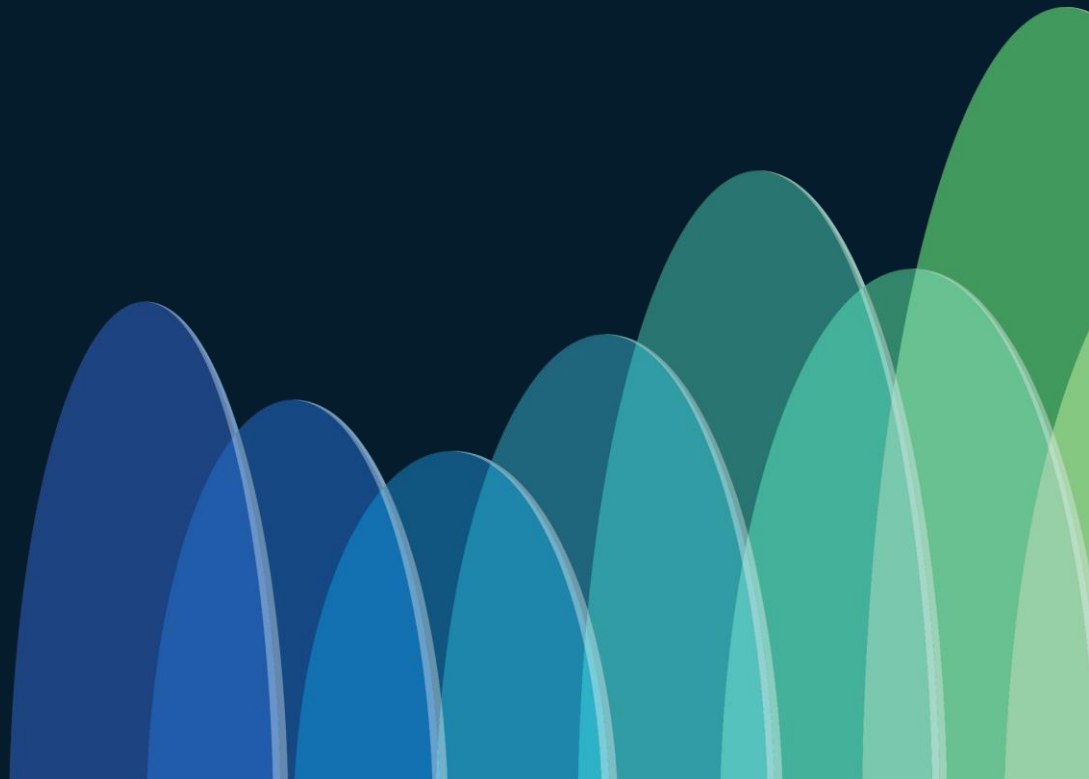
- Why Wi-Fi 7?
- Get to know Wi-Fi 7
- Cisco Wi-Fi 7 Product Portfolio
- Deployment & Migration considerations

Wi-Fi Evolution

- 25 years of constant evolution with faster speeds and density
- Prior to 6E: Spectrum shared in two bands 2.4 and 5 GHz
- 6E and Above: Spectrum shared in three bands 2.4, 5 and 6 GHz

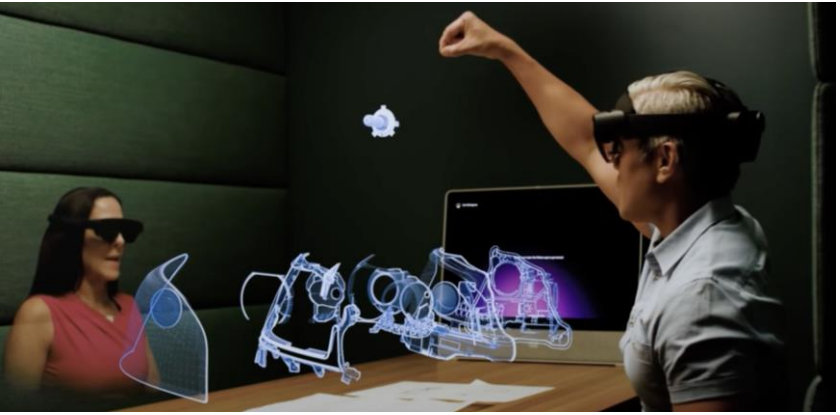


Why Wi-Fi 7 ?



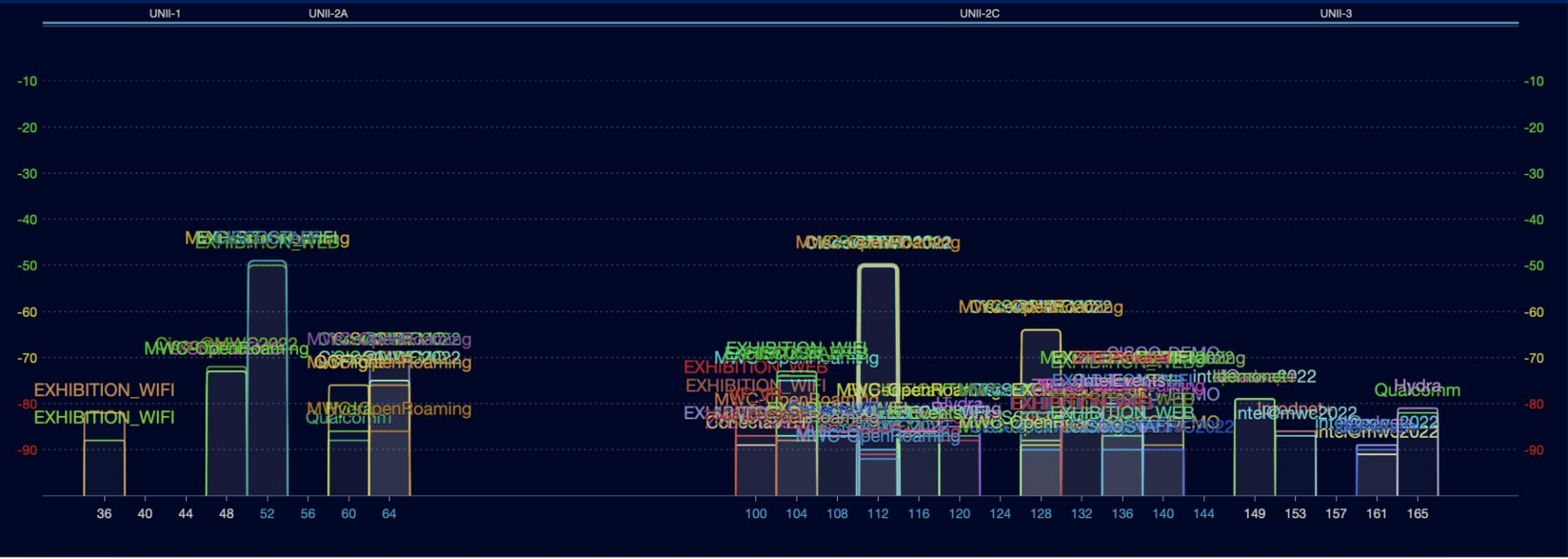
Wi-Fi

Meeting the Demands of a Hyperconnected World
Bandwidth, Latency & Beyond

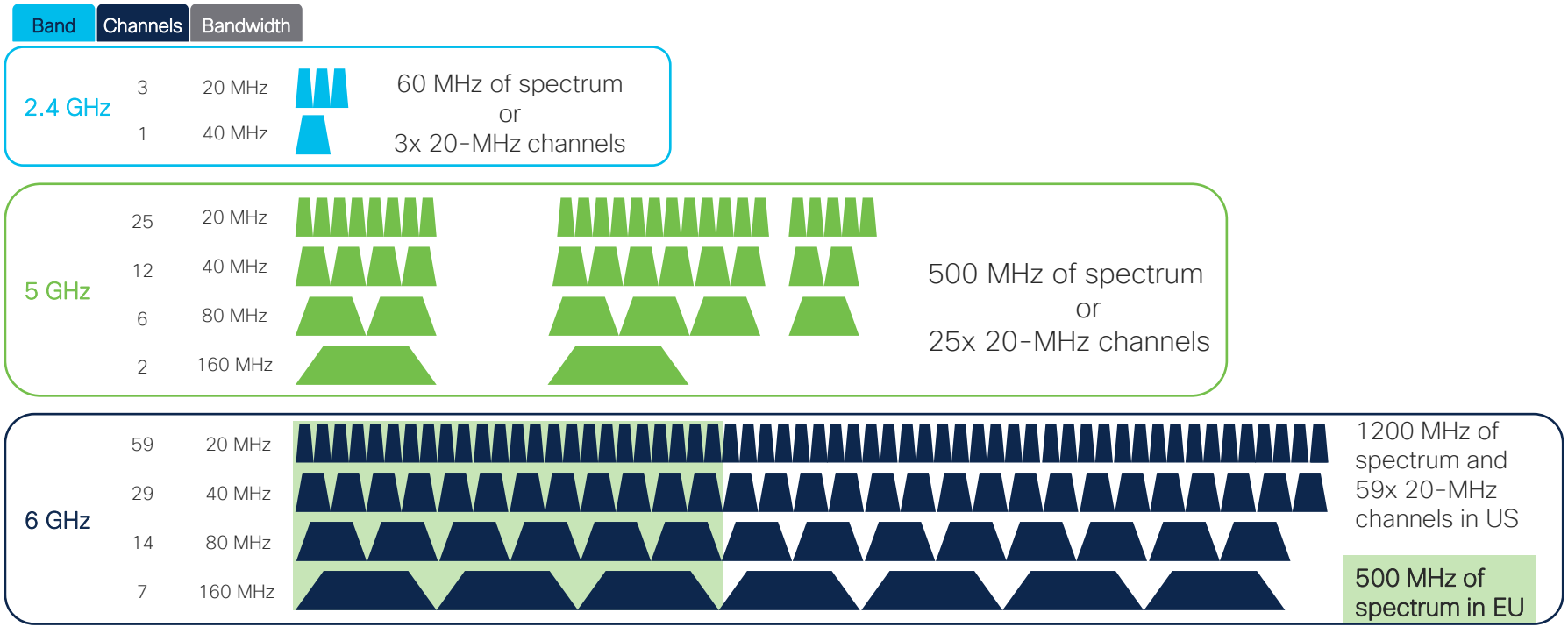


What is the problem?

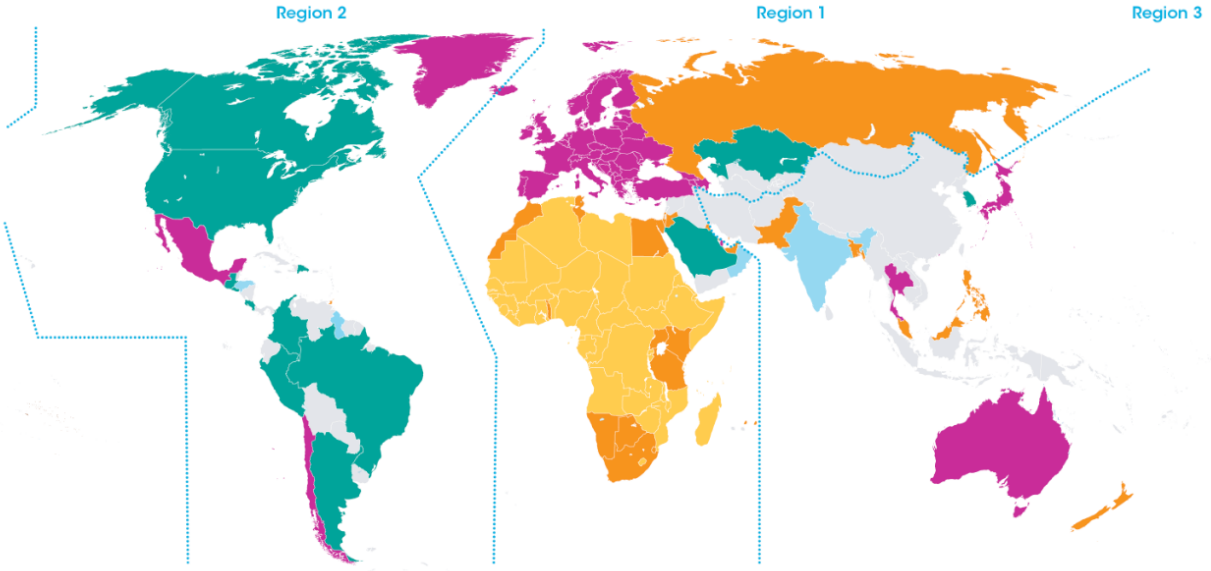
- Existing 2.4 GHz and 5 GHz spectrum is congested
- Interference
- Limited re-usable channels
- No way to use 80 or 160 MHz channels



6 GHz Wi-Fi spectrum expansion: Available with Wi-Fi 6E & Wi-Fi 7 today!



Global Progress towards Unlicensed access to 6 GHz Band



Region 2

1200 MHz	500 MHz (& evaluating 1200 MHz)	500 MHz
Argentina	Chile	Trinidad and Tobago
Brazil	Mexico	
Canada		
Colombia		
Costa Rica		
Dominican Republic		
El Salvador		
Guatemala		
Peru		
USA		

Region 1

1200 MHz	500 MHz		
Kazakhstan	Africa / ATU	Morocco	
Saudi Arabia	Bahrain	Namibia	
	Botswana	Oman	
500 MHz (& evaluating 1200 MHz)	Egypt	Russia	
CEPT Area	Eswatini	South Africa	
European Union (480 MHz)	Israel	Tanzania	
Qatar	Jordan	Togo	
United Kingdom	Kuwait	Tunisia	
	Kenya	Uganda	
	Mauritius (480 MHz)	UAE	

Region 3

1200 MHz	500 MHz
South Korea	Bangladesh
	Hong Kong
500 MHz (& evaluating 1200 MHz)	Macau
Australia	Malaysia
Japan	New Zealand
Taiwan	Pakistan
Thailand	Phillipines
	Singapore

- Adopted 5925-7125 MHz
- Adopted 5925/45-6425 MHz and evaluating 6425-7125 MHz
- Adopted 5925-6425 MHz
- Recommended 5925-6425 MHz
- Under consultation

Data correct as of December 2024

Source: https://6ghz.info

What is Wi-Fi 7?

Wi-Fi 7 & IEEE 802.11be

Wi-Fi 7 based on IEEE 802.11be amendment termed as “Extremely High Throughput”

IEEE 802.11be final publication expected Feb/Mar 2025.

Wi-Fi 7 R1 spec finalized in Jan ’24. WFA certification for R1 in progress. R2 expected Dec 2025.

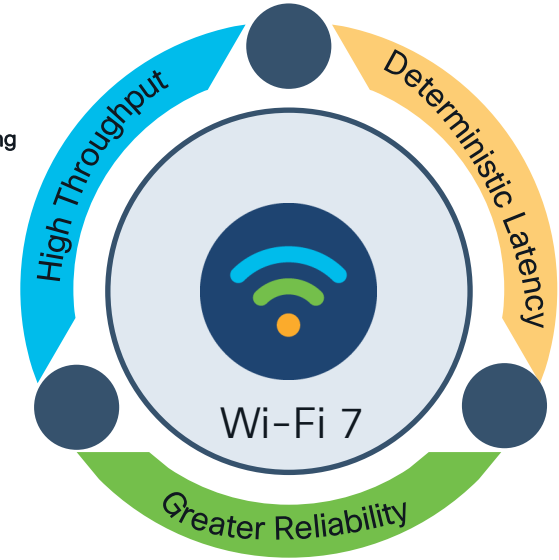
Cisco has been closely involved in development of Wi-Fi 7, and advocates for thorough client interop testing

Wi-Fi 7 Use Cases

High-Definition Video Streaming

Hybrid Work

Immersive Gaming & Entertainment



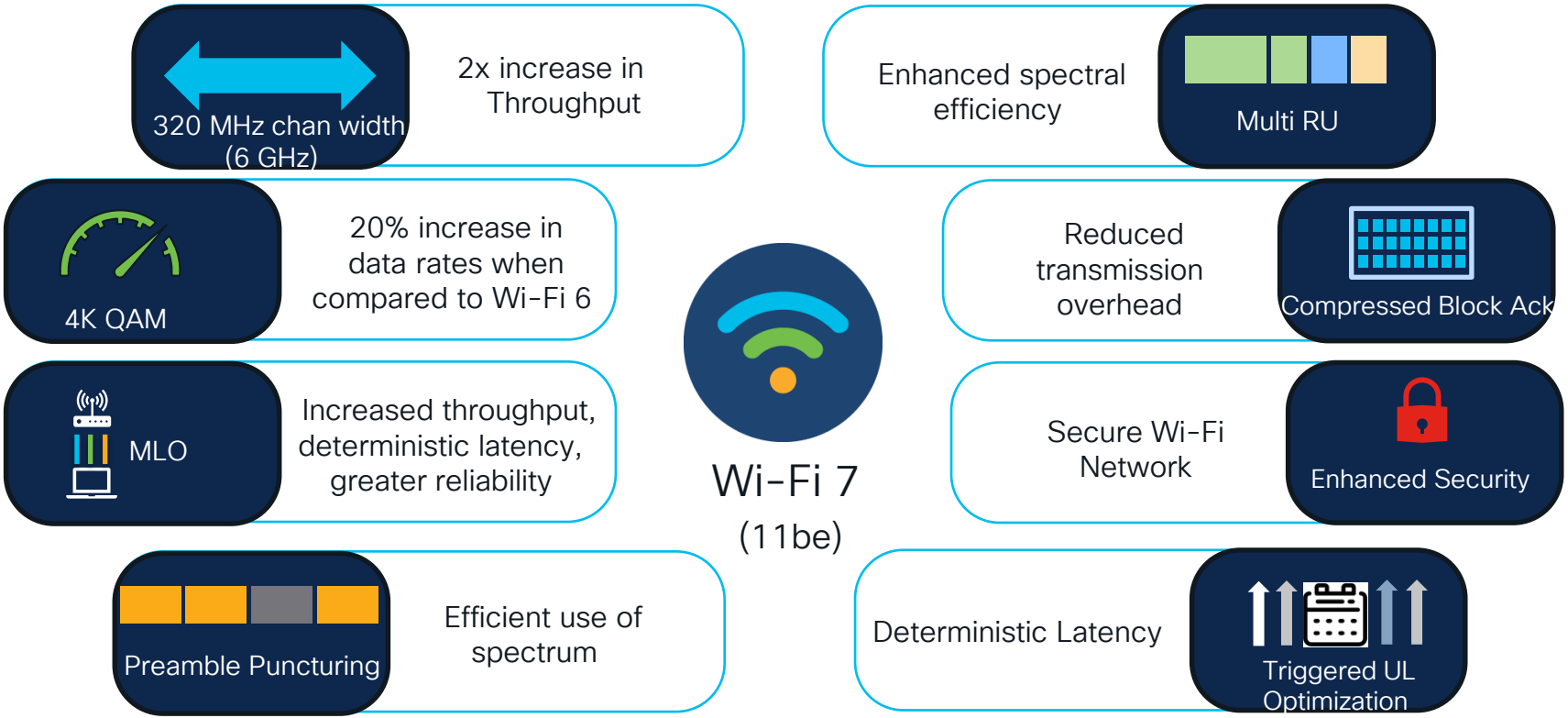
Industrial IoT

Immersive Learning

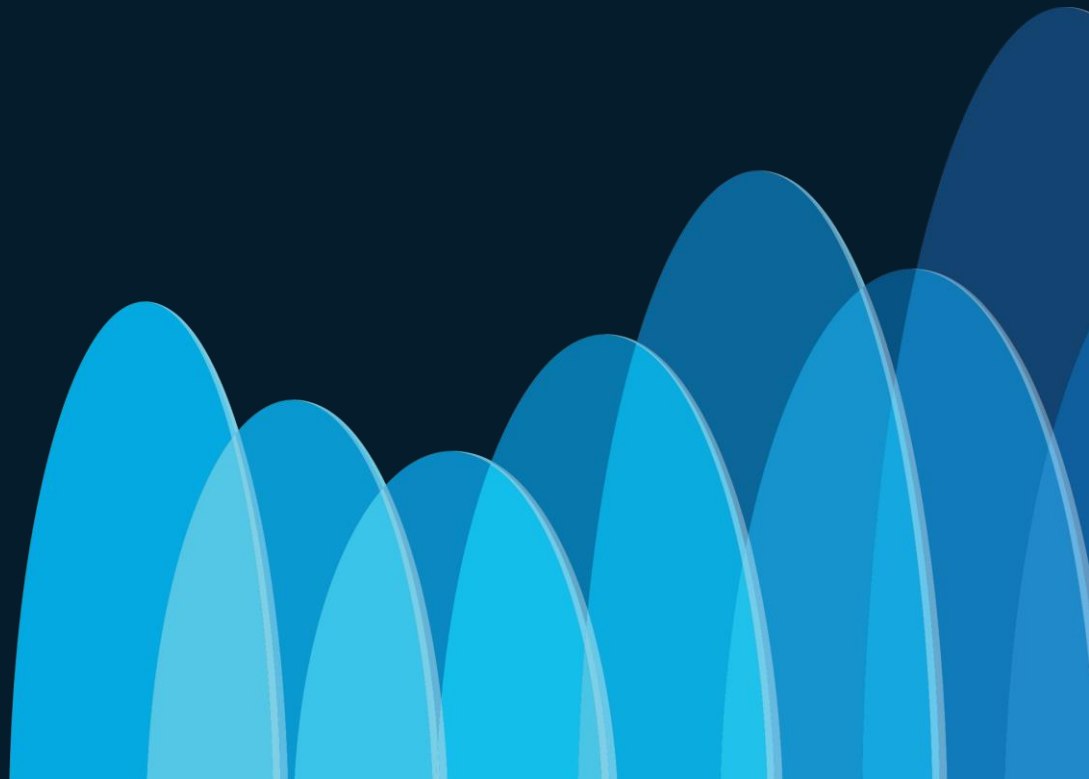
Multiuser AR/VR/XR

Automotive

Wi-Fi 7 Rel 1 Features

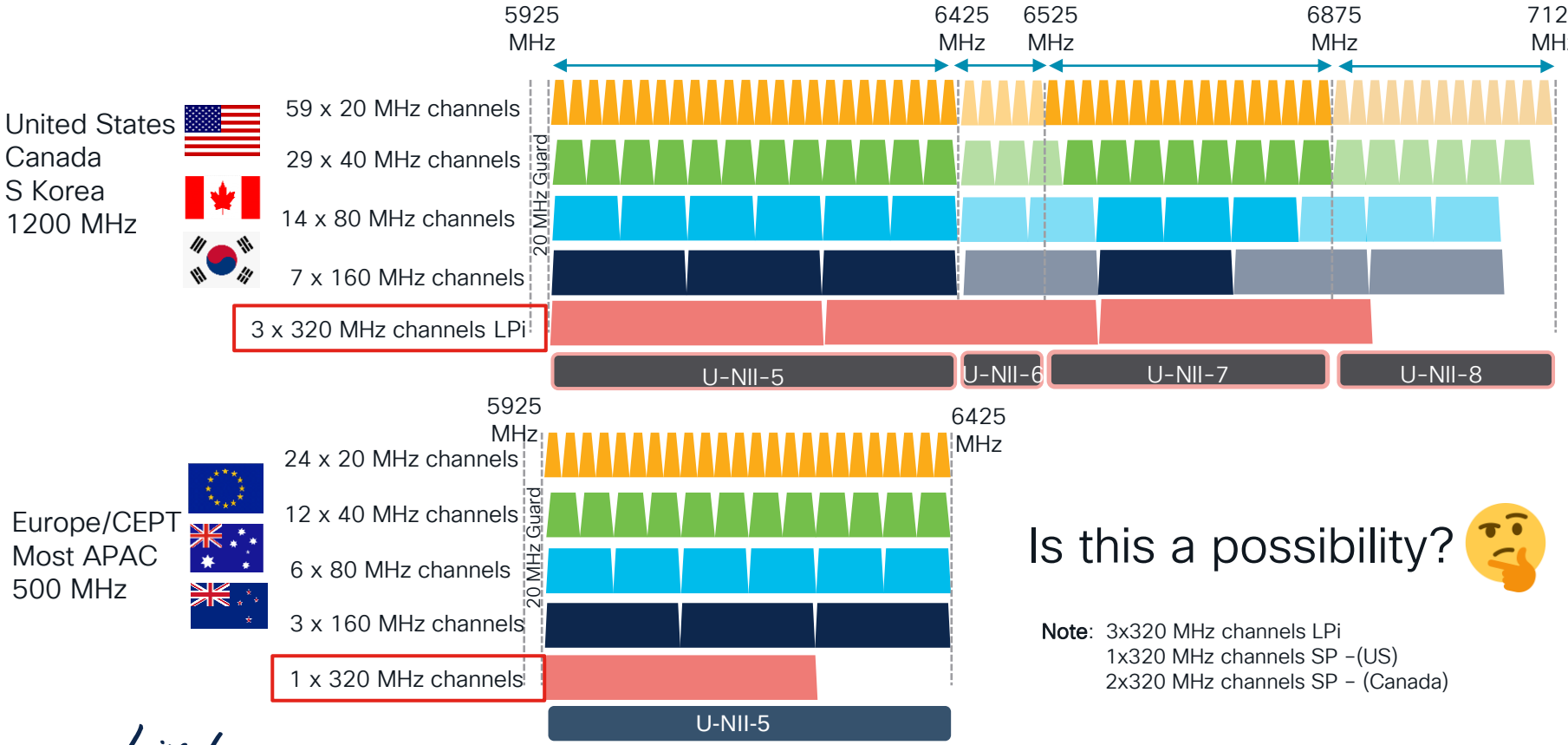


Wi-Fi 7 Feature Overview



cisco Live!

Wi-Fi 7 – 320 MHz channel width in 6 GHz



Is this a possibility? 🤔

Note: 3x320 MHz channels LPi
1x320 MHz channels SP –(US)
2x320 MHz channels SP – (Canada)

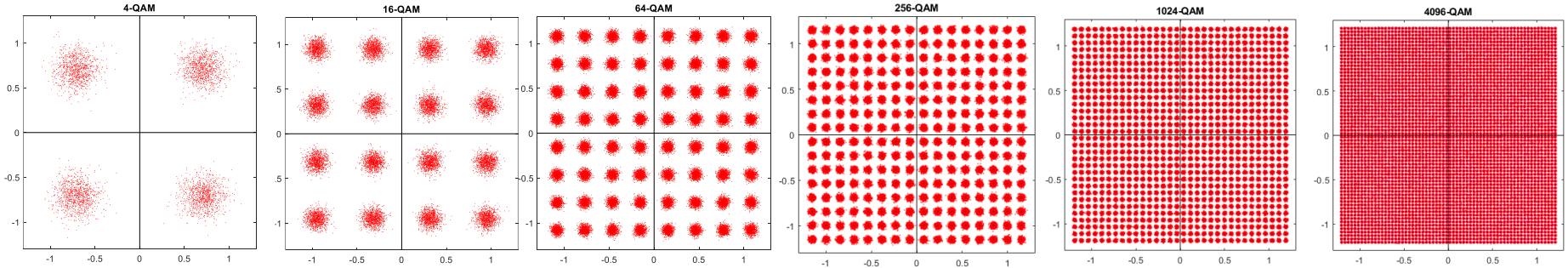
Wi-Fi 7 4K-QAM
(MCS12/13) increases the peak PHY data rate

- MCS 12 and MCS 13 indicate a 4096-QAM constellation with a code rate of ¾ and ⅝ respectively
- Very short range and most suited to a 1 antenna client with a multi-antenna AP (beamforming, MRC)

Need very high SNR for 4K QAM

Each increment in constellation size reduces range by approx. 50%

Incremental data rate	+100%	+50%	+33%	+25%	+20%
Relative Range	80	40	20	10	5

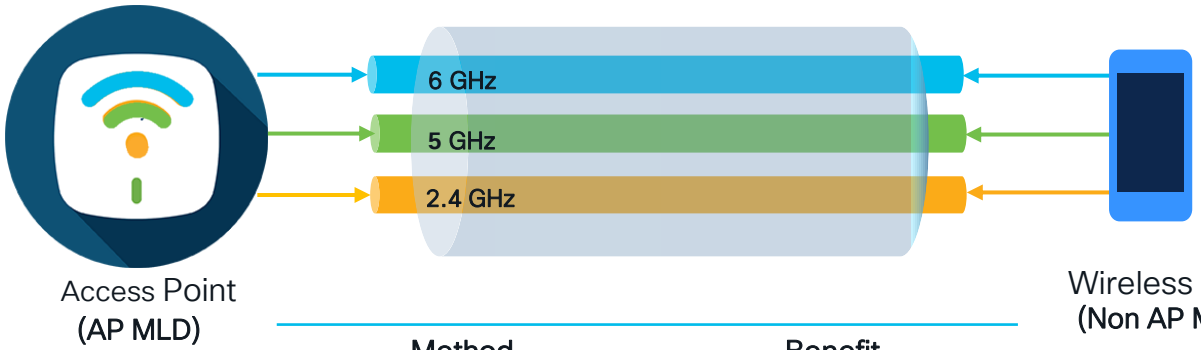


Wi-Fi4 Wi-Fi5 Wi-Fi6 Wi-Fi7

Wi-Fi Association (Before Wi-Fi 7)

Wi-Fi Multilink (MLO)

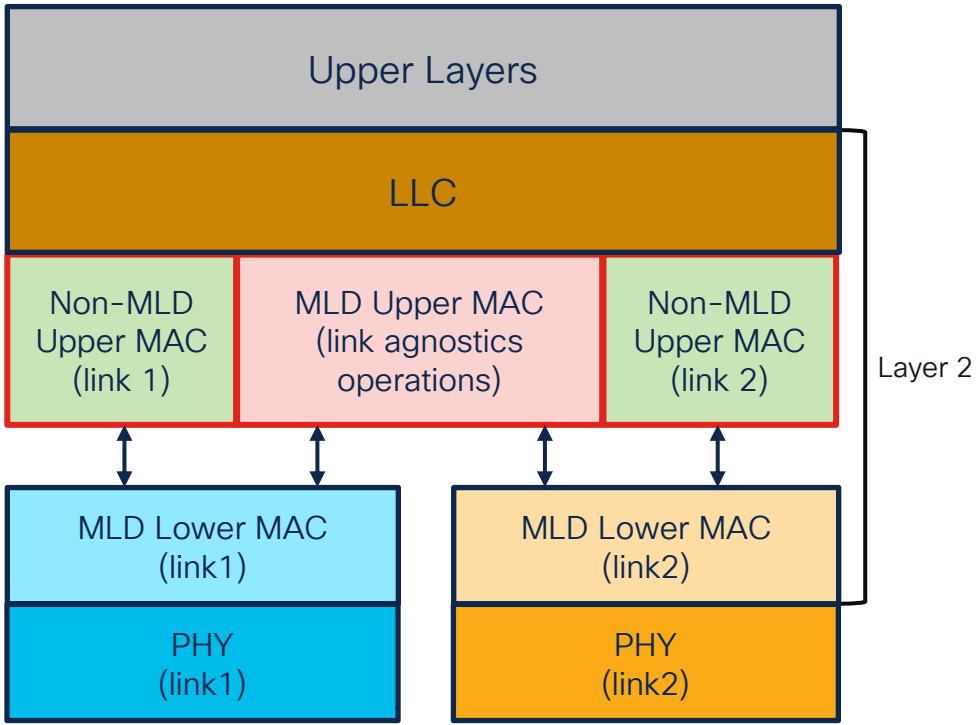
Wi-Fi 7 – Multilink (MLO)



Method	Benefit
Aggregation	Throughput
Steering	Lower Latency
Redundancy	Reliability

MLD: Multi Link Device

Wi-Fi 7 MLD MAC layers



MLD upper MAC layer functions :

- Auth, (Re)association
- Security association
- SN assignment for unicast & groupcast frames
- Encryption/Decryption of unicast frames
- Power save buffering of unicast frames
- MLD level management frames
- Unified Block Ack scoreboard
- Packet re-ordering, replay detection
- Selection of MLD lower MAC for Tx

Non-MLD upper MAC layer functions:

- Non-MLO peer operation (above MLD lower MAC)
- Link specific group keys
- Link specific encryption/decryption of groupcast
- Power save buffering of groupcast frames

MLD lower MAC layer functions:

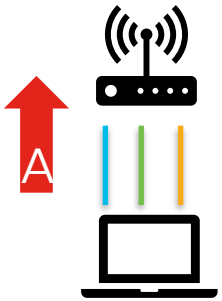
- Link specific mgmt. frames (beacons)
- Control Frames (RTS, CTS, Ack,...)
- Power save state and mode
- Per-link Block Ack scoreboard

The many “modes” of MLO

…because clients have different hardware capabilities

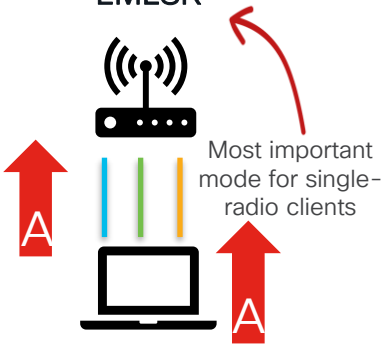
Single Radio

MLSR



Only one link operational at a given time

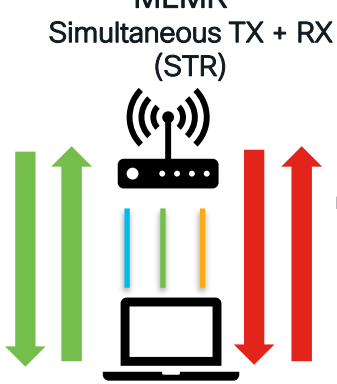
EMLSR



MLSR plus additional capability to listen to two links.

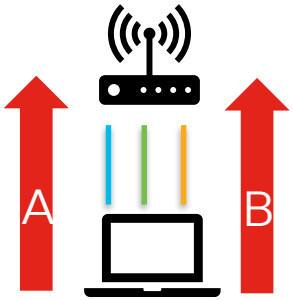
Multi Radio

MLMR Simultaneous TX + RX (STR)



Each link operating independently for Tx and Rx

MLMR Non-Simultaneous Tx+Rx (nSTR)

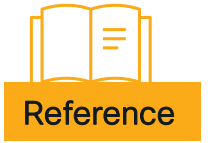


Tx or Rx at the same time on different links

(Not included in Wi-Fi 7 Certification)

Acronyms:
MLMR – Multi-link Multi Radio
MLSR – Multi-link Single Radio
EMLSR – Enhanced Multi-link Single Radio

Wi-Fi 7 MLO modes



MLO Modes	Number of Radios	Characteristics
Multi-Link Single Radio (MLSR)	1	Tx/Rx over one link at a time
Enhanced Multi-Link Single Radio (EMLSR)	1	MLSR with additional capability to listen on multiple links simultaneously in low capability mode
Simultaneous Tx and Rx (STR)*	>= 2	Simultaneous Tx/Tx, Rx/Rx or Tx/Rx on a pair of STR links independent of each other
Non-Simultaneous Tx and Rx (NSTR)*	>= 2	Simultaneous Tx/Tx or Rx/Rx over a pair of links with careful alignment of PPDUs end time
Enhanced Multi Link Multi Radio (EMLMR)*	>= 2	MLMR (STR) with additional capability to dynamically reconfigure spatial multiplexing support on each link

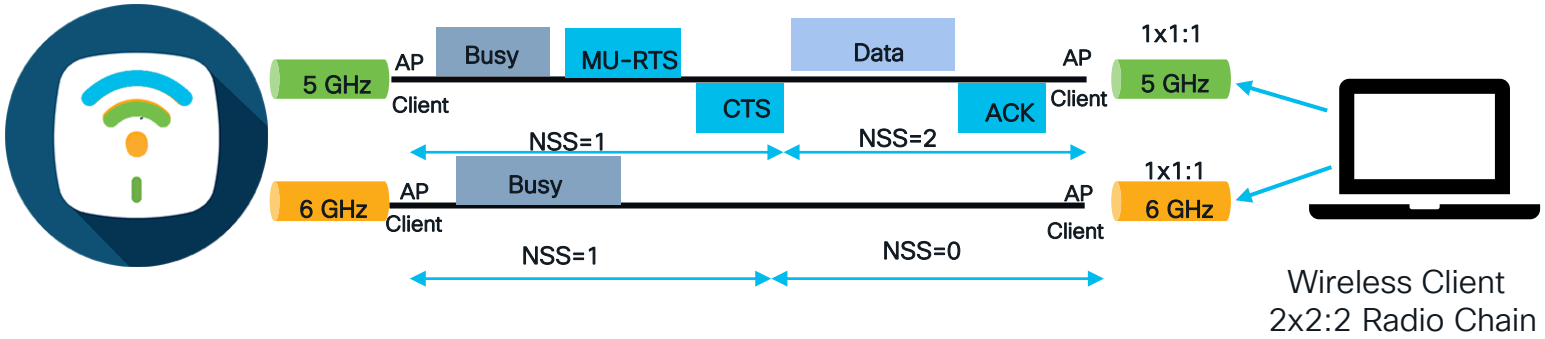
Requirement:

- MLSR is supported by all MLO devices.
- An AP MLD is required to support both EMLSR and STR .

* The last three modes are MLMR (Multi-Link Multi-Radio) operation modes. Only STR is part of Wi-Fi 7 R1. NSTR and EMLMR modes have significant implementation complexity and are not adopted in Wi-Fi 7.

Wi-Fi 7 – EMLSR operation

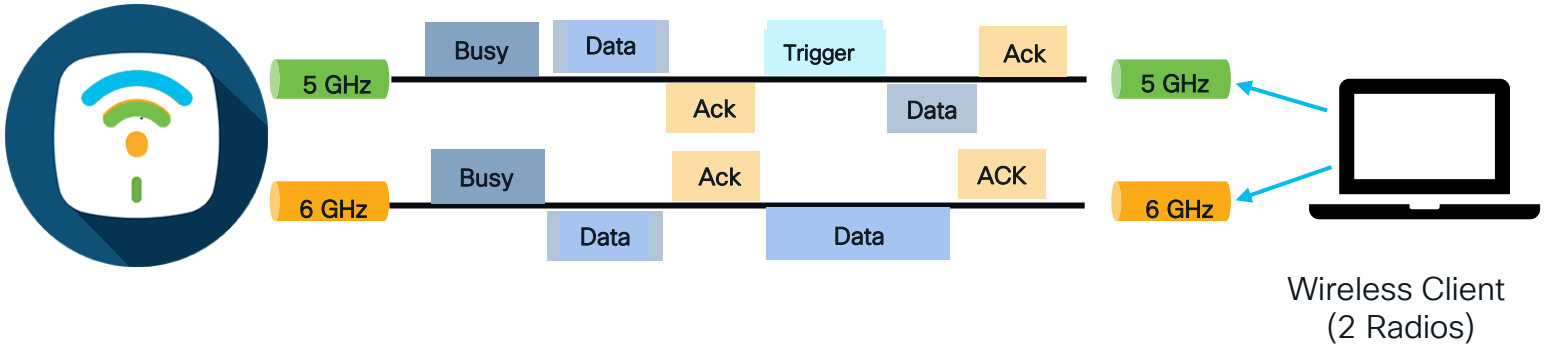
Downlink transmission from AP to EMLSR wireless client



- Single radio wireless clients with 2x2:2 radio listens to two channels
  Example: 1x1:1 on 5 GHz and 1x1:1 on 6 GHz
- Switches to 2x2:2 during active data transmission on the channel with TXOP
- After TxOP, goes back to listening mode with 1x1:1 on each channel.

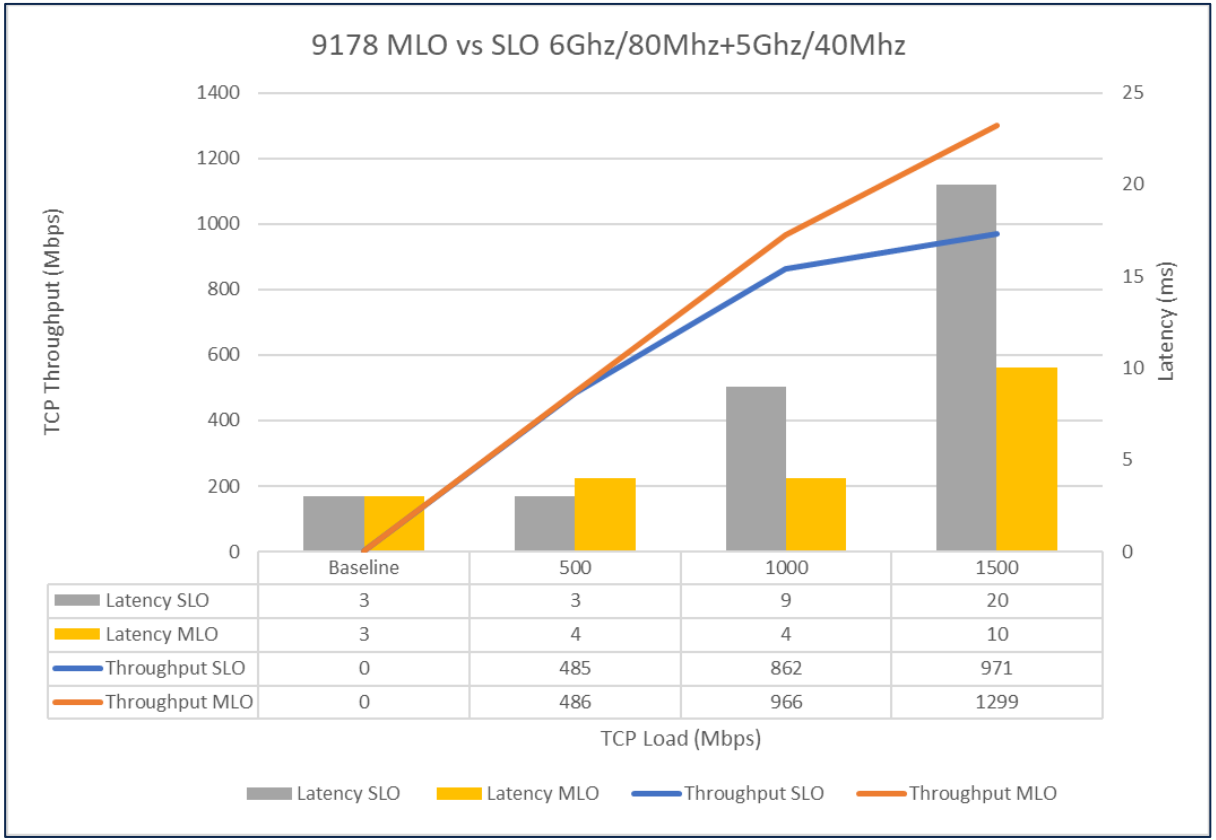
Wi-Fi 7 – MLMR – STR operation

Downlink transmission from AP to MLMR-STR wireless client



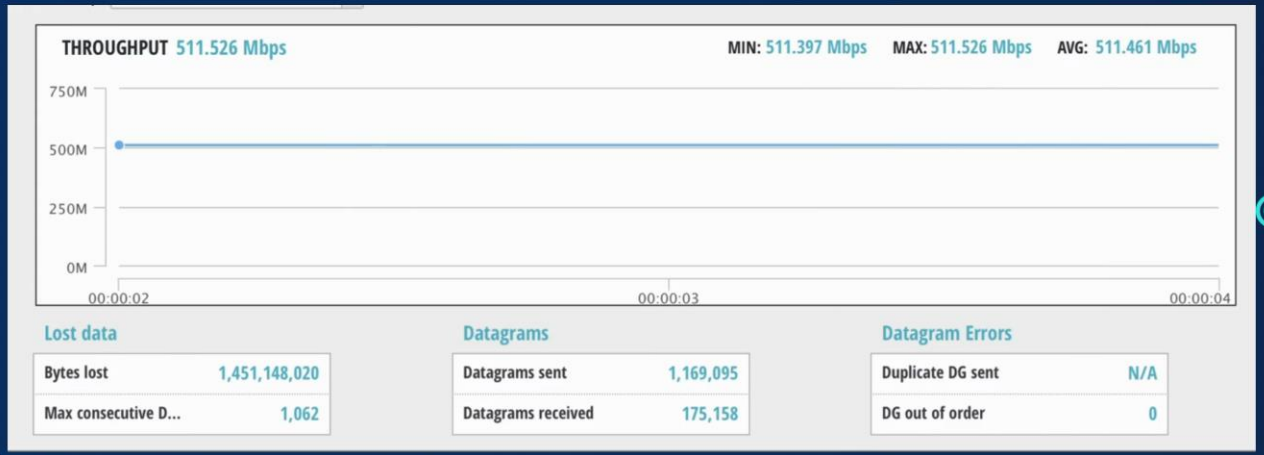
- Each link can transmit or receive independently
- Maximum throughput and performance

MLO vs SLO Performance comparison



Downlink Throughput Test

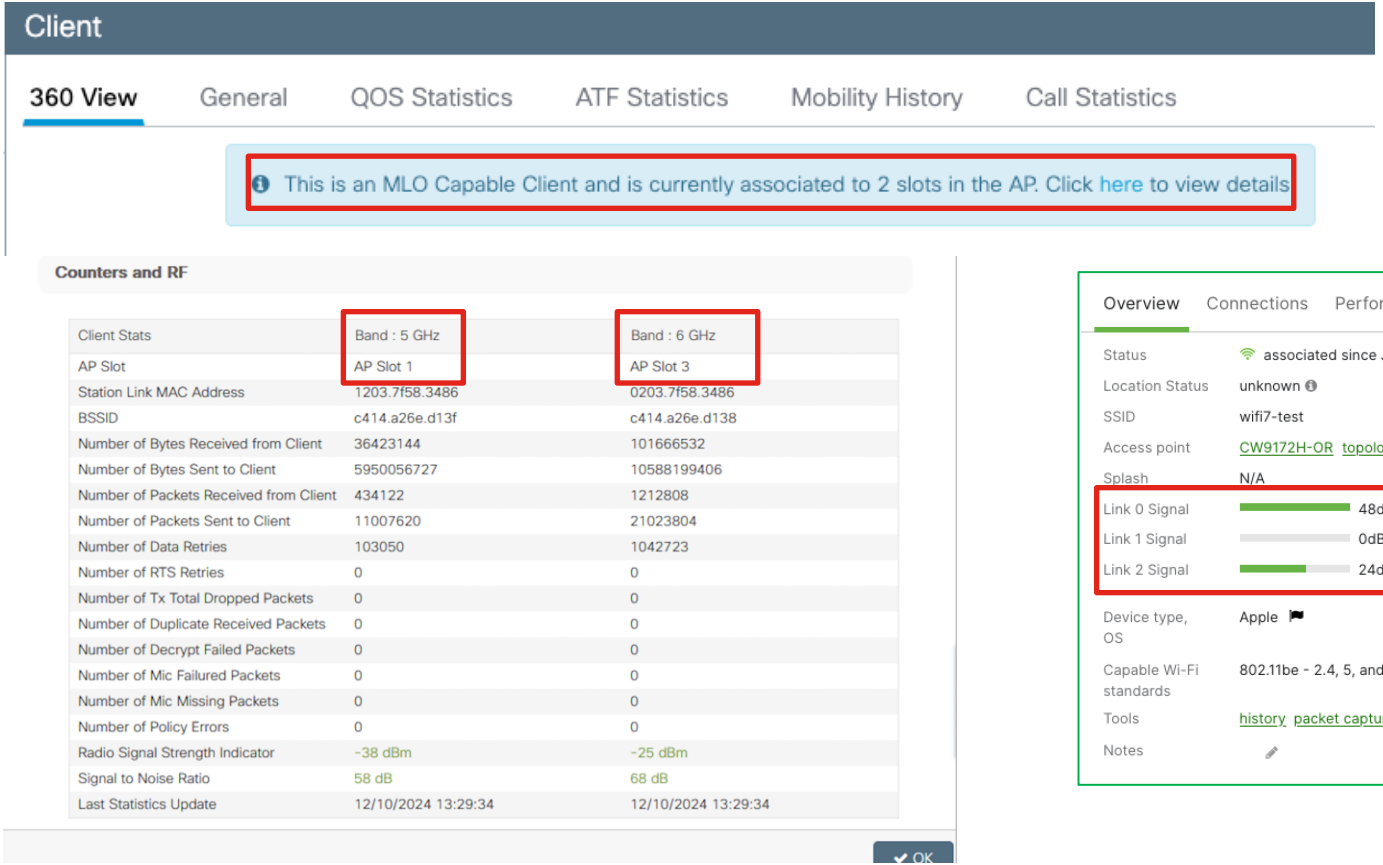
MLO: 5+6GHz/40MHz
Average Throughput: 980Mbps



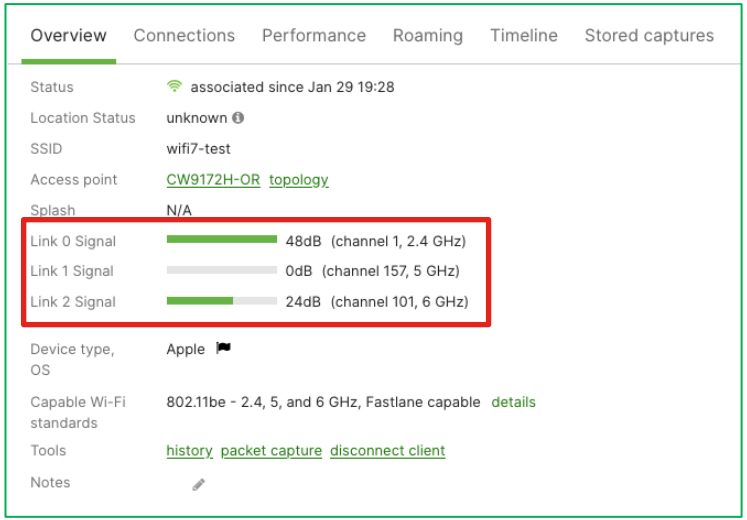
SLO: 5GHz/40MHz
Average Throughput: 510Mbps

Wi-Fi 7 Client Detail with MLO

WLC

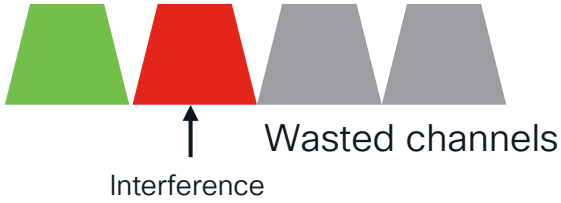


Meraki



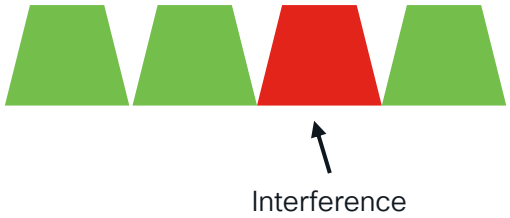
Wi-Fi 7 preamble puncturing

Without preamble puncturing:



Channel Width	Allowed Puncturing
80 MHz	20 MHz
160 MHz	20 or 40 MHz
320 MHz	40 or 80 MHz (or) 40 + 80 MHz

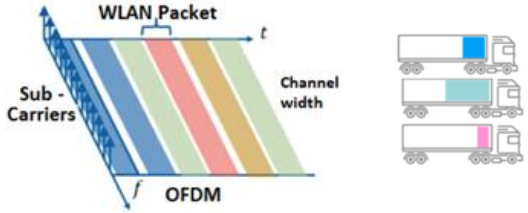
With preamble puncturing:



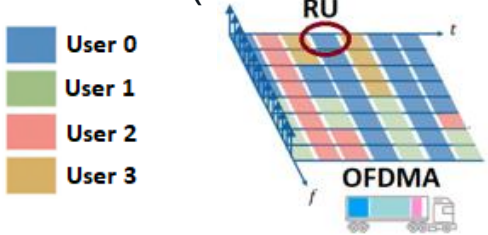
Puncturing allowed for 80 MHz channel width or wider

Wi-Fi 7 multiple resource unit (MRU)

OFDM (before Wi-Fi 6)



OFDMA (Wi-Fi 6 and later)



Wi-Fi 6 — User 1 | User 2 | User 3 ← One user can have only one RU

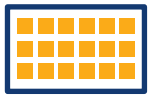
Wi-Fi 7 — User 1 | User 1 | User 2 | User 3 ← One user can have multiple RUs

Resource unit (RU) is a unit to denote a group of subcarriers (tones) in OFDMA

Multiple RUs make efficient use of spectrum

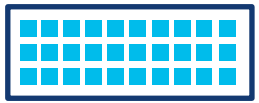
Wi-Fi 7 – 512 Compressed Block Ack

Wi-Fi 6/6E



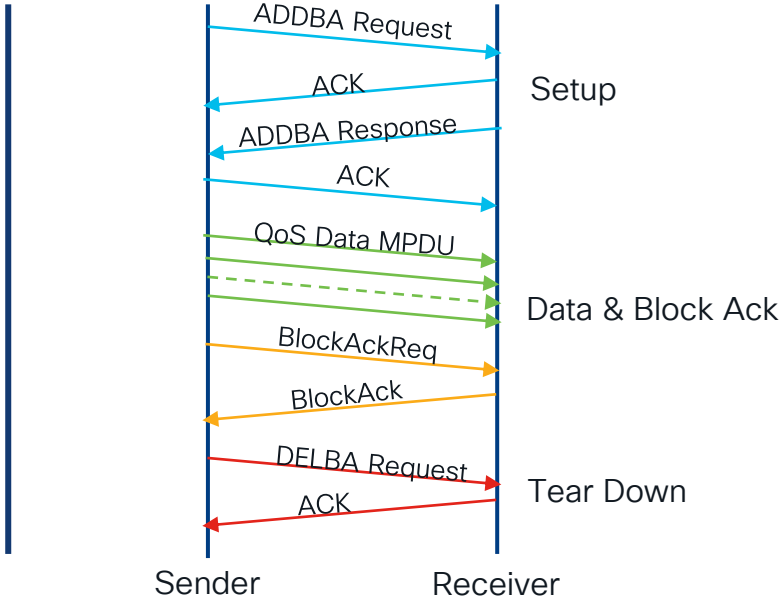
- Aggregation of upto **256** MPDUs in a single frame.
- Acknowledgement upto **256** MPDUs in a single Block Ack Frame

Wi-Fi 7



- Aggregation of upto **512** MPDUs in a single frame.
- Acknowledgement upto **512** MPDUs in a single Block Ack Frame

Block Ack frame exchange sequence



Reduces Protocol Overhead. Improve transmitter's performance at higher rates.

16 Spatial streams ?

- Won’t be supported in Wi-Fi 7
- Will stay at max 8 spatial streams per Radio
- Public docs refer to 16 spatial streams

Wi-Fi 7 Client Support

Windows

- Windows11 24H2
- Predominantly Intel BE200, QCA 7800
- Update your drivers
- !!WPA3-Enterprise (Requires dev version)

Android

- Android 13 or greater
- Samsung S24, Pixel 8 or greater

iPhone/iOS

- iPhone 16/16 Pro

iPhone

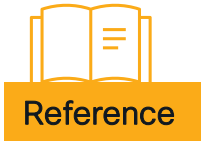
Mac OS

- Not yet

macOS

Client support picking momentum

Wi-Fi 7 Client behavior
From our observation ..

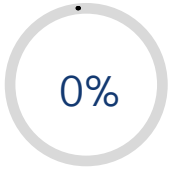


Feature	Windows (Intel BE200)	Windows (QCA 7850)	Google Pixel (8 and above)	Samsung S24 Ultra	MediaTek	Apple
OS	Windows 11 24H2	Windows 11 24H2	Latest release	Latest release	Windows 11 24H2	Latest release
Driver Ver	23.90.x	3.1.0.1314	Latest release	Latest release	5.4.0.2503	Latest release
EHT rates (MCS12/13)	Yes	Yes	Yes	Yes	Yes	No
MLO Links	2	2	2	3	3	3
MLSR	Yes	Yes	Yes	Yes	Yes	Yes
eMLSR	Yes	No	Yes	No	Yes	No
MLMR-STR	No	Yes	Yes	Yes	Yes	No
MRU	Yes	Yes	Yes	Yes	Yes	Yes
320 MHz	Yes	Yes	Yes	Yes	No	No
Preamble Puncturing	Yes	Yes	Yes	Yes	Yes	Yes

Cisco’s Wi-Fi 7 AP Portfolio

cisco Live!

Journey towards Unified Product ...



Wi-Fi 6

1 SKU per model

17+ SKUs per model

Wi-Fi 6E

- Day0 Separate SKUs (~10)
- Initial management Mode determined at purchase.
- Post-purchase/Day N option to migrate
- Separate lead time/RMA/license
- Same Warranty

Wi-Fi 7
Global Use AP

- Today! Lets talk about it

One Cisco Wireless Access Point

Global Use AP, Unified Product, Single SKU

Cisco Catalyst Management Mode
C9800 & Catalyst Center Stack

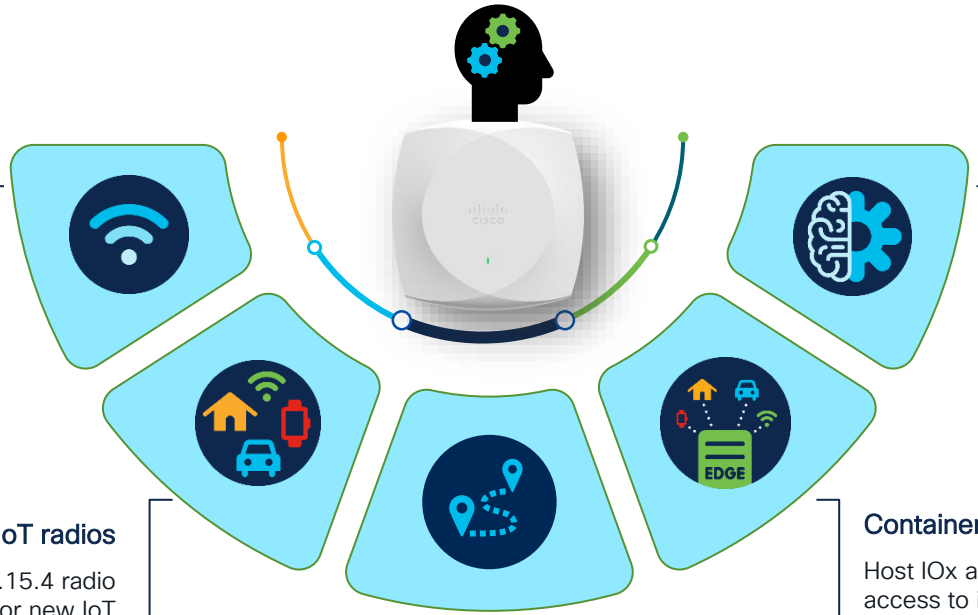
Meraki **Management Mode**
MR Dashboard Stack

Join any stack on Day 0, based on Intent
Management Mode Change from Day 1 to N

Catalyst Wi-Fi 7 series access points

Premium, multilingual AP platform for the future-ready digital enterprise

Unified Product, Single SKU, Global Use AP
Catalyst On-Prem or Meraki Cloud Ready



Unmatched Wi-Fi experience

Tri-band concurrent Flexible Radio Assignment (FRA) for changing needs.

Dedicated AI/ML-powered scanning radio

Smart, resilient infrastructure

Smart power consumption
Flexible feature uses given power budget
Dual 10 Gig uplink ports for resiliency

Multilingual IoT radios

Third-gen IoT 802.15.4 radio
USB with 4.5W for new IoT technology

Container hosting on AP

Host IOx applications at edge with access to integrated IoT radio and USB module

Hybrid Location System with GPS, Wi-Fi & UWB

AP Auto Locate, Indoor Navigation, Asset Tracking & AFC

The Wi-Fi 7 portfolio

CleanAir® Pro

CW9176I

12 Spatial Streams
4x4: 4 MU-MIMO
across 3 radios, 3 bands
(2.4/5GHz (XOR), 5 GHz, 6GHz)

BLE/IoT radio

Single 10Gbps multigigabit

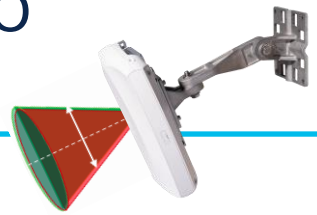
Ultra Wide Band (UWB)

USB 2.0 – 9W

Accelerometer

Built-in GPS/GNSS, w/ support for ext. antenna

Integrated Omnidirectional Antenna



CleanAir® Pro

CW9176D1

12 Spatial Streams
4x4: 4 MU-MIMO
across 3 radios, 3 bands
(2.4/5GHz (XOR), 5 GHz, 6GHz)

BLE/IoT radio

Single 10Gbps multigigabit

Ultra Wide Band (UWB)

USB 2.0 – 9W

Accelerometer

Built-in GPS/GNSS, w/ support for ext. antenna

Integrated Directional Antenna (70x70)

CleanAir® Pro

CW9178I

16 Spatial Streams
4x4: 4 MU-MIMO
across 4 radios, 3 bands
(2.4 GHz, dual 5GHz, 6GHz)

BLE/IoT radio

Dual 10Gbps multigigabit

Ultra Wide Band (UWB)

USB 2.0 – 9W

Accelerometer

Built-in GPS/GNSS, w/ support for ext. antenna

Integrated Omnidirectional Antenna

Same brackets as always

Already Wi-Fi 7 certified!

The Wi-Fi 7 portfolio

CW9172I

6 Spatial Streams

2x2:2 across 3 radios, 3 bands
(2.4GHz, 5GHz, 6GHz)
-or-
2x2:2 on 2.4GHz and 4x4:4 on 5GHz

BLE/IoT and dedicated scan radio

Single 2.5Gbps multigigabit uplink

USB 2.0 – 4.5W

DC Power Jack

Integrated Omnidirectional Antenna

Global Use AP

CW9172H

6 Spatial Streams

2x2:2 across 3 radios, 3 bands
(2.4GHz, 5GHz, 6GHz)

BLE/IoT and dedicated scan radio

Single 2.5Gbps multigigabit uplink

3x 1Gbps LAN port with 1x POE out

1x Passthrough port

Integrated Omnidirectional Antenna

Global Use AP

Same brackets as always. 9172H compatible with Meraki or Catalyst brackets

Cisco Wireless CW9178I/9176I/9176D1/9172I Mechanical Design

Brand New Design

Enlarged Recessed Area

Compatible with Standard Mounts:
AIR-AP-BRACKET-1 & AIR-AP-BRACKET-2

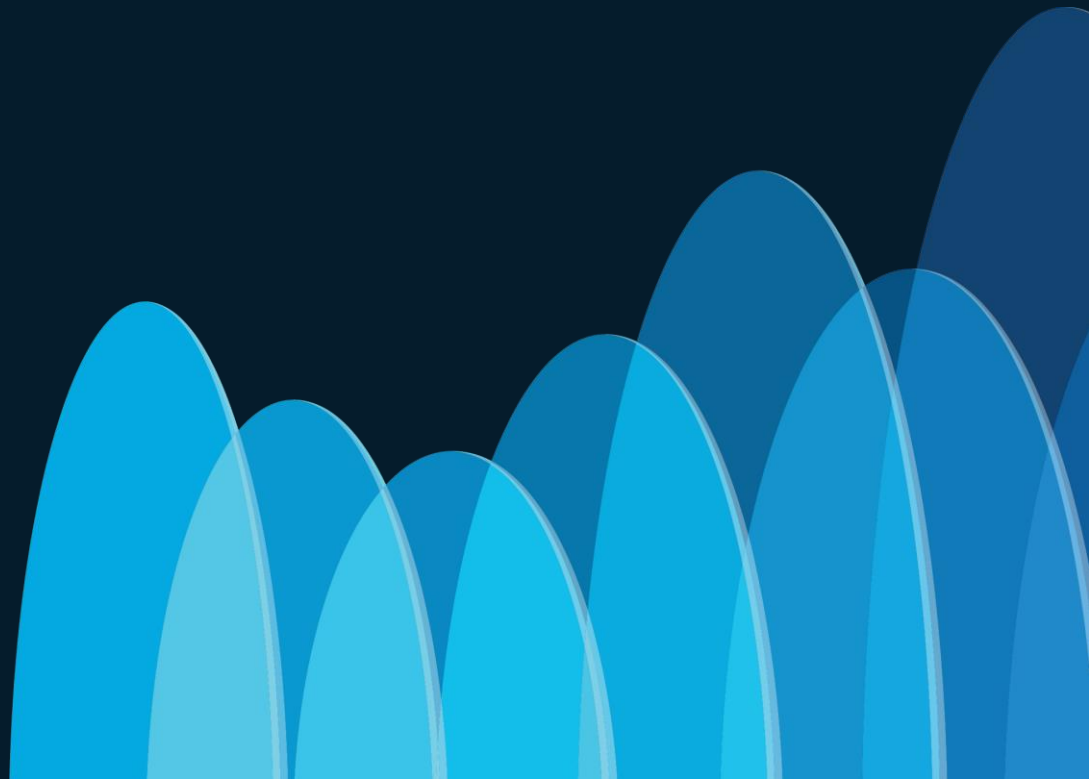
Improved Cabling Experience:
Larger Recessed Area

… the small details

- My favorite: The removable console cover ➡

- No plastic bags, and enhanced multipacks
- Improved USB cover
- Super elegant external GNSS antenna cover
- Unified reset button behavior across SW modes

Global Use AP



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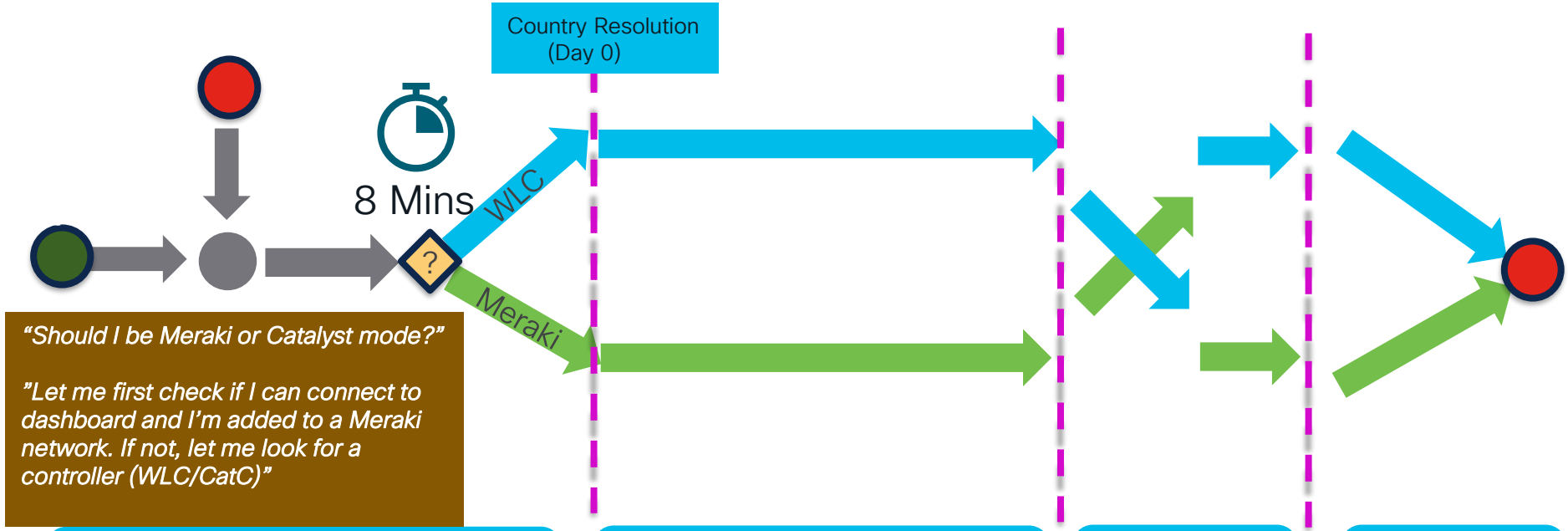
Map of a Global Use AP's journey

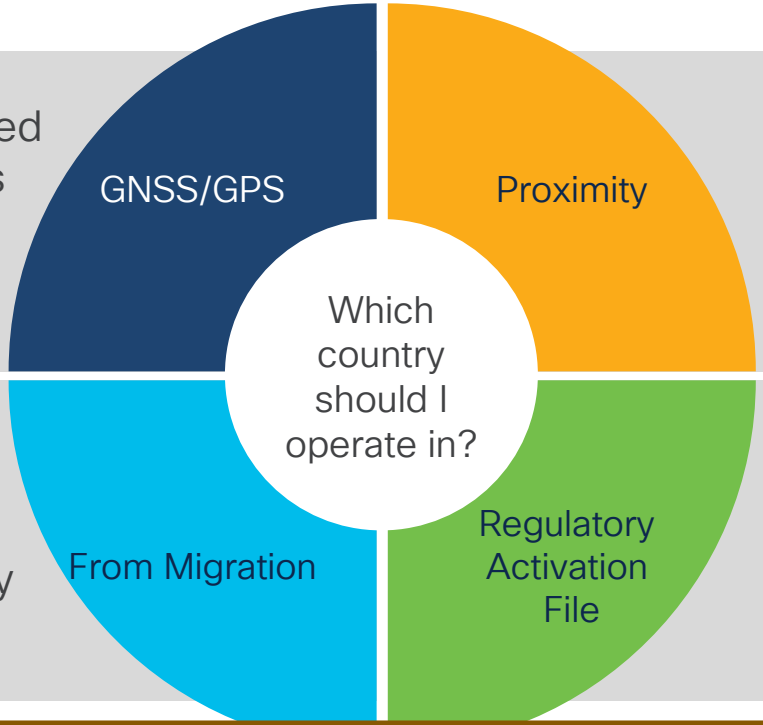


Let's zoom in on "Country Code"

WLC only

When APs are in WLC mode, APs will determine their Country Code in one of the following ways

For APs with integrated GNSS/GPS – use this



Learn from nearby (RF) APs on same WLC

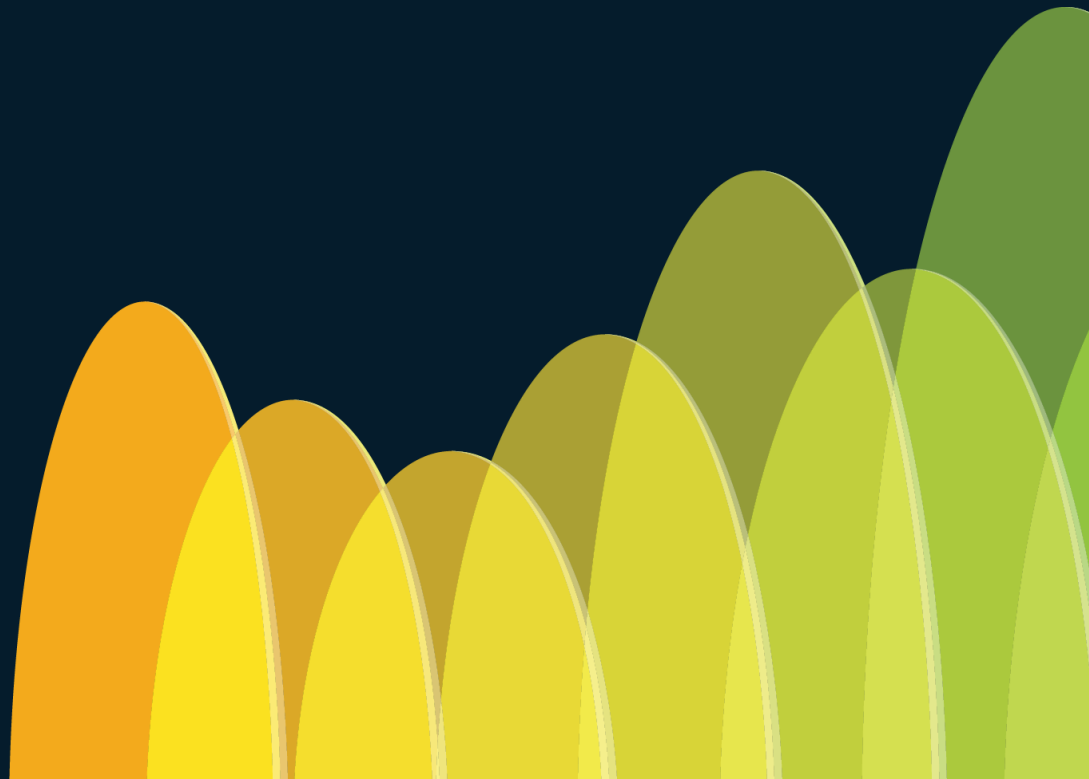
APs migrated from Dashboard will retain the country code they were operating in

Download a Regulatory Activation File (RAF) from Dashboard, that can be installed on WLC

Country Code determination is only done once - unless the admin triggers a country reset.

i.e. APs will not auto-change country codes, but network admins can change it!

Network Infrastructure



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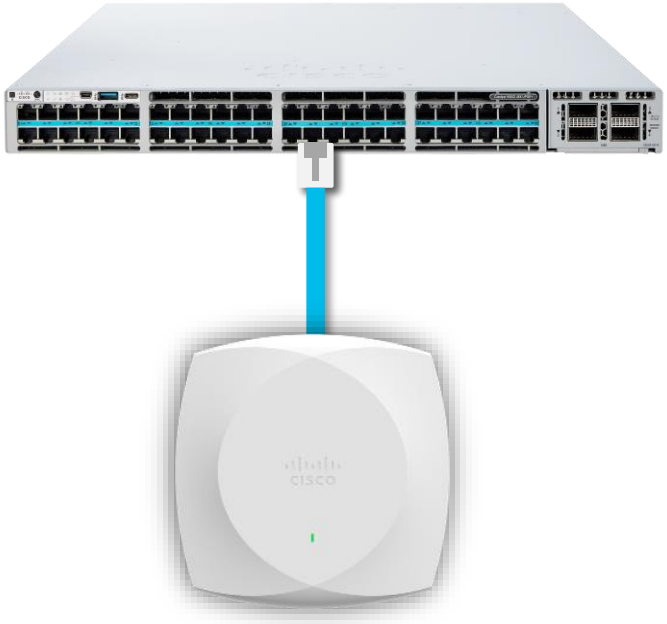
Cisco Wireless AP to switch connection



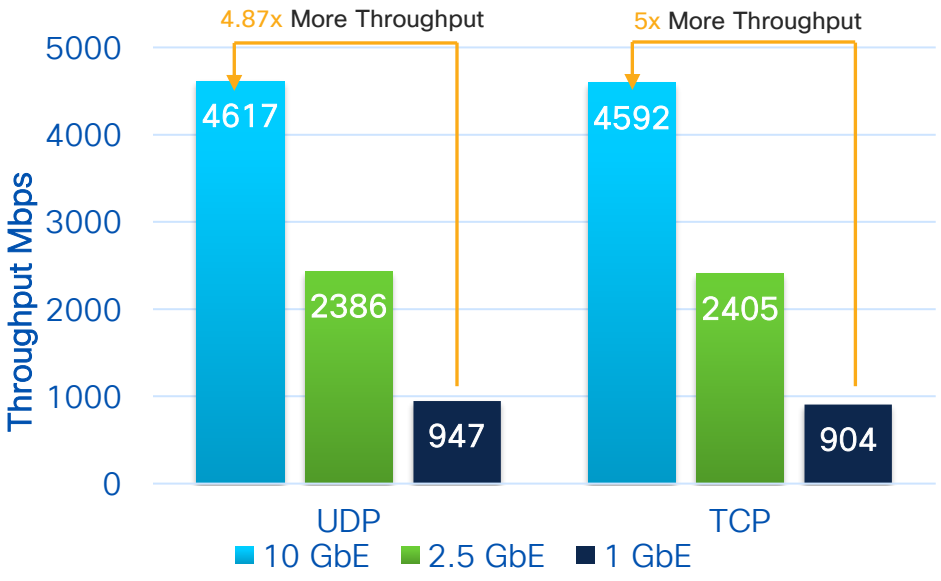
AP negotiates power, speed and duplex at boot time via CDP/LLDP

MGig switchport is recommended as Wi-Fi 6E/7 speed may exceed 1 Gbps

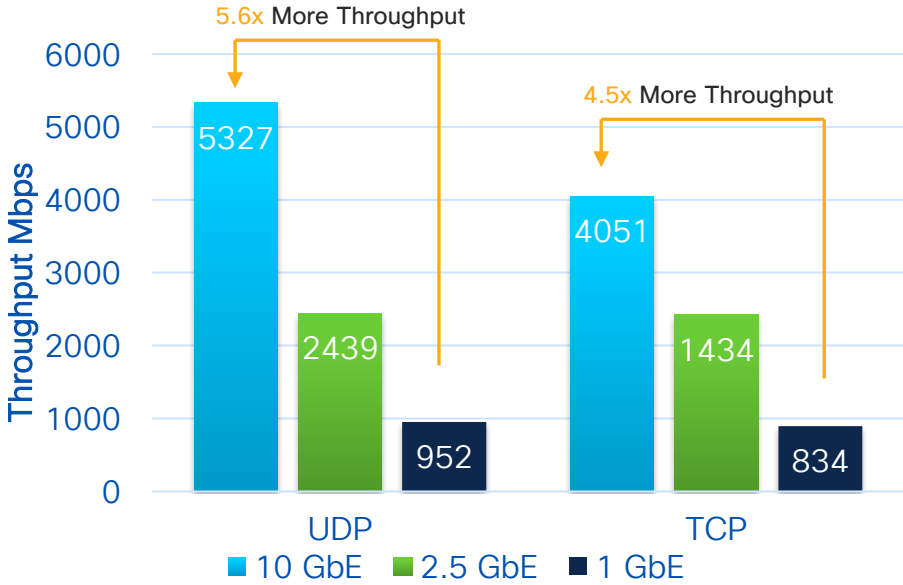
Cabling: Cat 6/6A required. Cat 5e can support up to 5Gbps

CDP = Cisco Discovery Protocol
LLDP = Link Layer Discovery Protocol
Cat = Category (of ethernet cable)

Cisco 9176 mGig Results
2.4 (20 MHz), 5 (160 MHz), 6 (320 MHz)

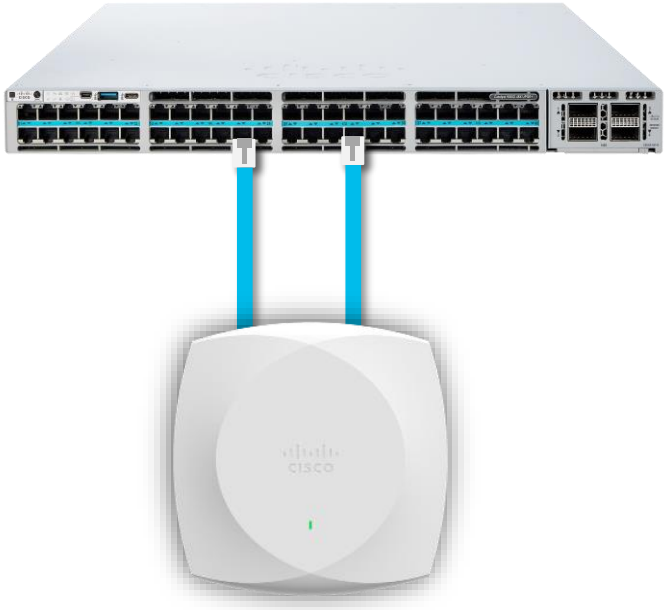


3 Clients



10 Clients

CW9178 to switch connection



AP CW9178

CW9178 has two mGig uplink ports

Dual port is for PoE power and uplink redundancy with hitless failover

Switchport and AP can be configured for LAG or standalone ports (default)

Non-LAG : Single & Dual Homed
LAG : Single Homed

mGig = multi gigabit ethernet
PoE = Power over Ethernet
LAG = Link Aggregation Group

CW9178I – Dual Ethernet Support Matrix

C9800 Deployment

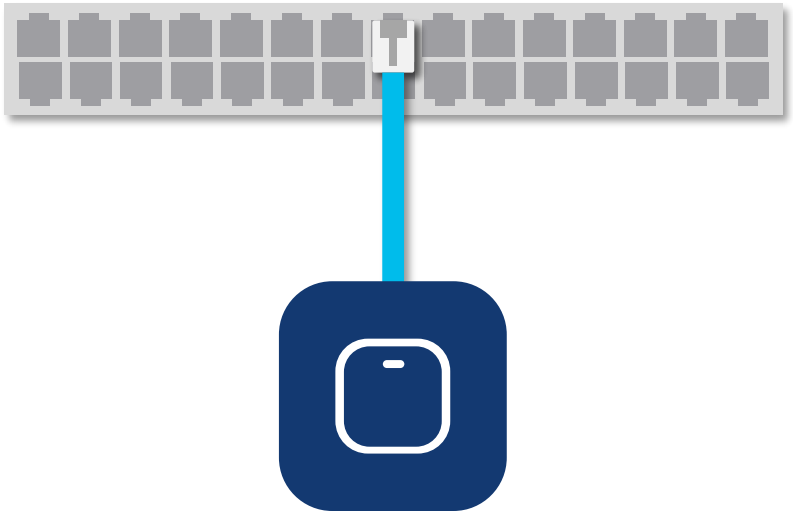
Feature	Non-LAG (Single Homed)	Non-LAG (Dual Homed)	LAG (Mode On)	LAG (Mode Active)
PoE Redundancy	Yes	Yes	Yes	Yes
Link Redundancy	Yes	Yes	Yes	Yes
CAPWAP Control Connection to WLC	Yes	Yes	Yes	Yes
Datapath – Local Mode	Yes	Yes	Yes	Yes
Datapath – Flex Mode	Yes	Yes	Yes	Yes
Datapath – Fabric Mode	Yes	Not supported	Yes	Yes
802.1x Port Control	Yes*	Yes*	Not supported at the switch	Not supported at the switch
MAB Authentication	Yes*	Yes*	Not supported at the switch	Not supported at the switch
IP connectivity (ssh, syslog)	Yes	Yes	Yes	Yes
Connectivity to Catalyst Cetner	Yes	Yes	Yes	Yes
Connectivity to Cisco Spaces	Yes	Yes	Yes	Yes

Note:

Yes* - Starting IOS-XE 17.17.1

Power Considerations

AP Power Consumption



Power Allocated	Power Consumed
48.3 W	16.5 W

PoE Power Negotiation happens at boot time through CDP/LLDP

Power allocation is what you need to consider for power budget

Actual Power consumption is dependent on the AP operation

Recap of Power Over Ethernet Standards

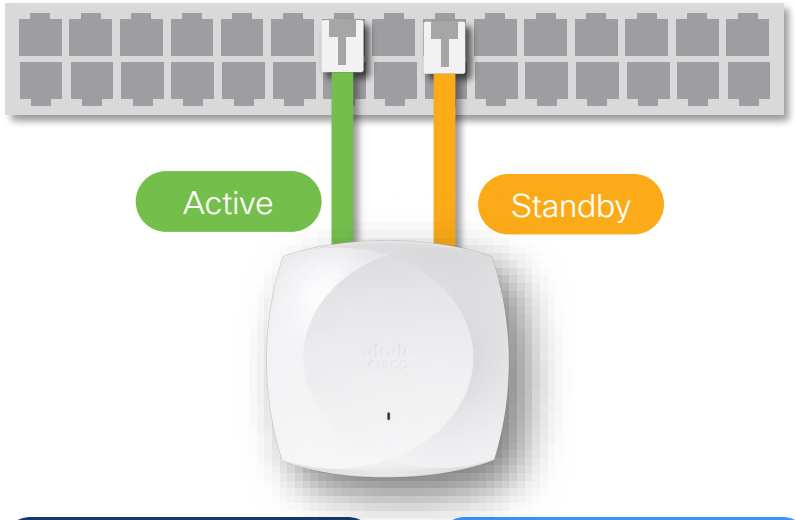
Spec	Known as	Class	Min PSE Output Power	Min PD Input Power
Type 1 IEEE 802.3af	PoE	Class 1	4 W	3.84 W
		Class 2	7 W	6.49 W
		Class 3	15.4 W	12.95 W
Type 2 IEEE 802.3at	PoE +	Class 4	30 W	25.5 W
Type 3 IEEE 802.3bt	PoE++, Cisco UPOE	Class 5	45 W	40 W
		Class 6	60 W	51 W
Type 4 IEEE 802.3bt	Cisco UPOE+	Class 7	75 W	62 W
		Class 8	90 W	71.3 W

CW9178I – IEEE 802.3bt (Class 6) – 60 W (For Full Operation including USB)

CW9176I/D1 & CW9172I– IEEE 802.3bt (Class 5) – 45 W (For Full Operation including USB)

CW9172I – IEEE 802.3at (Class 4) – 30 W (For Full Radio Operation)

CW9178I Power Consumption (dual port)



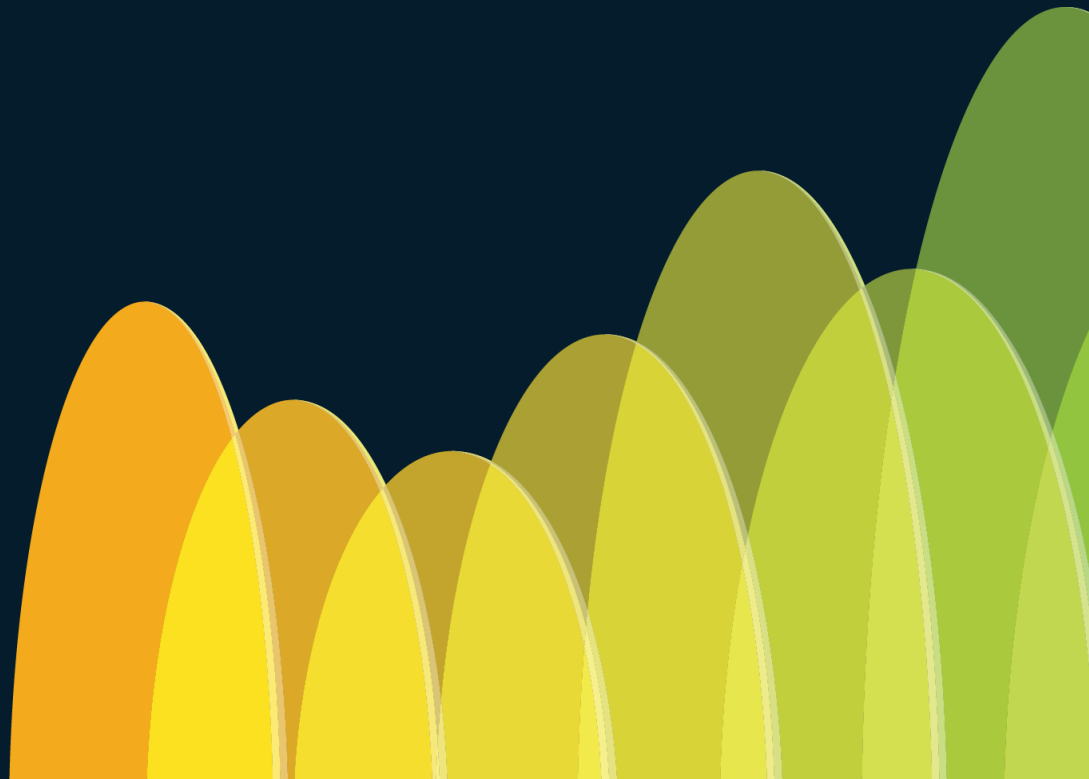
	Power Allocated	Power Consumed
Port 0	54.4 W	16.5 W
Port 1	54.4 W	0.5 W

Both ports negotiate power and need to be considered for budget

If no-LAG, Standby port consumes very little power

If LAG, both ports are active, and they both draw power

WLAN Security



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Wi-Fi 7 Security

WPA3/Enhanced Open Mandatory for Wi-Fi 7

New AKM support for WPA3-Personal*

Enhanced ciphers for WPA3-Personal & OWE*

Protected Management Frame (PMF) Mandatory

** New enhancements in Wi-Fi 7, when compared to Wi-Fi 6E*

Wi-Fi 7 Security

Wi-Fi 7 brings new AKM support for WPA3-SAE and new increased ciphers for OWE & SAE, WPA3 /OWE mandatory for EHT (11be MCS rates) & MLO

Cipher: GCMP 256 – Better Encryption & Speed; AKM: Better security

Legacy (Wi-Fi 5)	Wi-Fi 6	Wi-Fi 6E (6 GHz)	Wi-Fi 7
Open	Open (OWE support required)	Enhanced Open (AKM: OWE) (Cipher: CCMP128)	Enhanced Open (AKM: OWE) (Cipher: CCMP128 and GCMP256)
WPA1/WPA2/WPA3 Transition WPA3-Personal, PMF Optional	WPA2/WPA3 Transition/ WPA3-Personal, PMF Optional (WPA 2 – AKM – PSK, FT+PSK, PSK (SHA-256)) (WPA 3 – AKM – SAE, FT+SAE) (Cipher: CCMP 128 or AES)	WPA3-Personal, PMF Mandatory (AKM: SAE, FT+SAE) (Cipher: CCMP128 or AES)	WPA3-Personal, PMF Mandatory (AKM: SAE-EXT-KEY, FT-SAE-EXT-KEY) (Cipher: CCMP128 and GCMP256)
WPA1/WPA2/WPA3 Transition/ WPA3-dot1x (Enterprise), PMF Optional	WPA2/WPA3 Transition/ WPA3-dot1x (Enterprise), PMF Optional (AKM 802.1x, FT+802.1x & 802.1x-SHA256, 802.1x-SuiteB) (Cipher: AES, CCMP 128, GCMP128 GCMP256)	WPA3 Enterprise, PMF Mandatory (AKM: FT+802.1x, 802.1x-SHA256, 802.1x-SuiteB) (Cipher: CCMP128, GCMP 128 & GCMP 256)	WPA3 Enterprise, PMF Mandatory (AKM: FT+802.1x, 802.1x-SHA256, 802.1x-SuiteB) (Cipher: CCMP128, GCMP128 & GCMP 256)

Clients connecting to lower security, can connect to 2.4 & 5 GHz bands of Wi-Fi 7 AP, but restricted to 11ax or earlier. No 11be rates & MLO

Note: All devices since 2019 are required to support WPA3, regardless of generation

Wi-Fi 7 WLAN Design Considerations

What options would you have?

1. ”All-In” Option: Reconfigure the existing WLAN to WPA3, one SSID for all radio policies (2.4/5/6 GHz) – Most unlikely
2. “Multiple SSIDs” Option: Redesign your SSIDs, adding specific SSID/WLAN with specific security settings – Most flexible
3. “One SSID” Option: Use Transition Modes to support multiple security – Most conservative

Wi-Fi 7 APs can broadcast SSIDs with lower security; No 11be rates & MLO

Option 1 (All-In)

Pros

- Cleanest and simplest option
- No new WLAN and SSID to be managed
- Most secure with WPA3 everywhere

Cons

- Breaks support for existing clients that don't support WPA3 and PMF in 2.4 and 5GHz
- Requires full control on client devices and drivers

Option 2 (Multiple SSIDs)

Pros

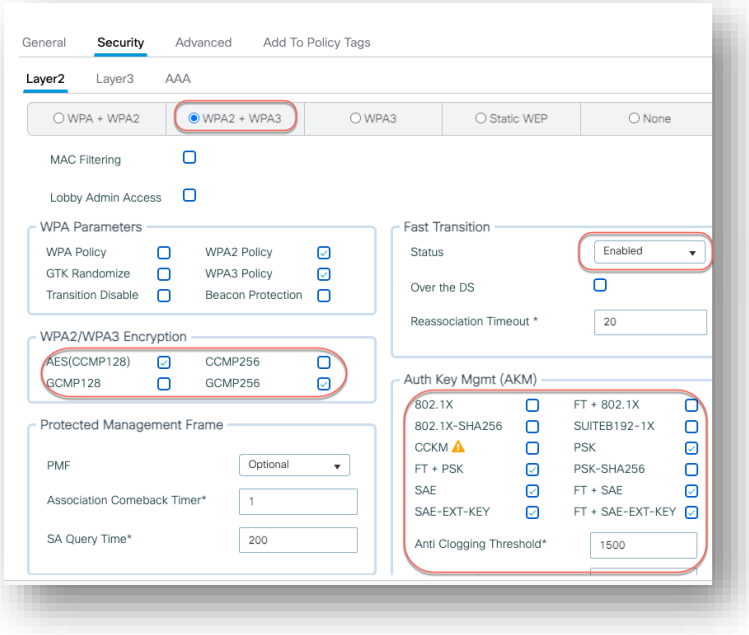
- Cleanest option from a client compatibility point of view
- Most secure options as clients can adopt WPA3 security
- WPA3 clients can roam across different bands
- Automated via Catalyst Center

Cons

- Additional SSIDs to configure & manage on WLC
- Need to manage additional SSID profiles on clients

Wi-Fi 7 WLAN Design Considerations – Option 3
Personal (PSK/SAE) SSID

Requirements: AKM 24 or 25, Cipher – CCMP128 and GCMP 256
Recommendation: WPA3 Transition Mode (a.k.a WPA2 + WPA3 Mixed Mode)



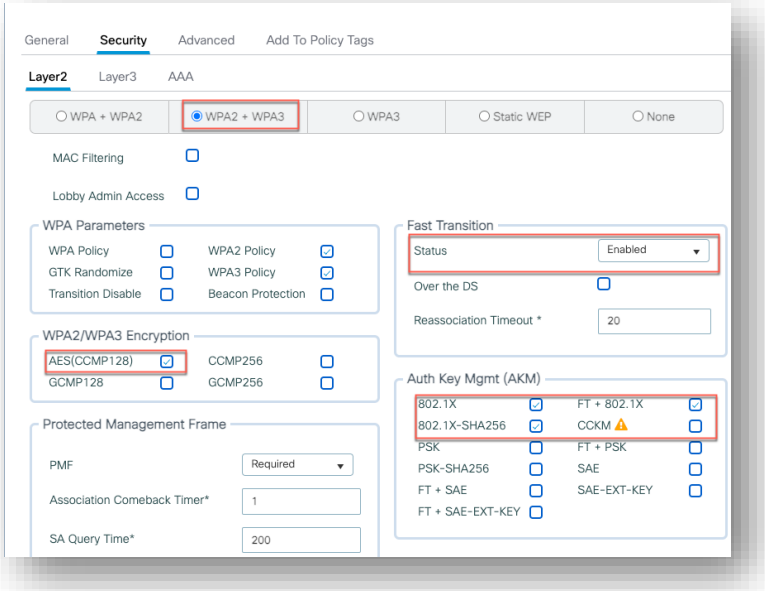
- L2 security set to **WPA2+ WPA3**. AKM configured with **PSK**, **SAE** and **SAE-EXT-KEY**. **PMF** as **Optional**.
  - Wi-Fi 7 clients connect with WPA3/SAE-EXT-KEY/PMF
  - Wi-Fi 6E clients connect with WPA3/SAE/PMF.
  - Wi-Fi 6 clients that support WPA3 connect with WPA3/SAE/PMF in 2.4/5 GHz bands.
  - Legacy clients connect with WPA2 in 2.4/5 GHz bands.
- If there are very old clients that still uses WPA1, then the recommendation is to have those clients in a separate SSID.

Note: Wi-Fi 7 needs AKM 24 or 25 as per spec. From our experience with different wireless clients, they do MLO/11be rates even with AKM 8 & 9.

AKM 8: SAE, AKM 9: FT-SAE, AKM 24- SAE-EXT-KEY, AKM 25- FT-SAE-EXT-KEY

Wi-Fi 7 WLAN Design Considerations – Option 3
Enterprise (dot1x) SSID

Requirements: AKM 3, 5 Cipher – CCMP 128 (Most common deployments)
Recommendation: WPA3 Transition Mode (a.k.a WPA2 + WPA3 Mixed Mode)



- L2 security set to **WPA2+ WPA3**. AKM configured with **802.1x-SHA256** and **802.1x (SHA1)**. **PMF** as **Optional**.
- For clients that support WPA3, configure WPA3 Enterprise. Wi-Fi 7 clients will use the settings to connect to any band with MLO.
- For clients that don't support WPA3, configure a WPA2 profile.

Note: There are chances some old clients with outdated driver, could have connectivity issues. Test the clients in your environment.

Note: WPA3-SuiteB will require a separate SSID, per specification.

Option 3

Pros

- Provide an adoption path to more secure Wi-Fi via WPA3 Transition mode
- Maintain support for older clients using WPA2.
- No new SSID profile to be managed on the client side

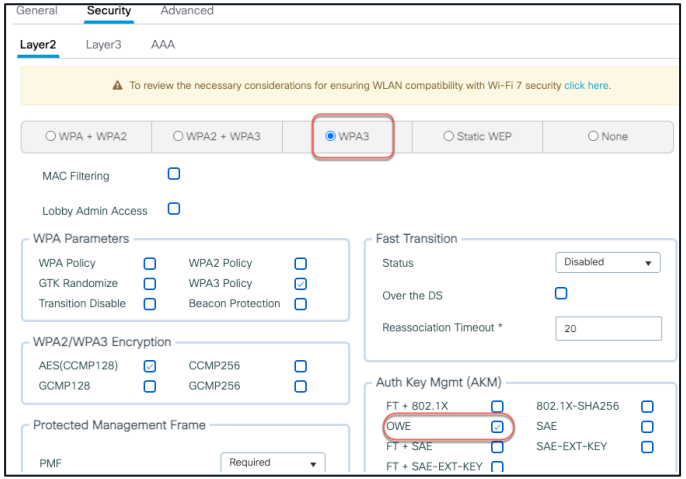
Cons

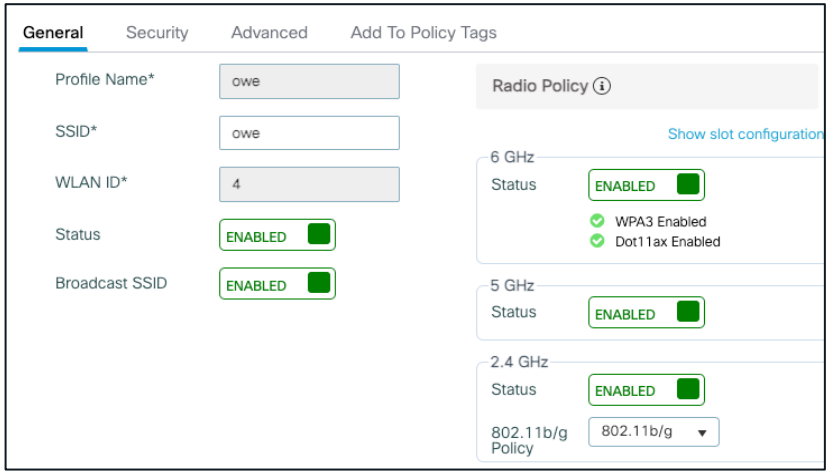
- Older clients may have issues connecting to an SSID with WPA3 Transition mode

Wi-Fi 7 WLAN Design Considerations
What about OWE Transition ?

The AP's BSS Configuration shall not allow Wi-Fi Enhanced Open Transition Mode (i.e., where the OWE Transition Mode element is included in Beacons and Probe responses) *(WPA3 Spec v3.4, Section 11.3)*

OWE Transition is not valid with 6 GHz and Wi-Fi 7



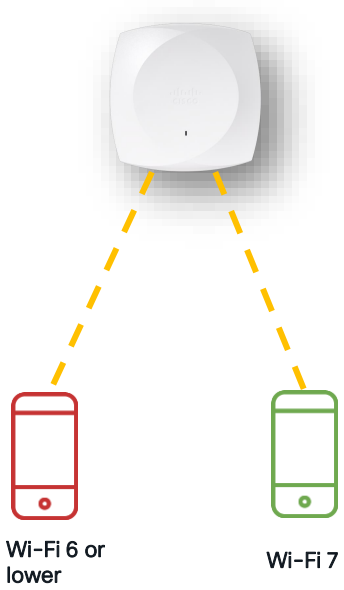


Some 6E/Wi-Fi 7 clients may not be able to discover or connect to OWE Transition in 6 GHz.

Note: WLC Config allows OWE Transition today

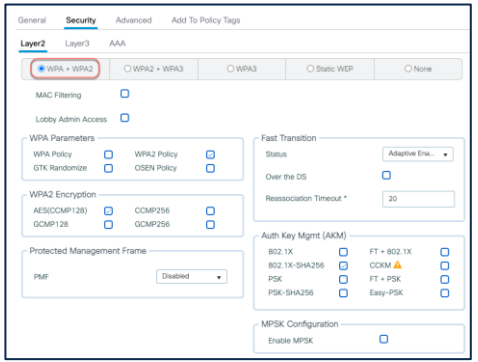
Client join behavior with Wi-Fi 7 AP

Scenario 1: AP Broadcasting WPA2/Open WLANs



- Configure client profile with WPA2 or Open (depending on WLAN security)
- Clients can associate only on 2.4 & 5 GHz radios
- Wi-Fi 7 clients join as 11ax capable.
- No MLO functionality, 11be rates

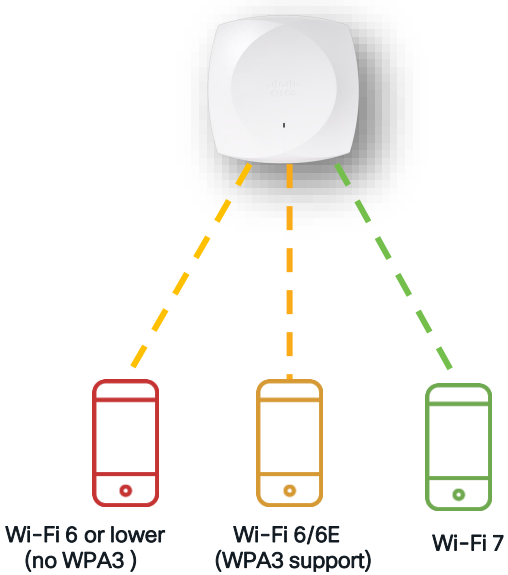
Example Config:



Backward compatible, but clients lose Wi-Fi 7 Functionality

Client join behavior in Wi-Fi 7 AP

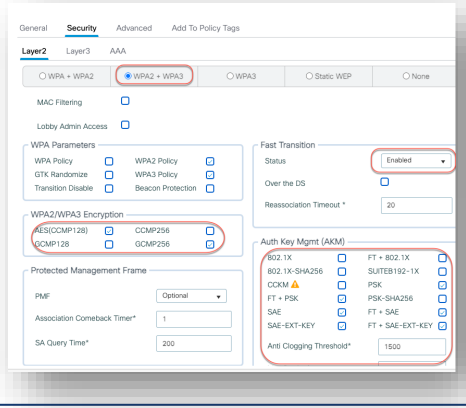
Scenario 2: AP Broadcasting WPA3 Transition WLANs



Client Profile:

1. WPA2 setting on Wi-Fi 6 or lower (without WPA3 support)
2. WPA3 setting on Wi-Fi 6 clients (with WPA3 support)
3. WPA3 setting on Wi-Fi 6E and Wi-Fi 7 Clients.

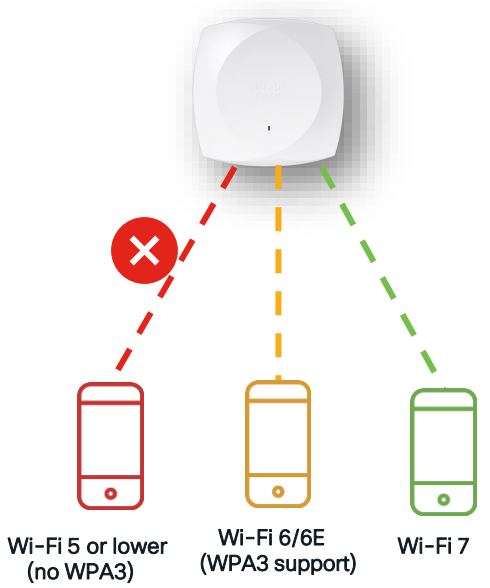
Example Config:



Wi-Fi 7 Clients join as 11be; MLO functionality
Wi-Fi 6E Clients join as 11ax (prefer 6 GHz band)
Wi-Fi 6 Clients join as 11ax (with WPA3)
Wi-Fi 6 or lower may join as WPA2 (11ax, 11ac and so on) in 2.4/5 GHz bands

Client join behavior in Wi-Fi 7 AP

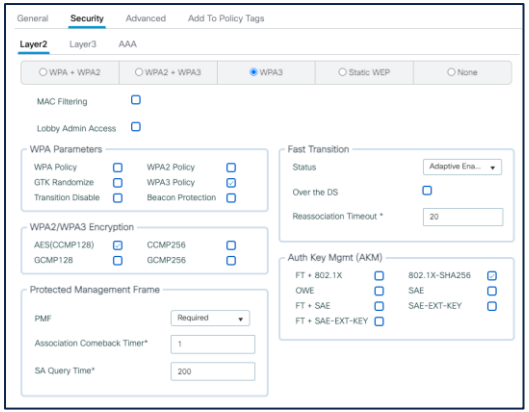
Scenario 3: AP Broadcasting WPA3/OWE only WLANs



Client Profile:

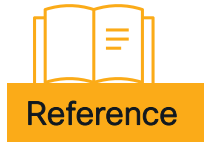
1. WPA2 setting on Wi-Fi 6 or lower (without WPA3 support)
2. WPA3 setting on Wi-Fi 6 (with WPA3 support)
3. WPA3 setting on Wi-Fi 6E and Wi-Fi 7 Clients.

Example Config:



Wi-Fi 7 Clients join as 11be; MLO functionality
Wi-Fi 6E Clients join as 11ax (prefer 6 GHz band)
Wi-Fi 6 Clients join as 11ax (with WPA3) in 2.4/5GHz bands.
Wi-Fi 5 or lower without WPA3 cannot join the WLAN.

Wi-Fi 7 Client WPA3 Support Matrix

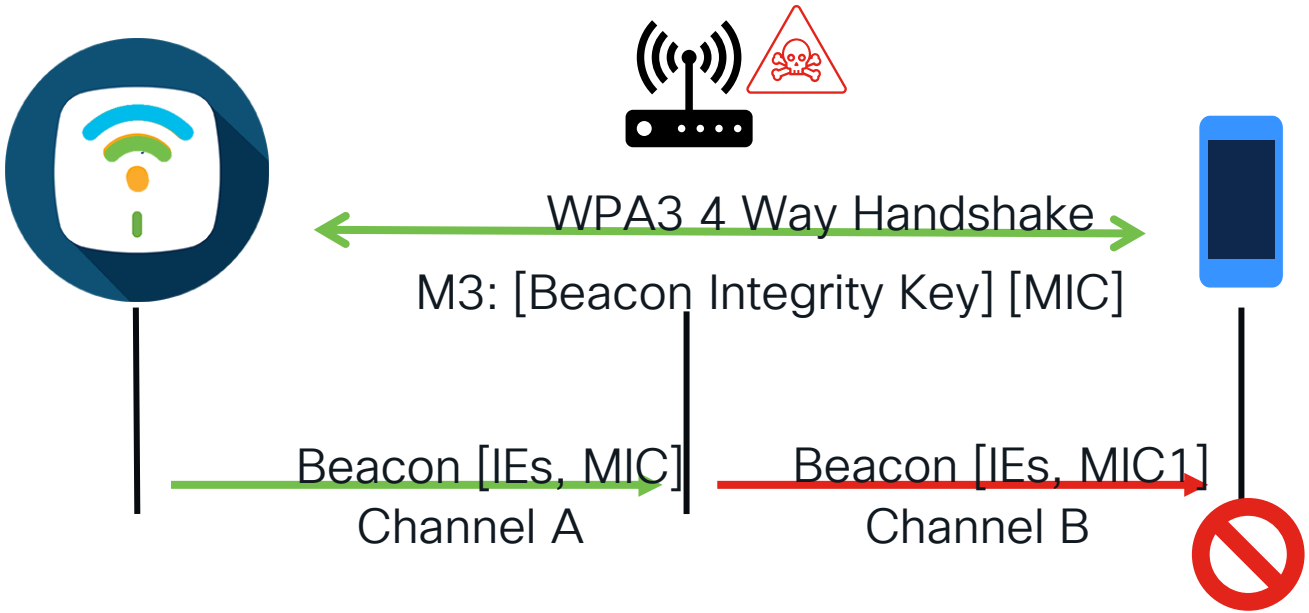


WPA3	Intel Windows	QCA Windows	Samsung S24	Pixel 9 Pro	iPhone	Chromebook BE200	MediaTek
OWE+MLO	Supported	Supported	Supported	Supported	Supported	Supported	Supported
SAE+MLO	Supported	Supported	Supported	Supported	Supported	Supported	Supported
SAE-EXT+MLO	Supported	Supported	Supported	Supported	Supported	Supported	Supported
802.1x+MLO	Not Supported	Not Supported	Supported	Supported	Supported	Supported	Not Supported
FT SAE+MLO	Not Supported	Not Supported	Supported	Not Supported	Supported	Supported	Not Supported
FT SAE-EXT+MLO	Not Supported	Not Supported	Supported	Not Supported	Supported	Supported	Not Supported
FT 802.1x+MLO	Not Supported	Not Supported	Supported	Not Supported	Supported	Supported	Not Supported

Note: Windows support available in Win 11 dev version.

Wi-Fi 7 Beacon Protection

Beacons protected with an Integrity Check



Prevents beacon forging by attacker

RF Design

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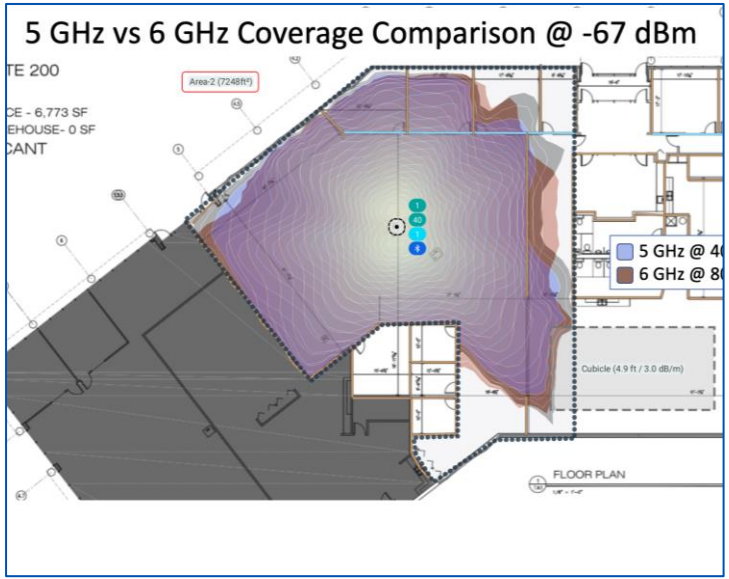
Designing for Wi-Fi 7

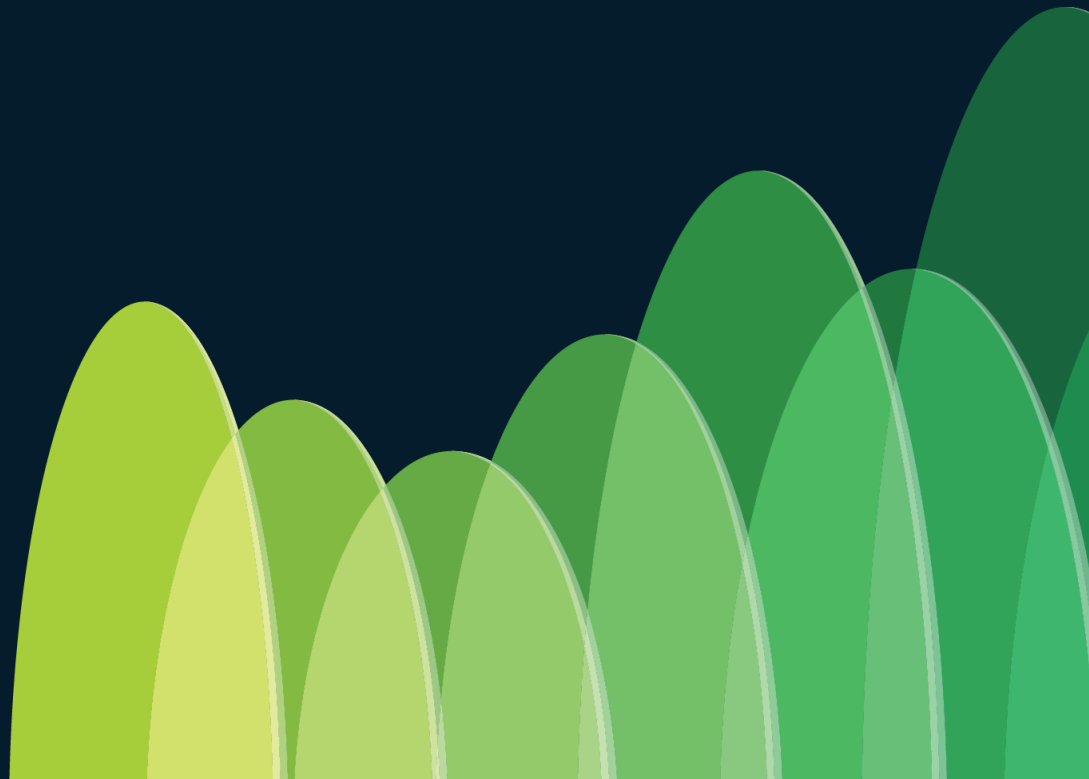
- Wi-Fi 7 coverage area will be similar to the previous generations for the same minimum data rate, channel bandwidth and so on.
- Design considerations:
  - 320 MHz channel width
  - MLO

Advanced RF Tuning in Cisco Wireless - Become an Expert While Getting a Little Help from Cisco AI [BRKEWN-3413]
Thursday 10.30 A.M to 12 P.M by Jim Florwick



Wi-Fi 7 site planning is very much like Wi-Fi 6E (6 GHz) or Wi-Fi 6 (5 GHz)

Migration

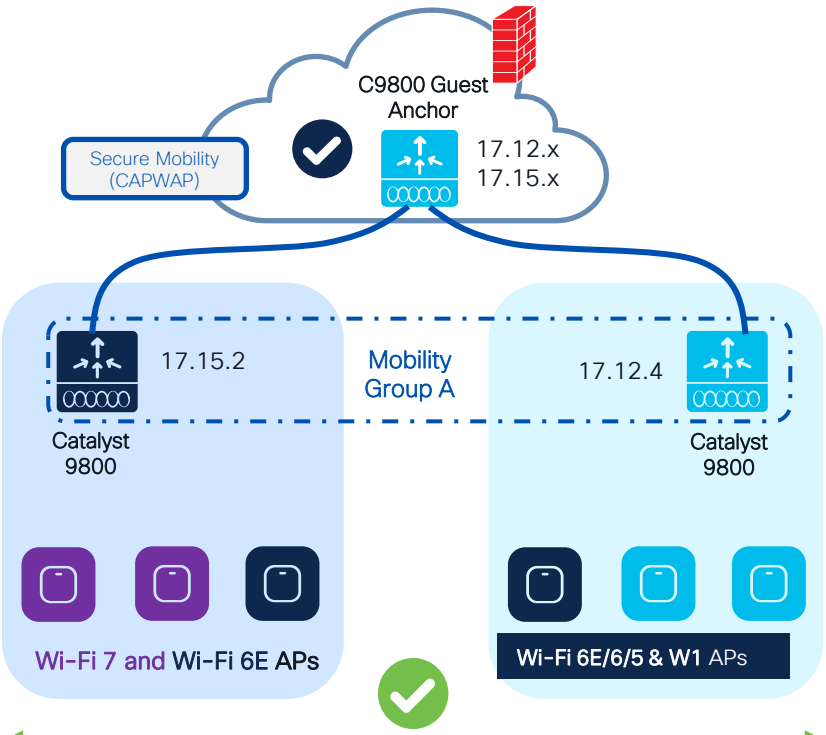


Wi-Fi 7 Software Support Matrix

IOS-XE 17.15.2 or later Catalyst Center 2.3.7.6 (for configuration) Catalyst Center 2.3.7.9 (for maps & assurance)	 CW9178/ CW9176	MR 31.1.5.1 or later
IOS-XE 17.15.2b or later Catalyst Center 3.1.3	 CW9172I	MR 31.1.5.1 or later
IOS-XE 17.17.1 or later Catalyst Center 3.1.3	 CW9172H	MR 31.1.6.1 or later

How do I start adopting Wi-Fi 7?

Answer: Inter Release Controller Mobility (IRCM)



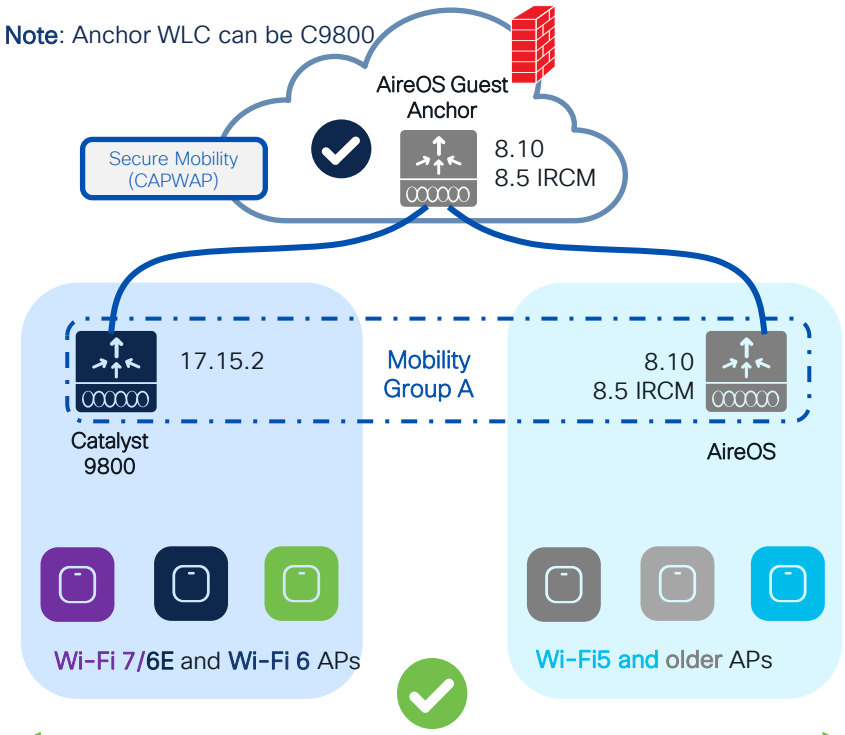
Scenario 1: If you're in IOS-XE 17.12.x code

- If you have already started your C9800 journey… & Wave 1 Aps are still present (1700/2700/3700).
- Introduce new AP hadware on the new supported IOS XE release and support seamless roaming and Guest Anchor with exsiting C9800 networks
- The release combinations shown have been tested at scale, check IRCM deployment guide*
- Fast & secure roam will only be supported if the WLAN profile is the same on the two WLCs
- **Note**: Anchor can be on AireOS as well (8.10 or 8.5 IRCM latest

(*) https://www.cisco.com/c/en/us/td/docs/wireless/controller/technotes/8-8/b_c9800_wireless_controller-aireos_ircm_dg.html

How do I start adopting Wi-Fi 7?

Answer: Inter Release Controller Mobility (IRCM)



Legacy Controller Supports IRCM

- Introduce new Wi-Fi 7 AP hadware on the new C9800 and support seamless roaming and Guest Anchor with existing networks
- This method allows the smooth coexistence of both controllers, with RF areas migrated as needed, without any overnight switchover.
- Things to consider:
  - If the controller is limited to 8.5 (5508, 8510), we will need a special IRCM version (8.5.182.104), to connect them to IOS-XE
  - Best to split the RF network into different areas, configuring different RF group names between the legacy and IOS-XE controllers.
  - Always configure the primary/secondary controller name in access points. The new controllers will reject unsupported APs, but if any AP could work in both controller types, this will avoid APs joining the wrong one, or flip-flopping between them, until the migration is ready to proceed
- Fast & secure roam will only be supported if the WLAN profile is the same on the two WLCs

(*) https://www.cisco.com/c/en/us/td/docs/wireless/controller/technotes/8-8/b_c9800_wireless_controller-aireos_ircm_dg.html

Summary

Deploying and migrating to Wi-Fi 7
Key considerations & requirements

Power considerations

Recommendation:
802.3bt (Cisco UPOE)
is the suggested
power input for full operation of AP

802.3at (PoE+) and 802.3af (PoE) are also supported by the CW9178I/CW9176I&D/CW9172I

Security requirements

Mandatory:
WPA3 is mandatory for 11be rates and MLO.

WPA3 was not required for prior Wi-Fi generations (6 and below); hence, it must be top of mind.

Multigigabit switching

Recommendation:

Use a Multigigabit switch with 10G Capability.

Better user experiences with speeds beyond 1 Gbps. Cat 6/6A cabling recommended,

Wireless coverage

Recommendation:
Ensure uniform cell size for 5 and 6 GHz cells. 2.4 & 5 GHz does not need a new site survey

Review the current RF coverage of 5 GHz network to achieve similar coverage for 6 GHz network.

Review Global Use AP Functionality; especially for WLC Management Mode Deployments

Wi-Fi 7 for enterprise - revisited

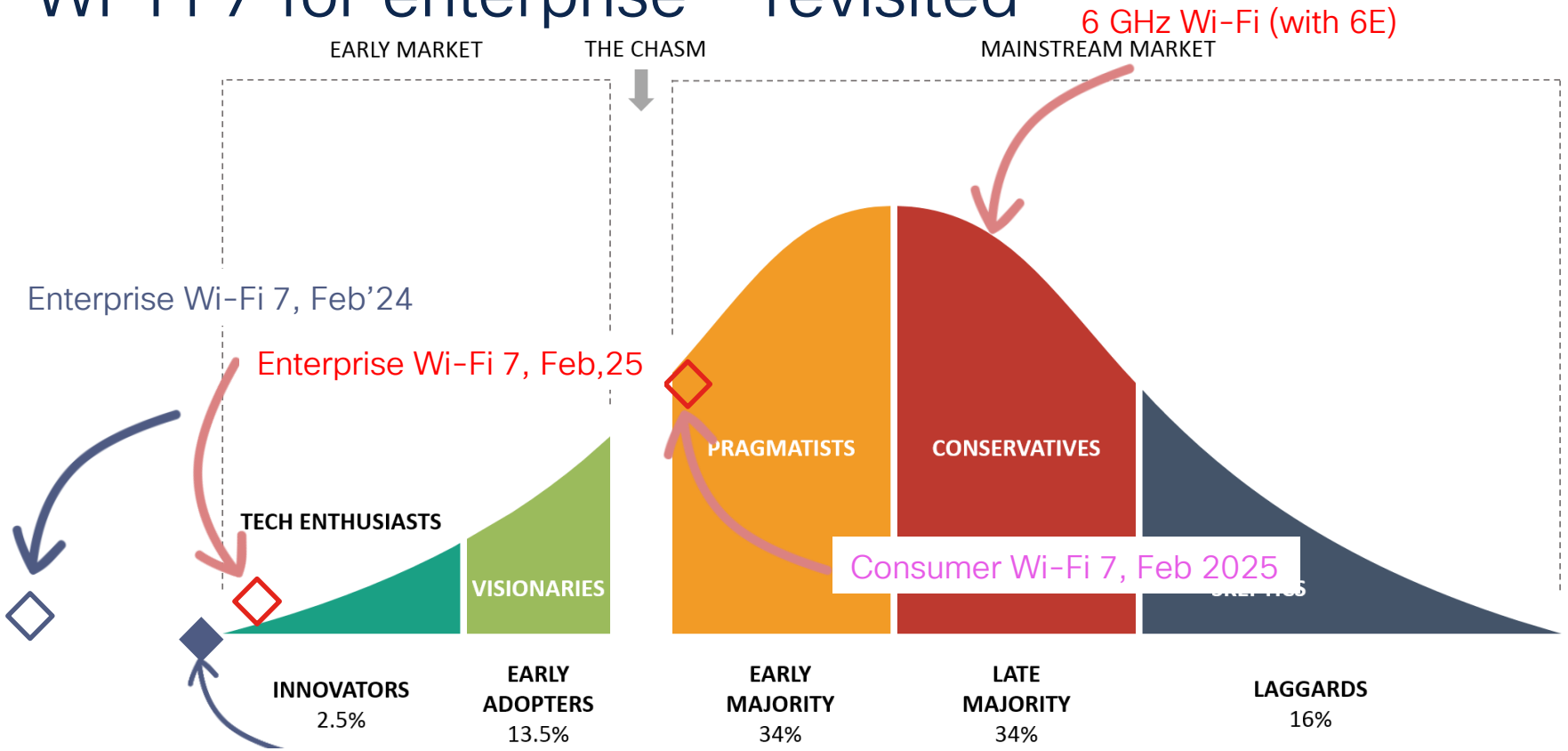


Image credit" https://www.business-to-you.com/crossing-the-chasm-technology-adoption-life-cycle/

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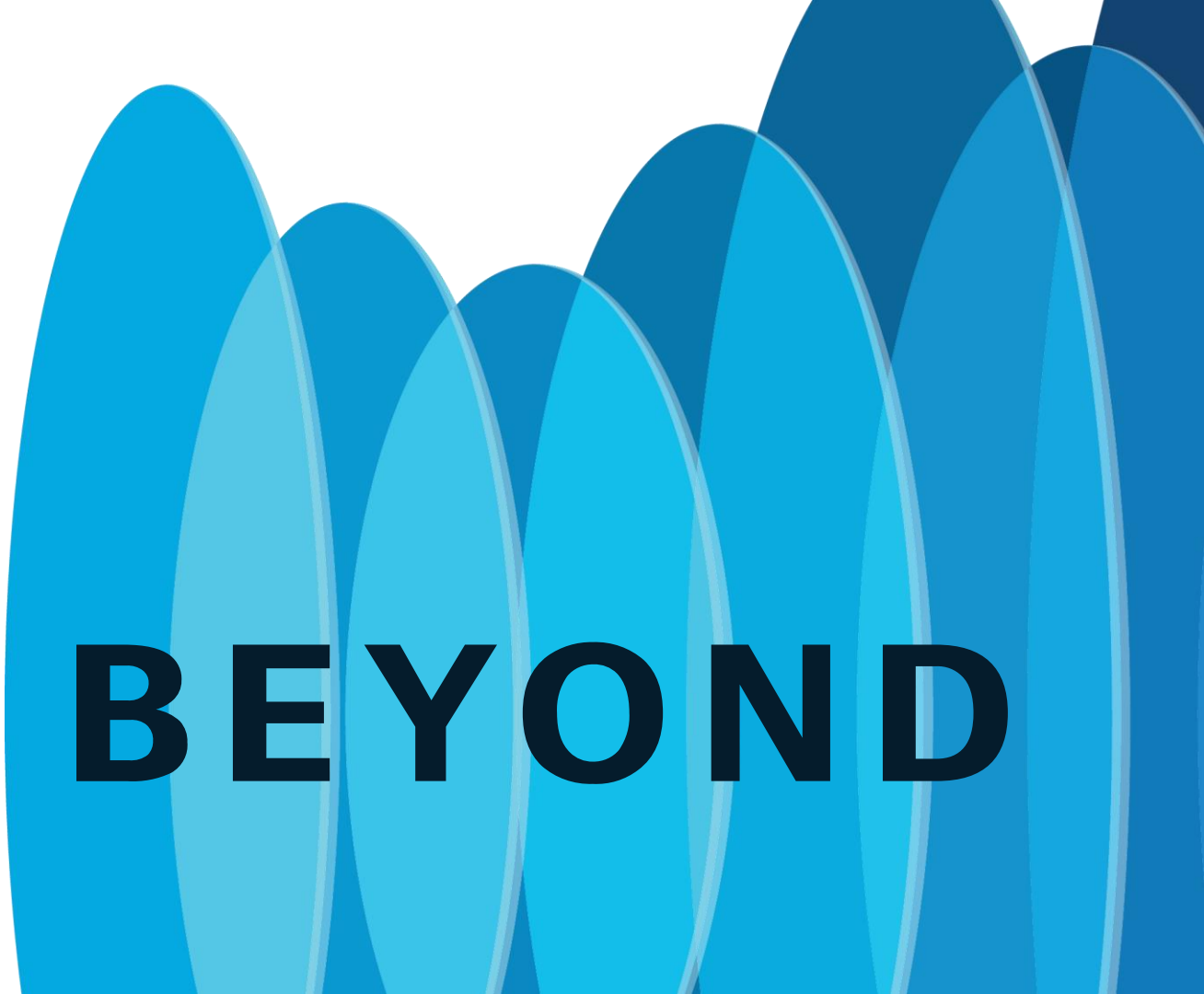

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