Wi-Fi 7 Unleashed: Next-Generation Wireless for the Modern Enterprise

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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

Wi-Fi 1
1999
Date Rate: 11 Mbps (max)
20 MHz
QPSK
2.4 GHz Band

Wi-Fi 2
2003
Date Rate: 54 Mbps (max)
20 MHz Channels
64 QAM
5 GHz Band

Wi-Fi 3
2004
Date Rate: 54 Mbps (max)
20 MHz Channels
64 QAM
2.4/5 GHz Band

Wi-Fi 4
2009
Date Rate: 600 Mbps (max)
40 MHz Channel Bonding
4x4 MIMO
64 QAM

Wi-Fi 5
2013
Date Rate: 7 Gbps (max)
80, 160 MHz Channel Bonding
4 DL MU-MIMO
256 QAM

Wi-Fi 6
2019
Date Rate: 9.6 Gbps (max)
80, 160 MHz Channel Bonding
OFDMA, UL, DL MU-MIMO
1024 QAM
TWT

Wi-Fi 6E
2021

Wi-Fi 7
2024
Date Rate: 23 Gbps (max)
320 MHz Channel Bonding
4096 QAM
MLO, MRU, R-TWT

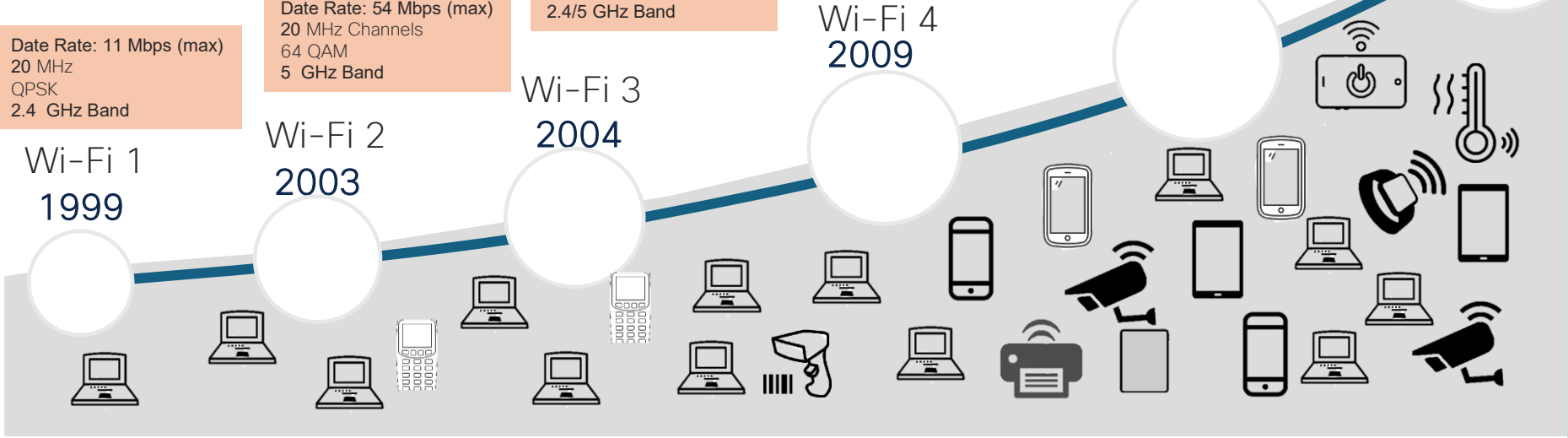
Extremely High throughput up to 3x speed of 11ax

New 6 GHz Band

- Multi-lane expressway for Wi-Fi
- More bandwidth

High Efficiency
4x Capacity
IoT Scale

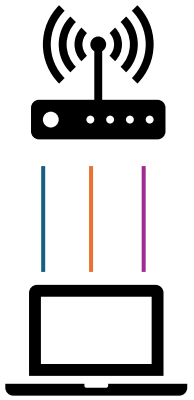
- Cellular like Determinism for high quality services
- Higher power efficiency to accelerate IoT adoption
- Extended outdoor range
- Better app. performance in high density deployments



What is Wi-Fi 7 (and a bit of 11be)

320 MHz in 6 GHz

4K QAM



MLO

Enhanced Security

Multi-RU

Compressed Block Ack

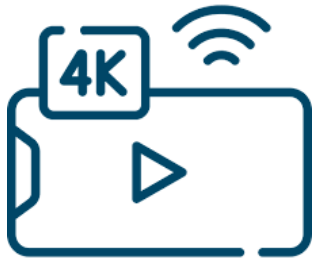
(512 MPDUs)

Preamble puncturing

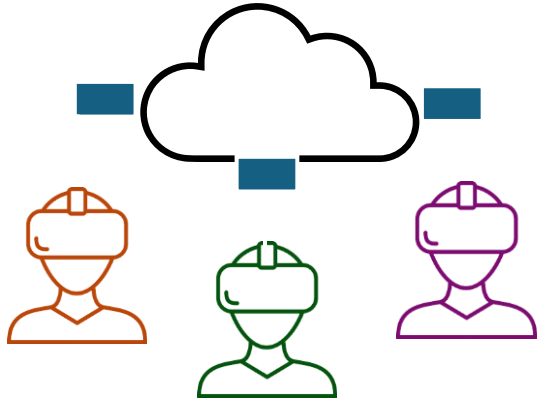
Min ch. width of 80

Triggered UL Access Optimization

Wi-Fi 7 Use Cases



High Definition Video Streaming



Multi-user AR/VR/XR

Emergency Preparedness Communication Services

Industrial IoT

Hybrid Work

Immersive Gaming & Entertainment

Automotive

Immersive Learning

Wi-Fi 7 4K-QAM

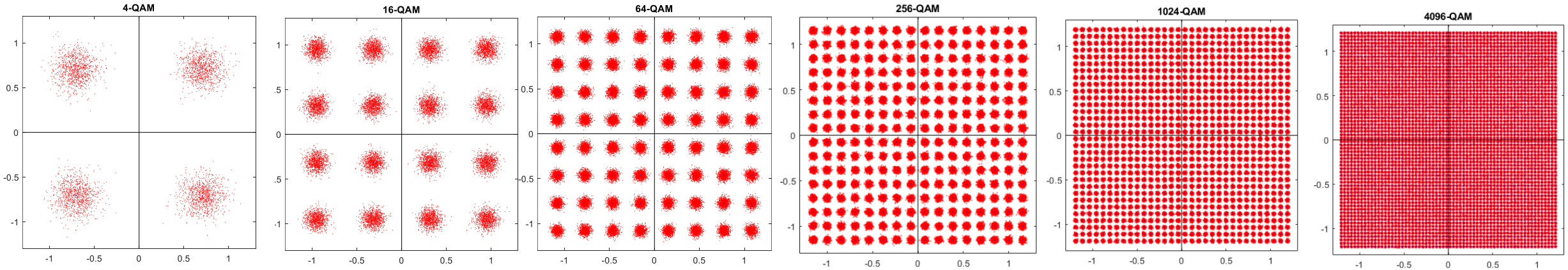
(MCS12/13) increases the peak PHY data rate

- MCS 12 and MCS 13 indicate a 4096-QAM constellation with a code rate of ¾ and ⅚ 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-Fi 7 – Multilink (MLO)

Method	Benefit
Aggregation	Throughput
Steering	Lower Latency
Redundancy	Reliability

MLD: Multi Link Device

Wi-Fi 7 Preamble Puncturing

Without Preamble Puncturing:

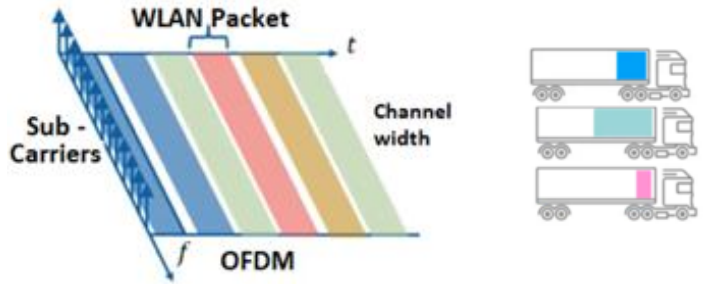
With Preamble Puncturing:

Puncturing allowed for
80 MHz channel width or wider

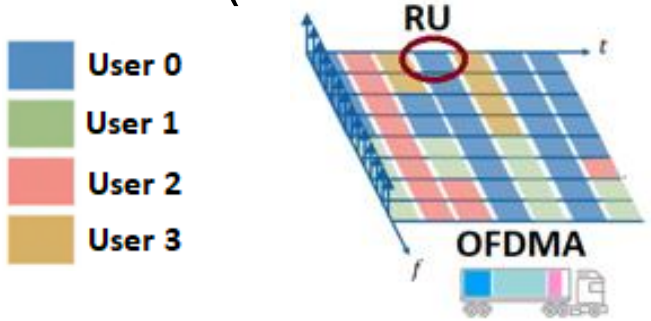
Channel Width	Allowed Puncturing
80 MHz	20 MHz
160 MHz	20 or 40 MHz
320 MHz	40 or 80 MHz (or) 40 + 80 MHz

Wi-Fi 7 Multiple Resource Unit (MRU)

OFDM (Before Wi-Fi 6)



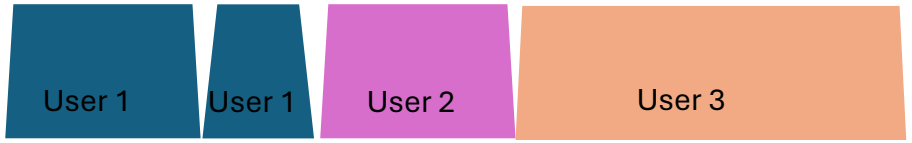
OFDMA (Wi-Fi 6 and later)



Wi-Fi 6

← One user can have only one RU

Wi-Fi 7



← 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 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 17 – all models
- ** 160MHz limitations

Mac OS

- Not yet

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

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 WLC or Meraki stack on Day 0, based on Intent

Management Mode Change from Day 1 to N

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

Indoor or Outdoor Use

Dual 10Gbps multigigabit

Accelerometer

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

Integrated Hyper-directional Antenna

Global Use AP

CleanAir®
Pro

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

BLE/IoT radio & accelerometer

Dual 10Gbps multigigabit

Ultra Wide Band (UWB)

USB 2.0 – 9W

Accelerometer

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

Integrated Omnidirectional Antenna

New Articulating Mount Option

Same brackets as always

Already Wi-Fi 7 certified!

CleanAir® Pro

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(2.4/5GHz (XOR), 5 GHz, 6GHz)

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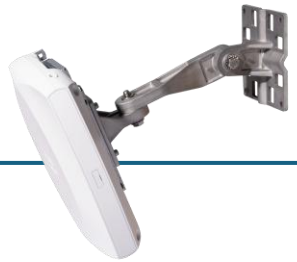

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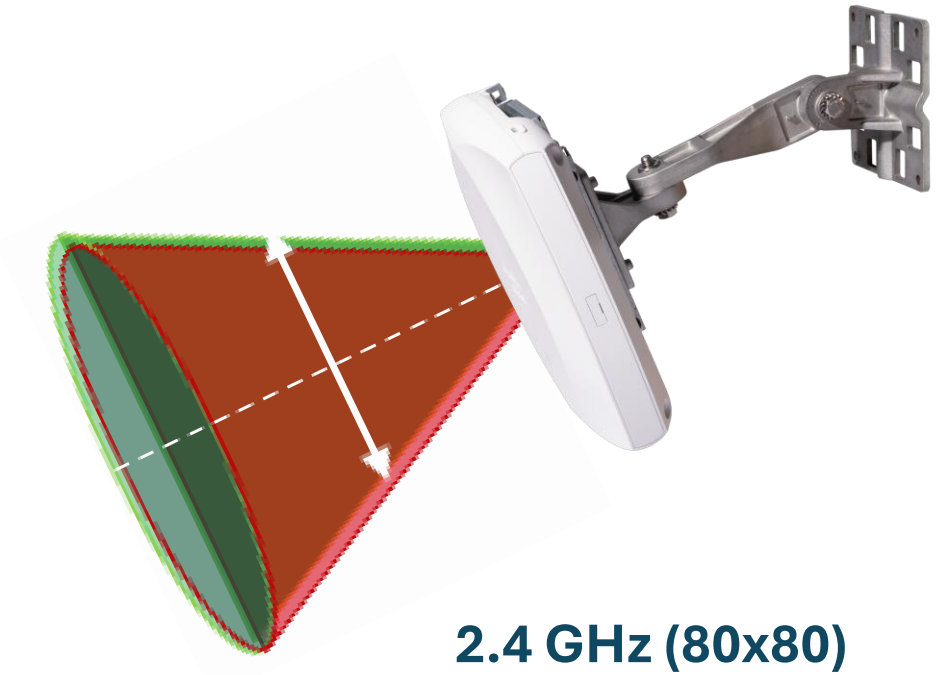
Antenna differences between CW9176I and CW9176D1

designed with an integrated omni-directional antenna ceiling mount for a “360 degree” coverage pattern – ideal for offices, conventional buildings



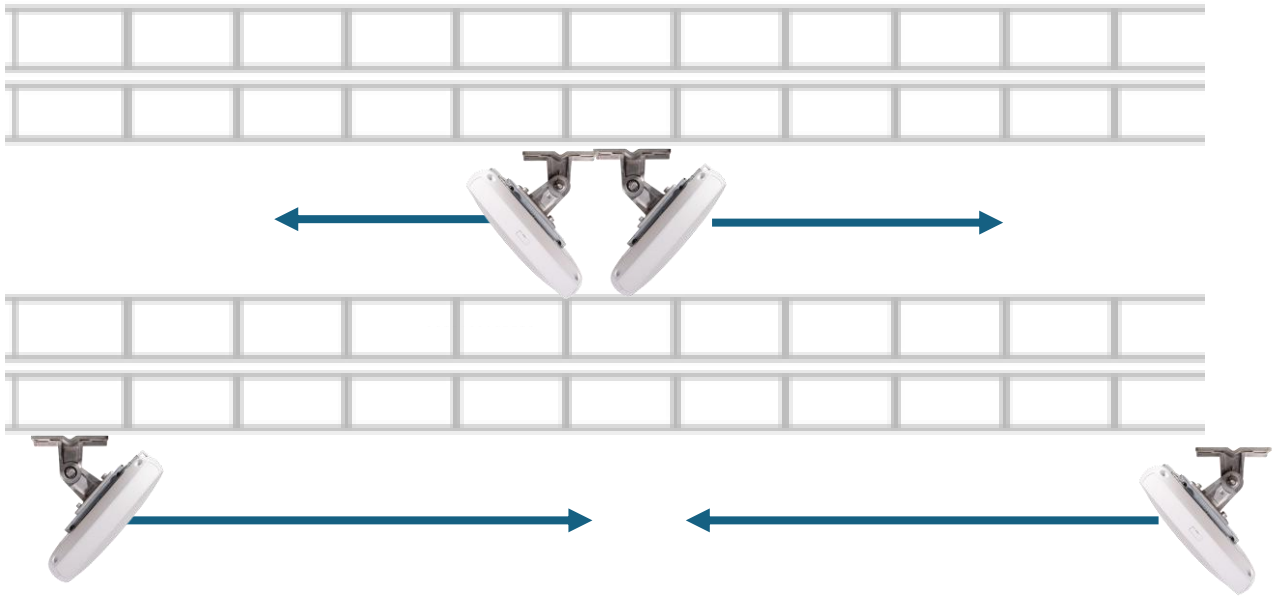
2.4 GHz (80x80)
5 & 6 GHz (70x70)

designed with an integrated directional antenna allowing the coverage pattern to favor the area the AP is facing - ideal for warehouse, auditoriums etc.

Use cases - Warehouse (High ceilings / long aisles)

Warehousing challenges

- High Ceilings
- Long aisles
- Stock material changes (seasonal)
- AP (distance to client) & mounting



The Wi-Fi 7 portfolio

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

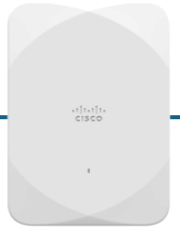
BLE/IoT and dedicated scan radio

Single 2.5Gbps multigigabit uplink

USB 2.0 – 4.5W

DC Power Jack

Integrated Omnidirectional Antenna



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

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

CW9176I/D1 Power over Ethernet

Default Configuration (Fixed Power profile)

Power Source	Number of Spatial Streams	2.4 GHz Radio	5 GHz Radio	6 GHz Radio	mGig Link Speed	USB	IoT/GPS/UWB/Scan Radio
802.3af (PoE)	NA	Disabled	Disabled	Disabled	1G	Disabled	Y
802.3at (PoE+)	10	2x2	4x4	4x4	2.5G*	Disabled	Y
802.3bt** (UPOE/PoE++)	12	4x4	4x4	4x4	10G	Y/9 W	Y

Note:

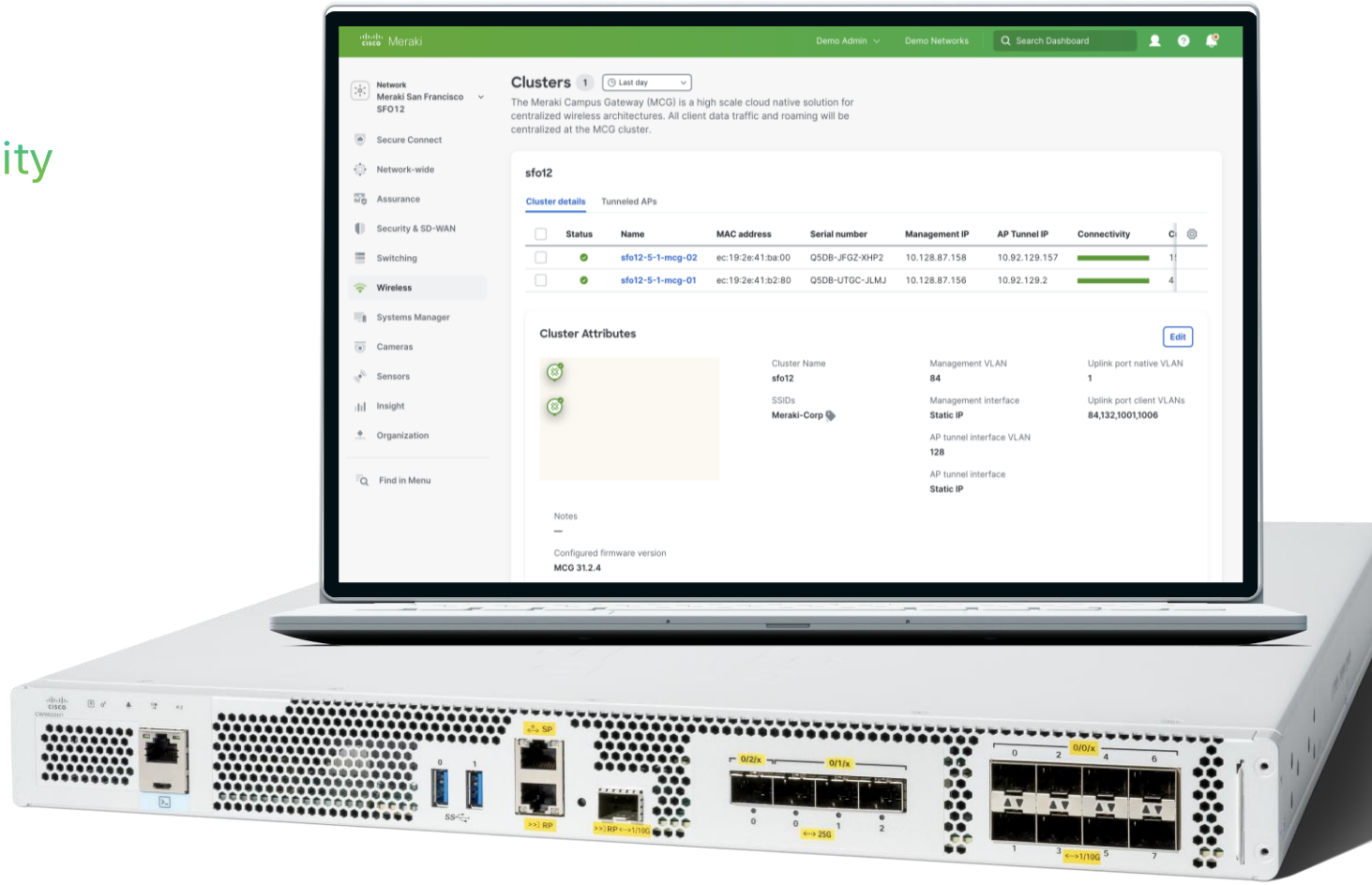
1. * - 2.5 G Ethernet speed with “802.3at” starting IOS-XE 17.15.3
2. **For full radio operation – AP needs more than 30W of power with Type 3 IEEE 802.3bt/ Class 5
3. CW-INJ-8, AIR-PWRINJ7, MA-INJ-6 are Cisco’s 802.3bt power injectors

Campus Gateway

Enterprise-class cloud functionality

Deploy without redesign

Seamless roaming at scale



Wi-Fi 7 Security

WPA3/Enhanced Open Mandatory for Wi-Fi 7

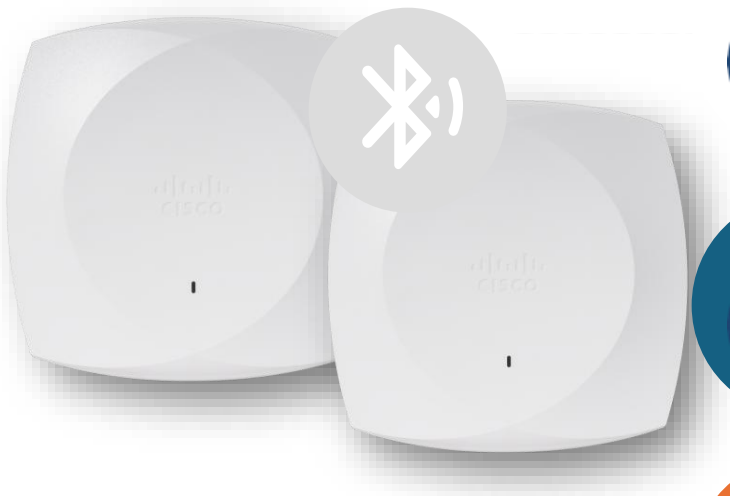
New AKM support for WPA3-SAE*

Enhanced ciphers for WPA3-SAE & OWE*

Protected Management Frame (PMF) Mandatory

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

CW917x IoT radio Integration with Cisco Spaces



Configure as a BLE Gateway

Enable CW917x Access Points as a Base or Advanced AP Gateway

Enable Scan and/or Transmit Mode

Scan for information from nearby BLE devices and stream that data to Cisco Spaces and/or transmit BLE signals from CW917x Access Points

BLE Device Configuration

Configure the BLE devices from Cisco Spaces and remove the need for multiple Gateways

AP Product	IOS-XE Release
CW9178I	17.15.2
CW9176I/D1	17.15.2

IoT radio use cases

Asset Tracking

- Deploy BLE sensors to track real time location of high value devices at an increased accuracy
- Leverage one simple platform to understand how assets are being used and where processes could be more efficient

Environmental Monitoring

- Real-time monitoring from IoT devices that measure environmental factors such as humidity, CO2 levels, air quality, temperature, etc.
- Create alerts and reports based on the data recorded from the sensors

Workspace Optimization

- Gain insight on workspaces from BLE devices to enhance visitor and employee experience for venues and workplaces
- Transform workspaces to increase efficiency and utilization

Deploying and migrating to Wi-Fi 7

Recommendations, tips, and tricks

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

Security requirements

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

WPA3 was not required for prior Wi-Fi generations; 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

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