
Wi-Fi 8
Extreme networks

Extreme networks

@ WLPC PRAGUE 2026

EXTREME NETWORKS EVENING EVENT

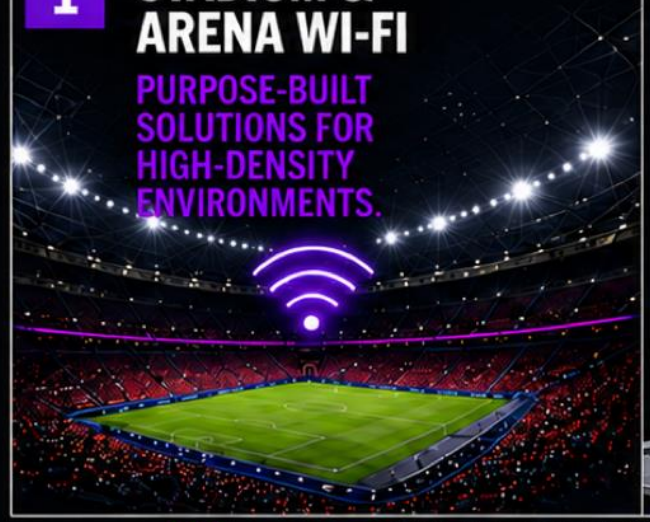
WEDNESDAY • 6:15 PM • SUN 1 ROOM

EVERYBODY IS WELCOME!



1 STADIUM & ARENA WI-FI

PURPOSE-BUILT SOLUTIONS FOR HIGH-DENSITY ENVIRONMENTS.



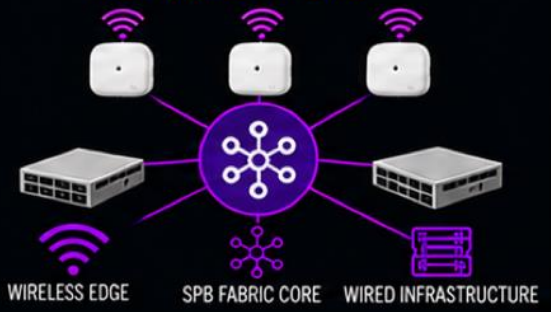
2 API FIRST

LIVE DEMOS OF OUR API-FIRST STRATEGY AND WHAT'S ON THE HORIZON.



3 IT'S NOT YOUR DADDY'S FABRIC

LIVE DEMO OF OUR SPB-BASED FABRIC THAT INTEGRATES WITH WI-FI TO EXTEND AUTOMATION AND SEGMENTATION.



4 GREEN AP

WHAT IT REALLY MEANS TO HAVE A "GREEN AP." LIVE DEMO.



JOIN THE EXTREME NETWORKS TEAM

FOR AN EVENING EVENT!

WEDNESDAY • 6:15 PM • SUN 1 ROOM

FOOD | DRINKS | GREAT CONVERSATIONS

EVERYBODY AT WLPC IS WELCOME!

Let’s get connected…

David Coleman
Office of the CTO



Wi-Fi 8 – Ultra High Reliability

Wi-Fi 8 is coming to market as early as late 2027

Based on IEEE 802.11bn – Ultra High Reliability (UHR)

Marketing Goals:

- Reliability at 99.9999th percentile (i.e., <0.0001% packet failure)
- Latency reduced to sub 5 ms or even 1 ms

What can Wi-Fi 8 deliver over Wi-Fi 7 ?

Technical Targets:

- 25% throughput increase at a given SINR (rate-vs-range)

  25% faster at the same distance

- 25% reduction in 95th percentile latency

  25% fewer worst-case lag spikes

- 25% reduction in MPDU loss

  25% fewer dropped packets and retransmissions

Wi-Fi 8 Capability Overview

Extreme networks

Domain	What It Addresses	Key Features	How It Works
Spectrum Efficiency	Better use of available channels	NPCA, DSO, DBE	Single-AP — AP optimizes its own spectrum
Multi-AP Coordination (MAPC)	APs working together	Co-TDMA, Co-BF	Inter-AP coordination agreements
Mobility	Seamless roaming	SMD Roaming, Bounded ESS	Security context maintained across APs
Reliability	Smoother performance	New MCS, IDC/DUO, DPS, TWT	Finer rate steps, coexistence, power mgmt
Uplink / Range	Stronger signal at distance	DRU, ELR	PHY enhancements for edge-of-coverage
Security	Protecting all planes	WPA3, RSNO, Secure Control Frames, 802.11bi	Mandatory baseline plus optional enhancements

Spectrum Efficiency



Non-Primary Channel Access (NPCA)

1 AP SENSES THE CHANNEL

The AP performs clear channel assessment across the entire operating channel.



AP

Primary 20 MHz	Secondary 20 MHz	Secondary 20 MHz	Secondary 20 MHz
⊗	✓	✓	✓

⊗ Busy ✓ Idle

Primary channel is **BUSY**
Secondary channels are **IDLE**

2 AP MAKES THE DECISION

AP decides not to wait for the primary channel and selects available secondary channel(s) for transmission.



AP

Primary 20 MHz	Secondary 20 MHz	Secondary 20 MHz	Secondary 20 MHz
⊗	✓	✓	✓

AP selects available secondary channel(s)

Decision is **made by the AP**
Not a client (STA) decision

3 AP TRANSMITS USING NPCA

AP transmits (or schedules) on the selected non-primary channel(s) using available bandwidth.



AP

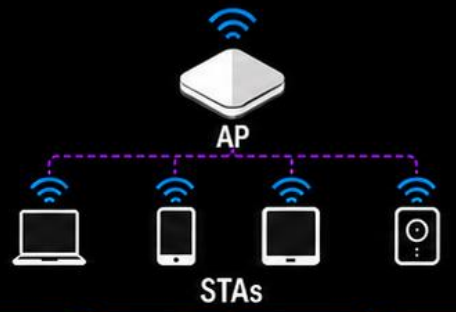
Primary 20 MHz	Secondary 20 MHz	Secondary 20 MHz	Secondary 20 MHz
⊗	↑	↑	✓

Transmission on non-primary channel(s) (NPCA)

Bandwidth may be reduced
(e.g., **20 / 40 MHz** instead of 80 MHz)

4 STAs FOLLOW AP CONTROL

Associated STAs respond to the AP's transmission/schedule on the non-primary channel(s).



Primary 20 MHz	Secondary 20 MHz	Secondary 20 MHz	Secondary 20 MHz
⊗	↑	↑	✓

STAs do **NOT** independently decide to use NPCA.
They **follow the AP**.

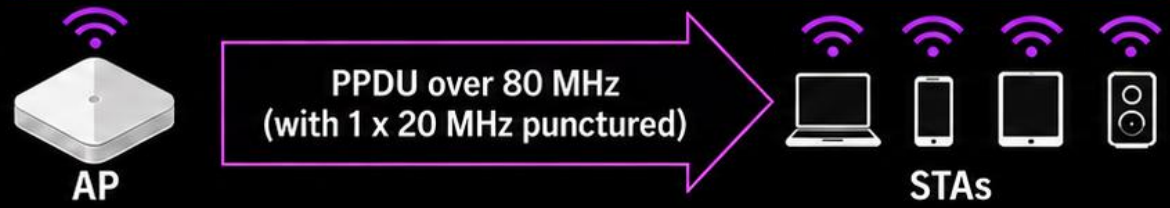
NPCA versus Preamble Puncturing

PREAMBLE PUNCTURING (PP)

Transmit over the full channel while "puncturing" only the busy subchannel(s) during the preamble.

EXAMPLE: 80 MHz CHANNEL

PRIMARY 20 MHz	SECONDARY 20 MHz	SECONDARY 20 MHz	SECONDARY 20 MHz
DATA	PUNCTURED (not used)	DATA	DATA
Must be included (always idle) and Used for data	Punctured (if busy)	Used for data	



You cannot puncture the primary channel.

NON-PRIMARY CHANNEL ACCESS (NPCA)

If the primary channel is busy, transmit only on available non-primary channel(s).

EXAMPLE: 80 MHz CHANNEL

PRIMARY 20 MHz	SECONDARY 20 MHz	SECONDARY 20 MHz	SECONDARY 20 MHz
BUSY	DATA	DATA	NOT AVAILABLE
Busy (ignored)	Used for data (40 MHz total)		Not used



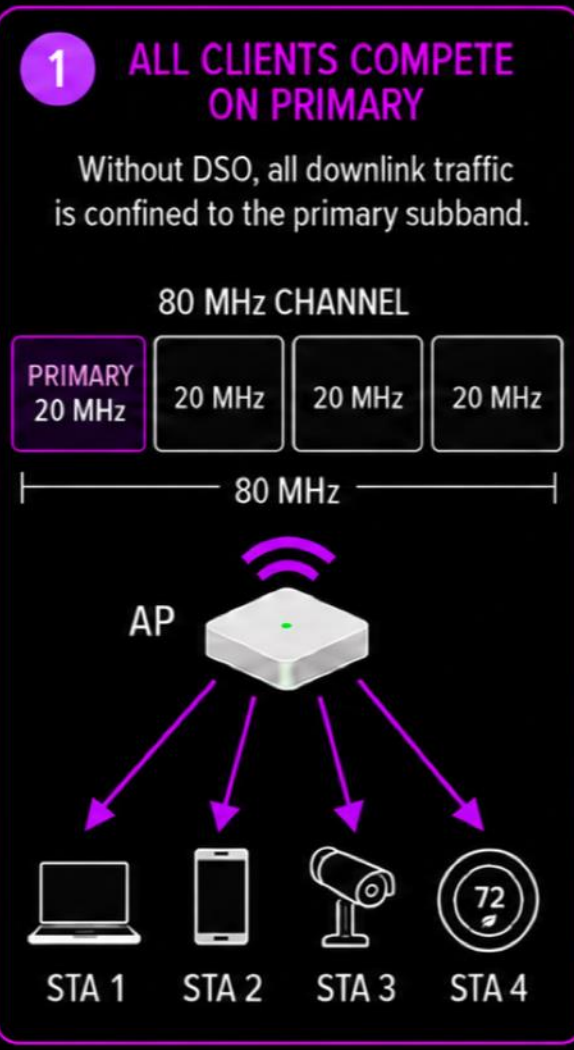
Primary channel can be bypassed for data.

Dynamic Sub-band Operation (DSO)

Single 80 MHz channel — divided into 20 MHz subbands.

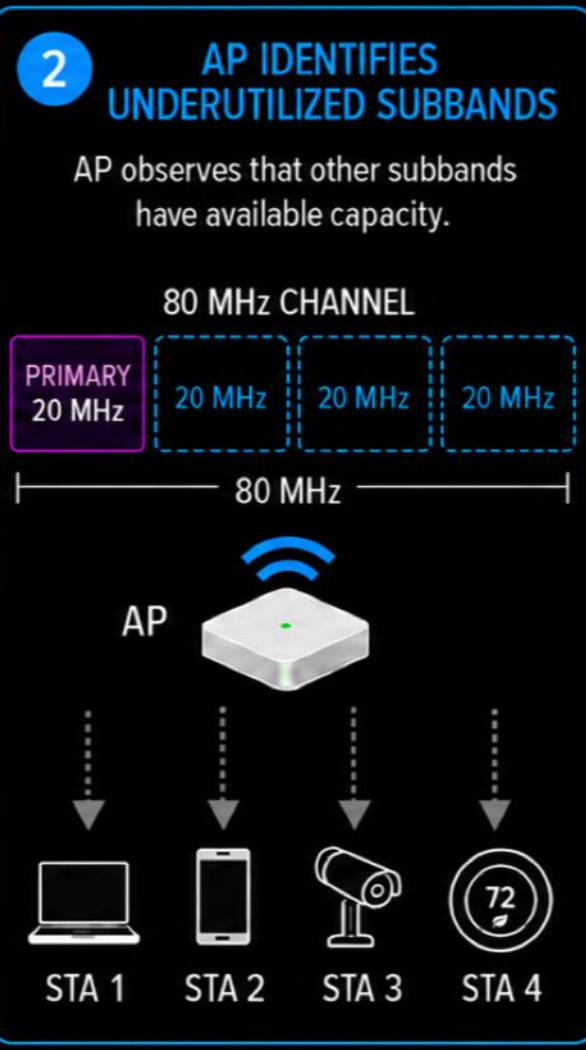
1 ALL CLIENTS COMPETE ON PRIMARY

Without DSO, all downlink traffic is confined to the primary subband.



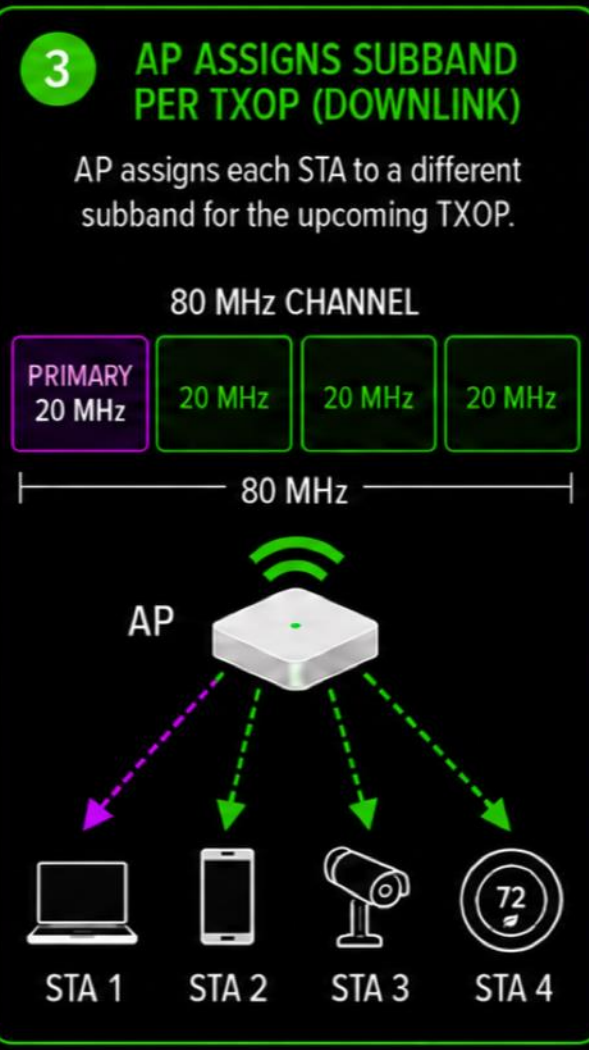
2 AP IDENTIFIES UNDERUTILIZED SUBBANDS

AP observes that other subbands have available capacity.



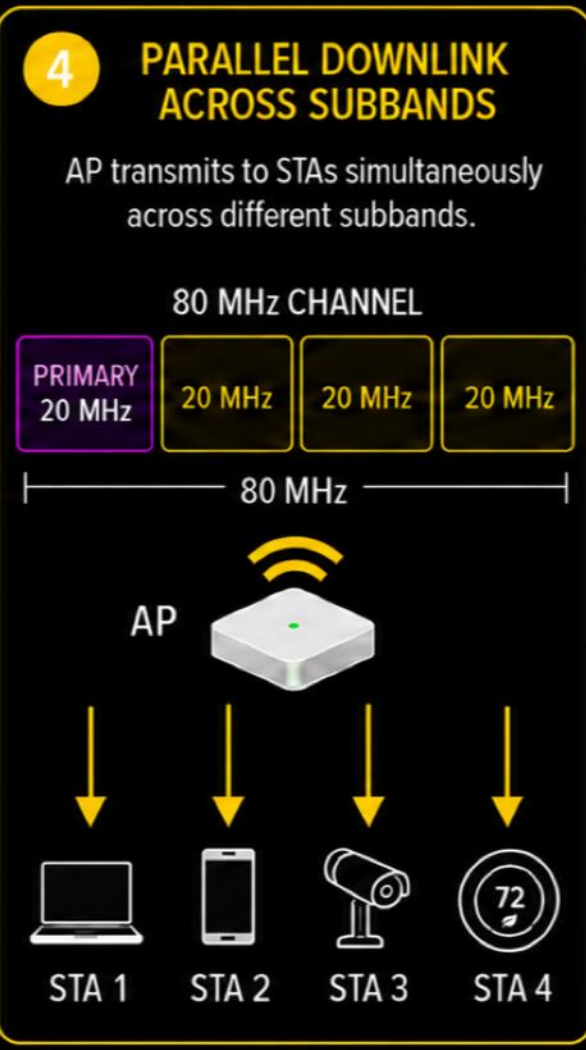
3 AP ASSIGNS SUBBAND PER TXOP (DOWNLINK)

AP assigns each STA to a different subband for the upcoming TXOP.



4 PARALLEL DOWNLINK ACROSS SUBBANDS

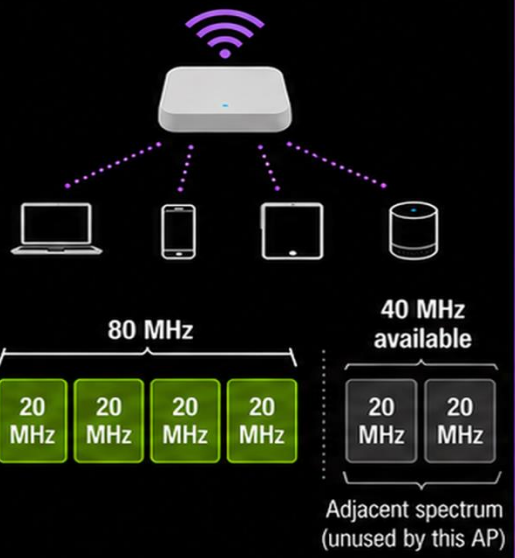
AP transmits to STAs simultaneously across different subbands.



Dynamic Bandwidth Expansion (DBE)

1 NORMAL OPERATION

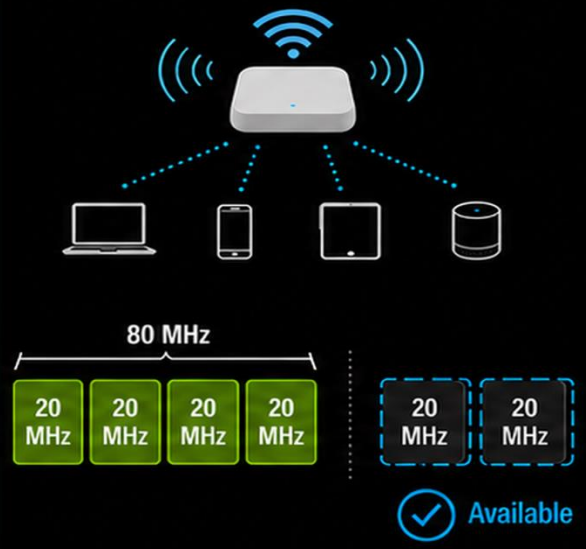
The AP operates on its standard BSS bandwidth.



AP stays within its assigned 80 MHz channel.

2 AP DETECTS AVAILABLE SPECTRUM

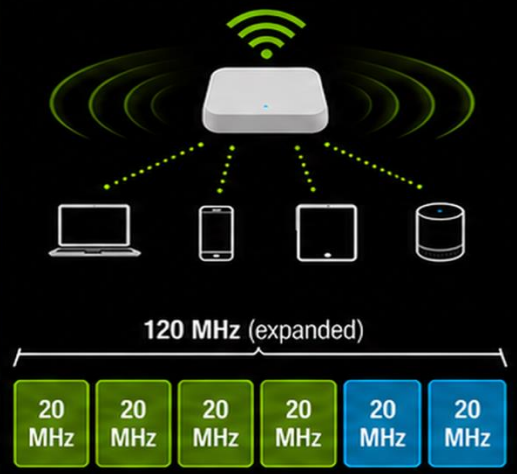
The AP senses that adjacent spectrum is idle — no OBSS activity detected.



Adjacent channels are idle — opportunity to expand.

3 BANDWIDTH EXPANSION

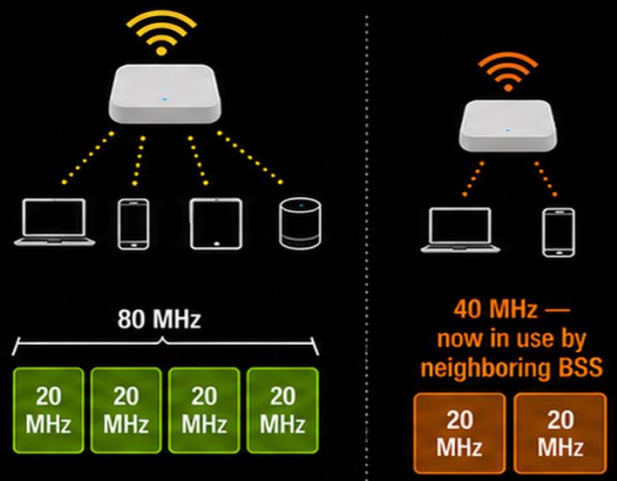
The AP temporarily expands its operating bandwidth to include the available adjacent spectrum.



Clients get higher throughput during the expansion window.

4 DYNAMIC CONTRACTION

When adjacent spectrum is needed by other BSSs, the AP contracts back to its original bandwidth.



Expansion is temporary and automatic — no disruption to clients.

Green blocks = Original BSS bandwidth

Blue blocks = Expanded bandwidth (temporary)

Gray blocks = Available but not assigned

DBE is optional, but becomes mandatory for APs supporting WPA3-Enterprise.

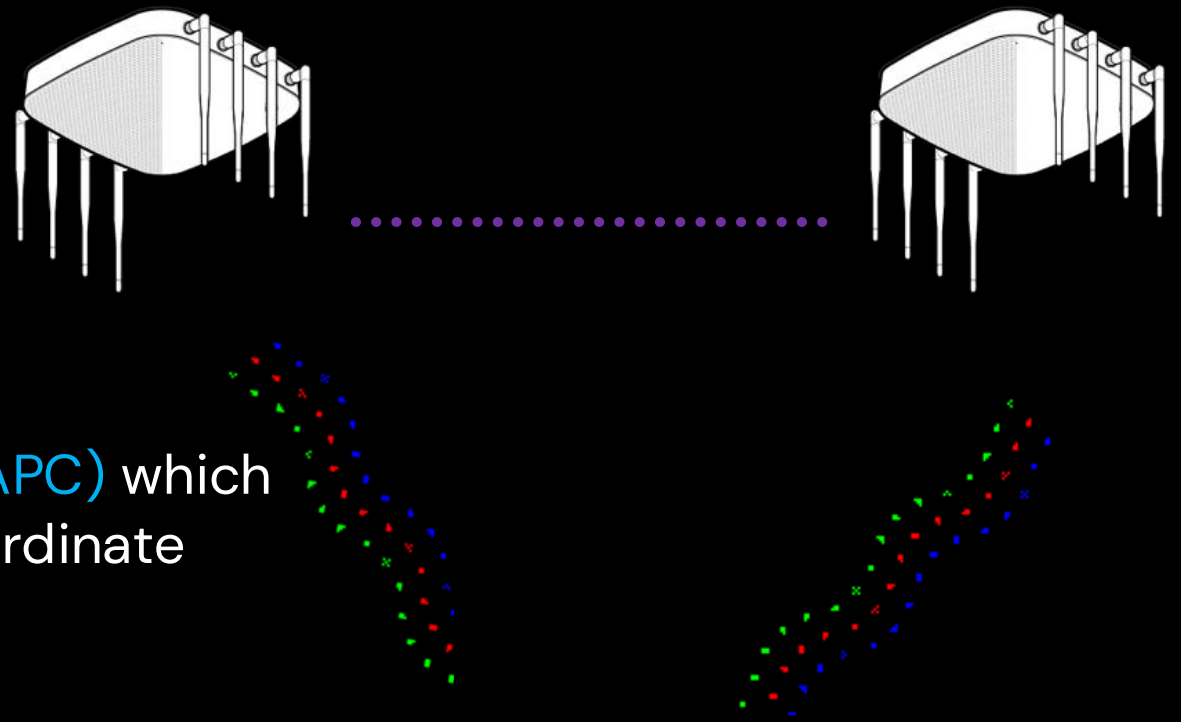


Multi-AP

Coordination (MAPC)



Wi-Fi 8 – MAPC



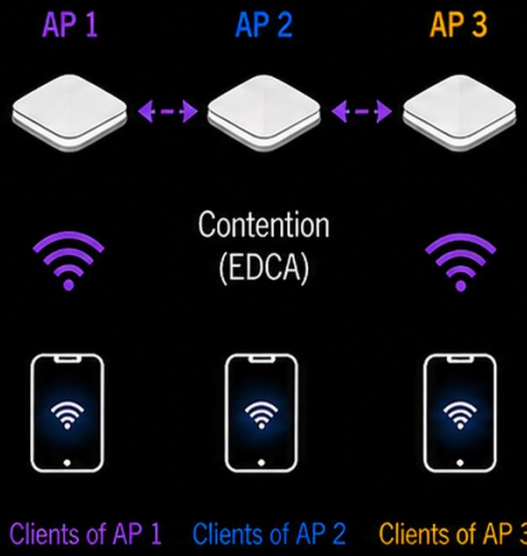
A flagship capability is Multi-AP Coordination (MAPC) which enables two or more Wi-Fi 8 access points to coordinate their transmissions to improve efficiency, reduce interference, and enhance performance

Coordinated Time Division Multiple Access (Co-TDMA)

Extreme networks

1 APs Compete for Channel Access

Standard EDCA contention determines the TXOP owner.



2 One AP Wins the TXOP

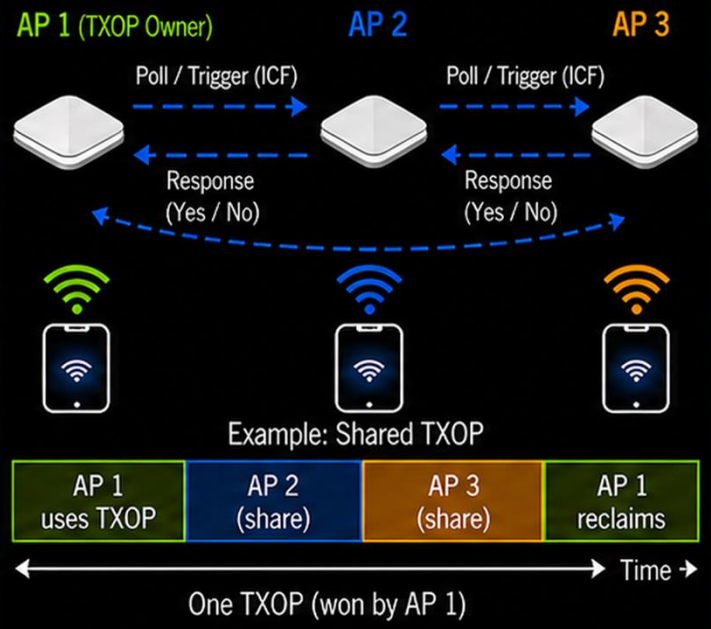
The winning AP gains exclusive use of the channel (TXOP).



AP 1 is the TXOP owner

3 Dynamic TXOP Coordination

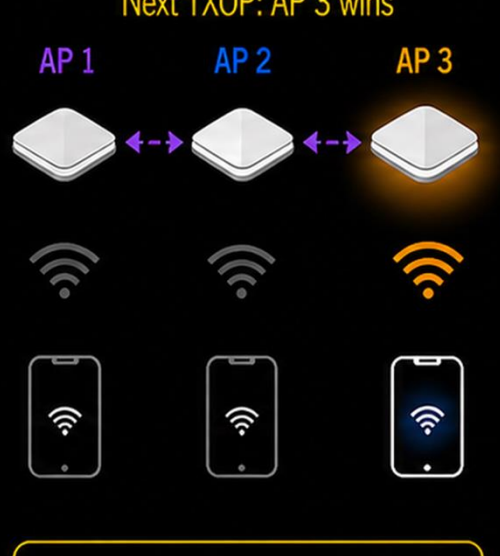
The TXOP owner may poll neighbors and share part of its TXOP.



Sharing is sequential — one AP transmits at a time.
Supports TXOP return for chaining to multiple APs.

4 Per-TXOP Coordination Repeats

For each new TXOP, normal contention occurs again—any AP may win.

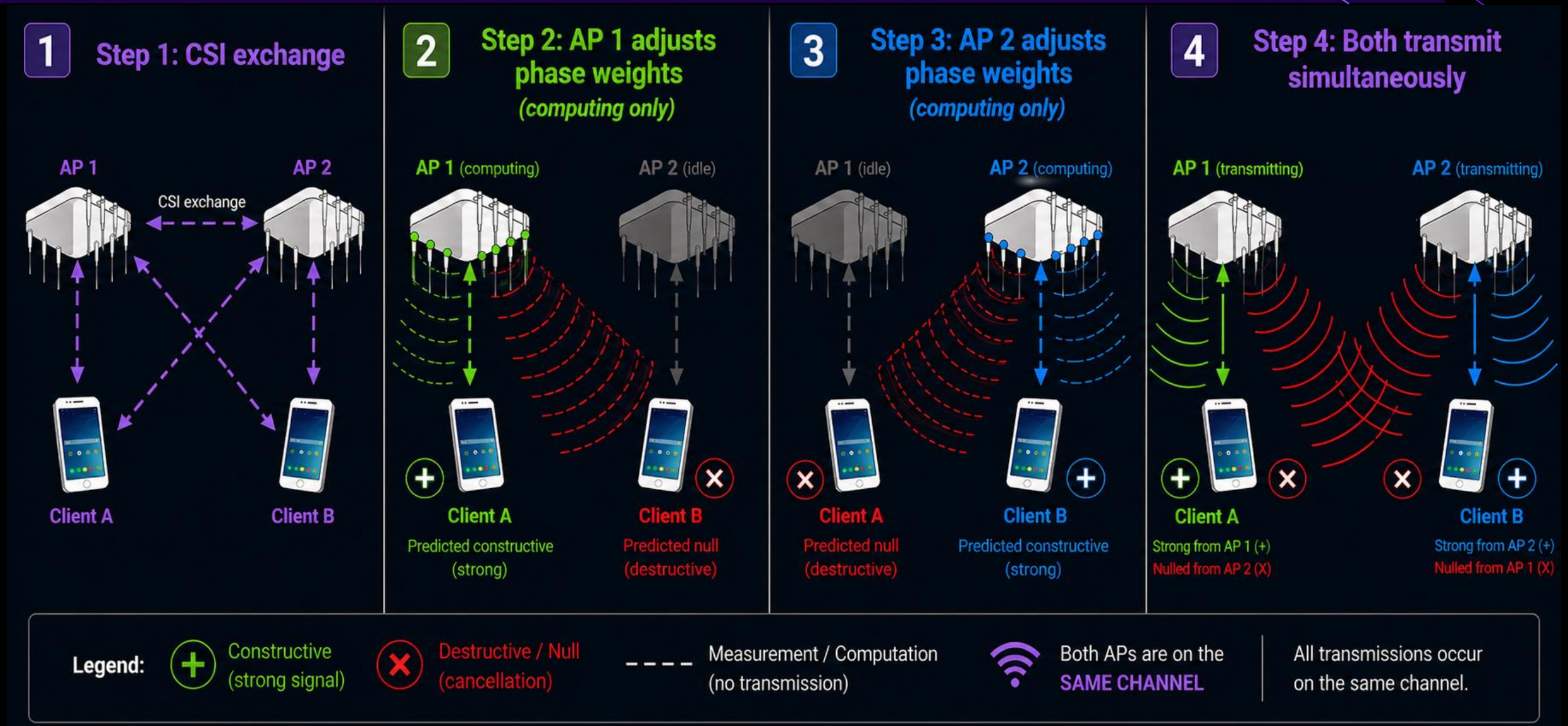


Coordination happens per TXOP based on current conditions.

Legend:

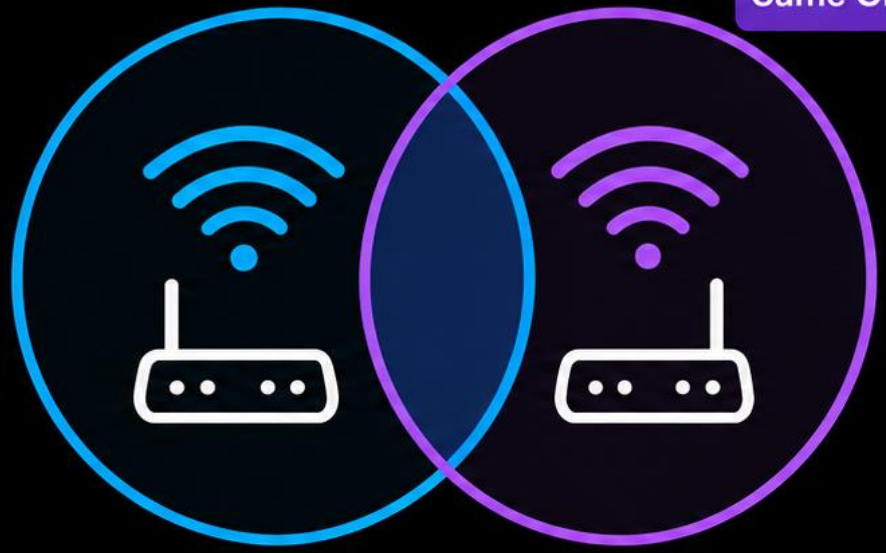
- AP 1 transmission opportunity
- AP 2 transmission opportunity
- AP 3 transmission opportunity
- Contention / Information exchange
- Control / Polling (Trigger)
- All APs are on the same channel
- Silent (no transmission)

Coordinated Beamforming (Co-BF)



Wi-Fi 8: What Didn't Make the Cut

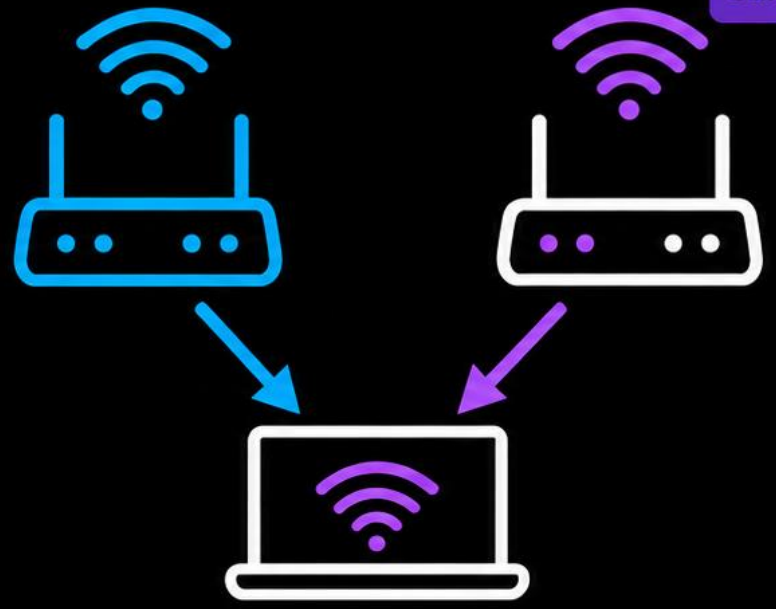
Same Channel



Coordinated Spatial Reuse (Co-SR)

Multiple APs transmit simultaneously on the same channel by coordinating power levels and interference thresholds.

Same Channel



Joint Transmission (J-TX)

Multiple APs simultaneously transmit the same data to a single client, combining signals for a massive SNR boost.

These features are defined in the IEEE 802.11bn specification framework but are not expected as first-generation Wi-Fi 8 capabilities



Mobility

Spectrum Efficiency

Multi-AP Coordination (MAPC)

Mobility

Reliability

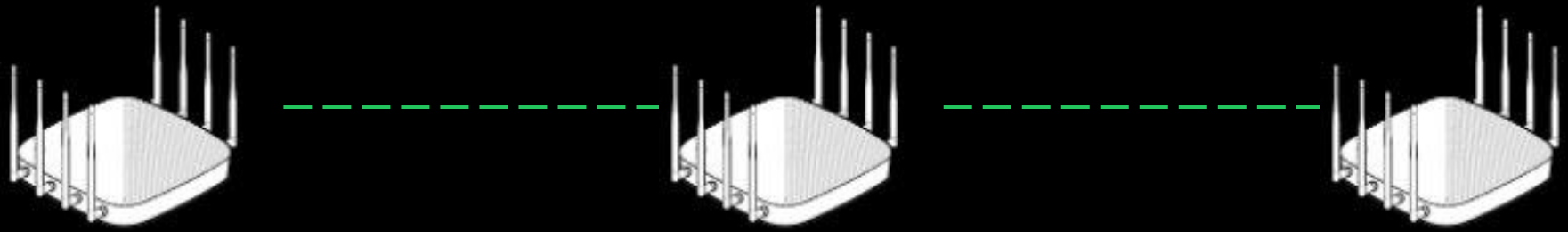
Uplink / Range

Security

Wi-Fi 8 – Enhanced Roaming

SEAMLESS MOBILITY DOMAIN (SMD)

Shared Security Context across the domain



AP MLD 1
2.4 / 5 / 6 GHz

AP MLD 2
2.4 / 5 / 6 GHz

AP MLD 3
2.4 / 5 / 6 GHz

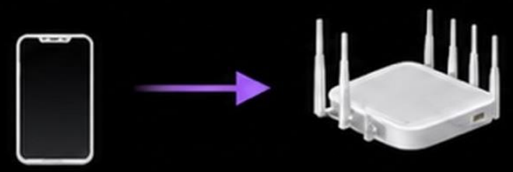


SMD: Association, Transition and Coordination

SMD eliminates re-authentication by sharing a security context across all APs in the domain

1 INITIAL ASSOCIATION

SMD



- Client associates with SMD ID
- PMK derived against SMD ID
- Shared PTK for the domain
- No per-AP key negotiation

One association, one key — entire domain

2 SEAMLESS TRANSITION (ST)



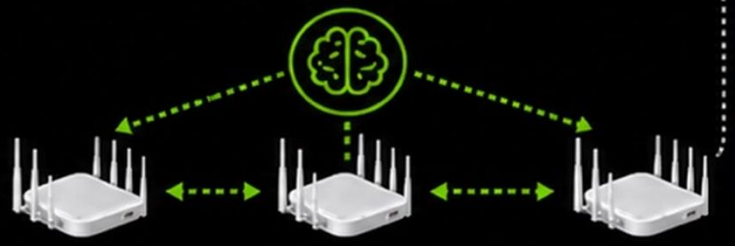
- **Step 1:** Add link to target AP
- **Step 2:** Source AP drains downlink
- **Step 3:** Delete link from source AP

- ✓ Minimized packet loss
- ✓ Sub-millisecond roam

Client never disconnects — links added before removed

3 SMD-ME COORDINATION

SMD-ME
(Management Entity)



- Security keys and sequence numbers
- Client capabilities and state
- Shared via inter-AP backhaul



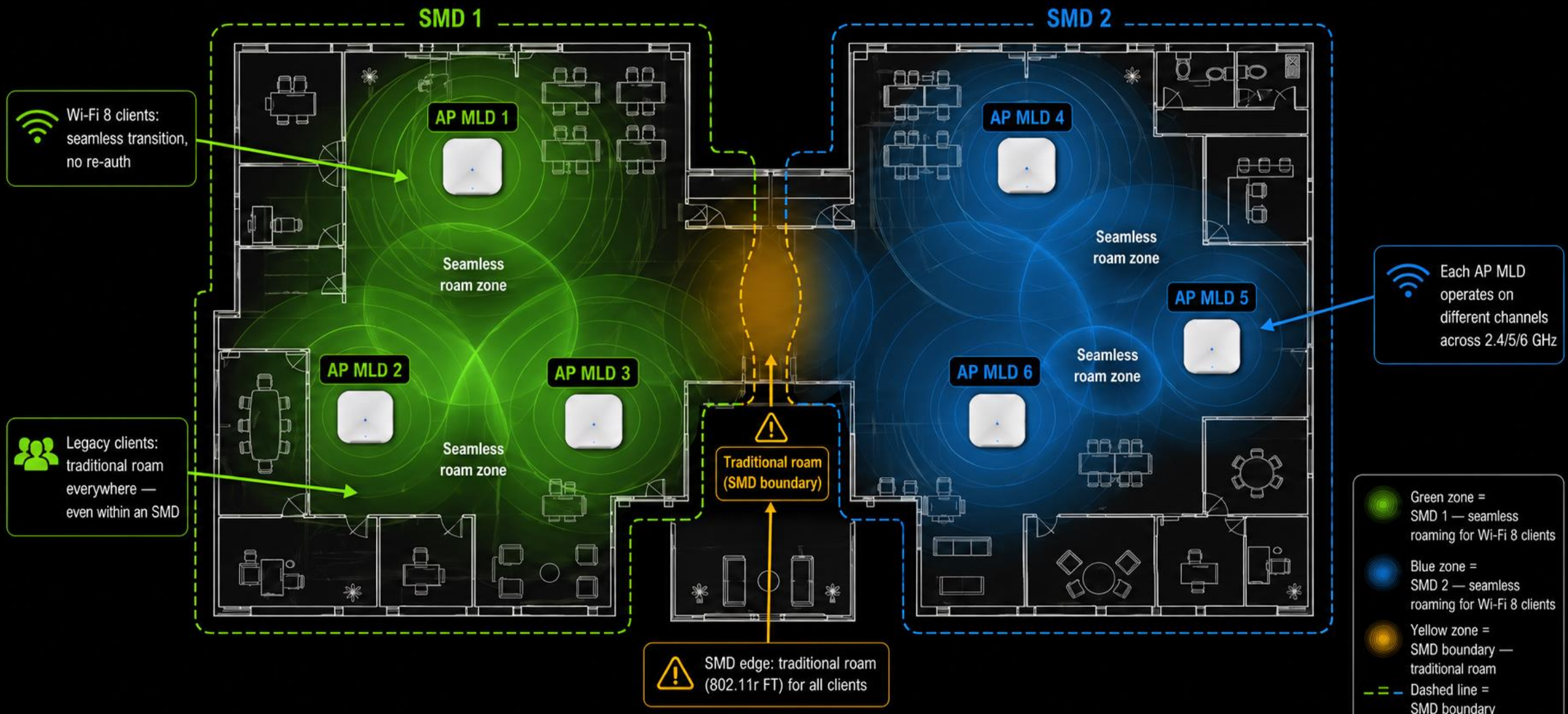
Centralized:
single controller



Distributed:
synced across APs

Every AP has context before the client arrives

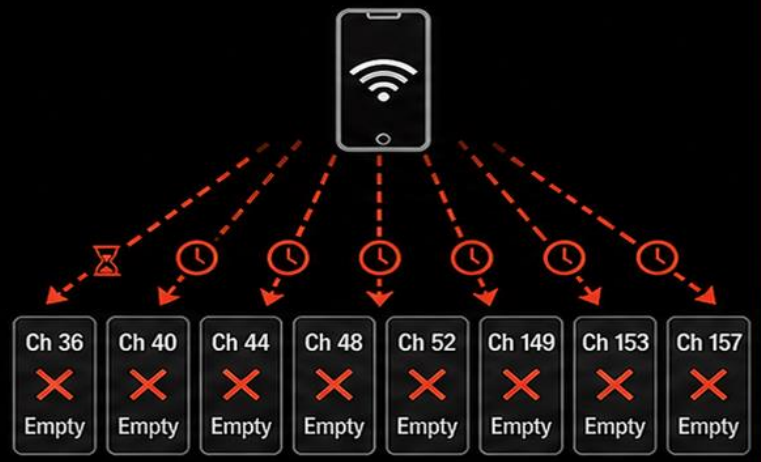
Designing for SMD Roaming



Bounded ESS: Less Scanning, More Battery

1 TODAY: BLIND SCANNING

Client scans every channel looking for roaming targets



Wastes battery, wastes airtime, causes off-channel gaps

2 WI-FI 8: BOUNDED ESS

AP tells client exactly which channels to scan

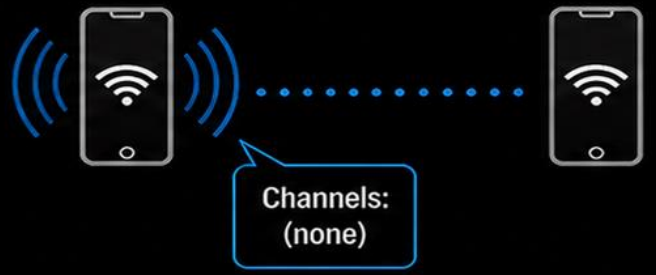


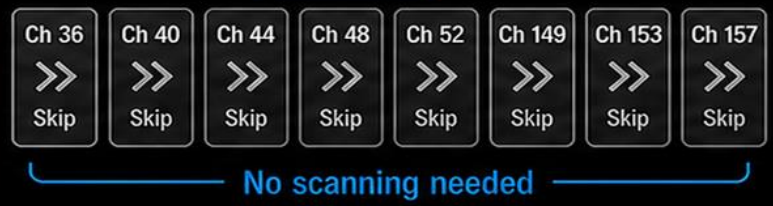


Less scanning, faster roaming, longer battery life

3 SPECIAL CASE: SINGLE AP / MOBILE HOTSPOT

AP signals: no roaming targets exist





Client stops scanning entirely — maximum battery savings

Bounded ESS: the AP tells clients where to look — or not to look at all.



Reliability



New MCS rates for Ultra High Reliability (UHR)

1 MCS LADDER COMPARISON



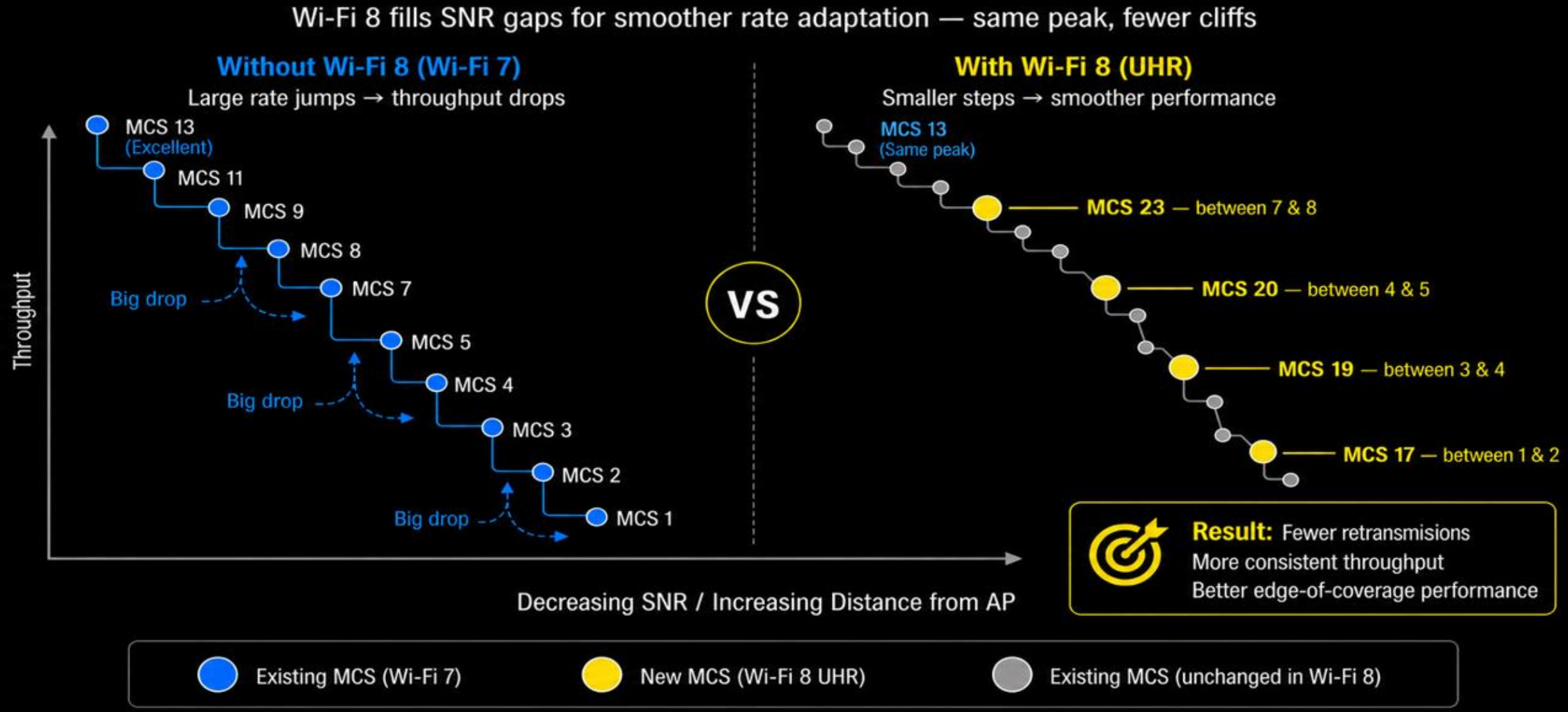
KEY IDEA: Wi-Fi 7 increases peak speed. Wi-Fi 8 improves how smoothly you get there.

2 APPROXIMATE SNR RANGE FOR NEW UHR MCS RATES

MCS	MODULATION	CODING RATE	APPROX. SNR NEEDED (dB)	PURPOSE / BENEFIT
MCS 1	QPSK	1/2	~5 dB	Baseline low-rate
MCS 2	QPSK	3/4	~8 dB	Low-rate step
MCS 3	16-QAM	1/2	~11 dB	Mid-low rate
MCS 4	16-QAM	3/4	~14 dB	Mid rate
MCS 5	64-QAM	2/3	~18 dB	Mid-high rate
MCS 7	64-QAM	5/6	~21 dB	Reliable high rate
MCS 8	256-QAM	3/4	~25 dB	High throughput
MCS 17	**QPSK**	**2/3**	**~6–7 dB**	Fills gap between MCS 1 and MCS 2
MCS 19	**16-QAM**	**2/3**	**~12–13 dB**	Fills gap between MCS 3 and MCS 4
MCS 20	**16-QAM**	**5/6**	**~15–16 dB**	Fills gap between MCS 4 and MCS 5
MCS 23	**256-QAM**	**2/3**	**~23–24 dB**	Fills gap between MCS 7 and MCS 8

SNR values are approximate and vary with bandwidth, LDPC, channel conditions, and device implementation.

Why the new MCS rates are important



Unequal Modulation (UEQM)

1 THE PROBLEM (TODAY: EQUAL MODULATION)



AP (4x4:4)

SS1 — High SNR → MCS 17 (QPSK 2/3) → WASTED CAPACITY

SS2 — Low SNR → MCS 17 (QPSK 2/3) → WASTED CAPACITY



Client (2x2:2)

Weakest stream limits both streams.

AP must drop all streams to the lowest common denominator.

2 THE SOLUTION (WI-FI 8: UNEQUAL MODULATION)



AP (4x4:4)

SS1 — High SNR → MCS 4 (16-QAM 3/4) → FULL CAPACITY UTILIZED

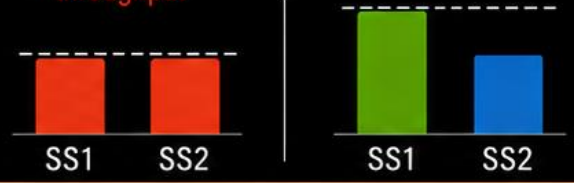
SS2 — Low SNR → MCS 17 (QPSK 2/3) → FULL CAPACITY UTILIZED

THROUGHPUT COMPARISON

Equal modulation: both streams at MCS 17 = lower total throughput

VS

UEQM: MCS 4 + MCS 17 = higher aggregate throughput





Client (2x2:2)

Each stream optimized independently.

New MCS rates (17, 19, 20, 23) provide the finer steps that make UEQM work.

3 WHY IT MATTERS

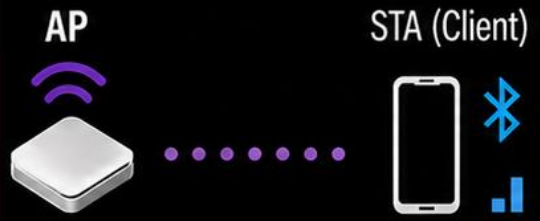
More aggregate throughput — strong streams no longer held back by weak ones

Effectively mandatory — required for any AP with beamforming or any client with 2+ spatial streams

Dynamic Power Save (DPS)

1 LOW CAPABILITY (LC MODE)

By default, the STA operates in low capability mode to reduce power consumption.

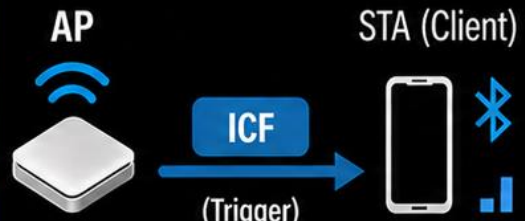


- 20 MHz
- 1 Spatial Stream
- Lower MCS / Simplified PHY

Power-saving baseline

2 AP SENDS ICF (TRIGGER)

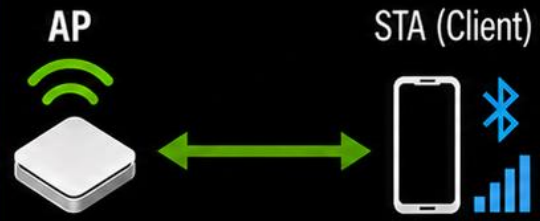
When the AP has data for the STA, it sends an Initial Control Frame (ICF) to trigger a mode switch.



AP tells the STA: "Switch to high capability now."

3 HIGH CAPABILITY (HC MODE)

The STA switches to high capability mode and exchanges data with the AP at full performance.



- Full Bandwidth (e.g., 160 MHz)
- Multiple Spatial Streams
- Higher MCS / Full PHY

High performance when needed

4 BACK TO LOW POWER

After the transmission is complete (or traffic reduces), the STA returns to low capability mode.



Returns to power-saving baseline automatically

DPS is capability scaling, not sleep/wake. The STA stays awake, but operates in low capability until triggered by the AP.

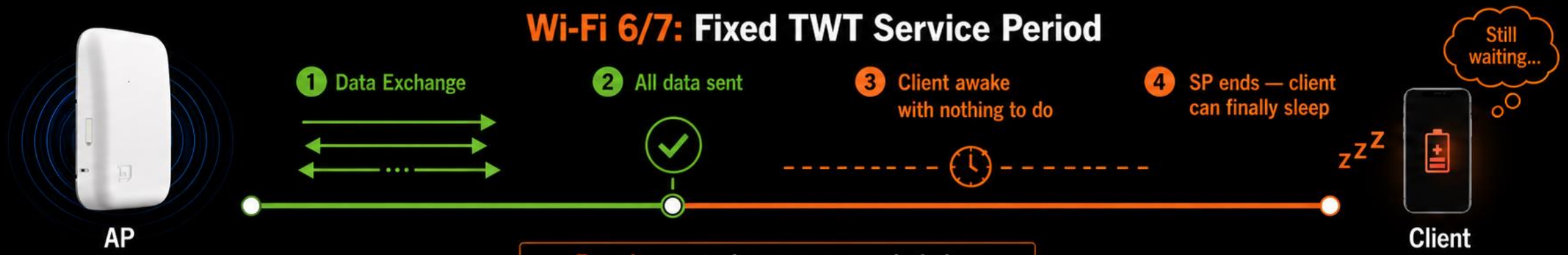
Your APs Were Always 4×4 – Are Clients Are Finally Catching Up?



Four antennas — coming to the clients on your network.

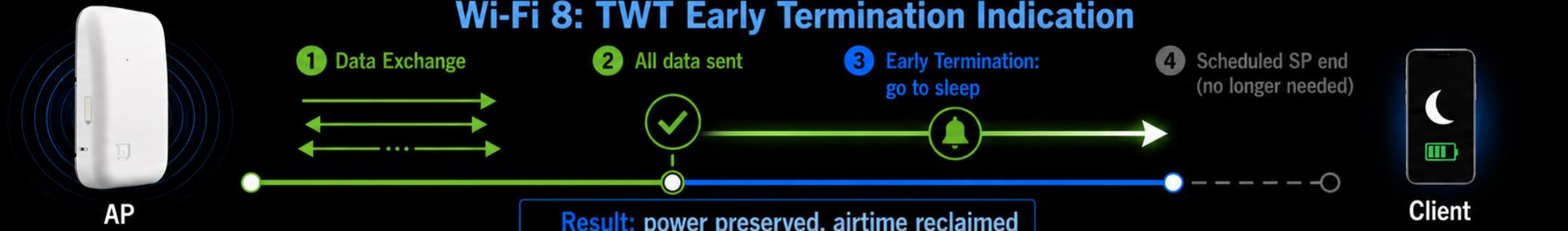
TWT Early Termination

Wi-Fi 6/7: Fixed TWT Service Period



Result: wasted power, wasted airtime

Wi-Fi 8: TWT Early Termination Indication



Result: power preserved, airtime reclaimed

Power Efficiency
clients sleep immediately after data exchange

Airtime Reclaimed
unused SP released to other clients

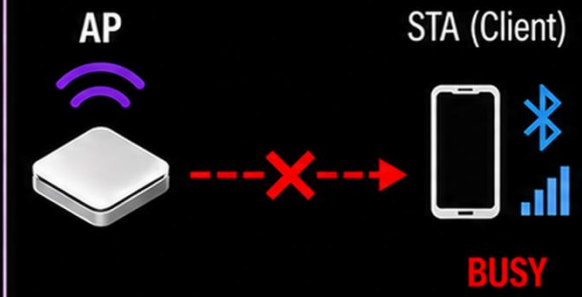
Mandatory for all Wi-Fi 8 certified APs

One signal from the AP **changes everything** — no wasted wake time, no locked airtime

In-Device Coexistence (IDC) using Device Unavailability (DUO) feedback

1 CLIENT BUSY (NO AWARENESS)

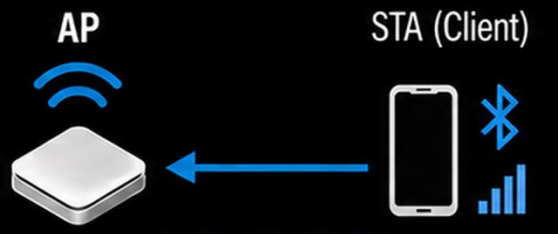
AP transmits to the client while the client is unavailable due to another radio (e.g., Bluetooth or cellular).



Transmission fails due to client radio conflict.

2 STA REPORTS DUO WINDOW

The client reports its upcoming unavailability window to the AP using DUO feedback.



DUO FEEDBACK
(time-based unavailability)



3 AP ADJUSTS SCHEDULING

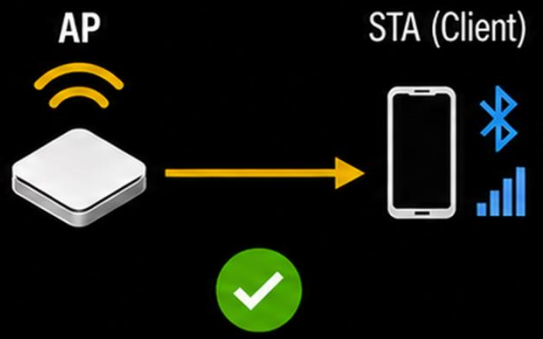
The AP avoids transmitting during the unavailability window, preventing wasted airtime.



AP HOLDS TRANSMISSION
No wasted airtime.

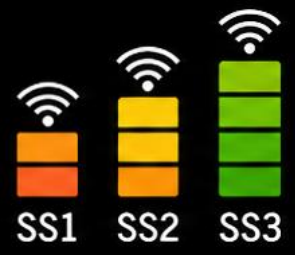
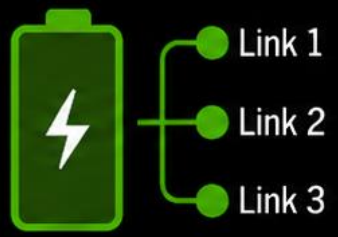
4 TRANSMIT WHEN AVAILABLE

When the client is available again, the AP transmits successfully.



Successful transmission when client is available.

Appendix: Additional Optional Reliability Features

	Feature	Description	AP Status	STA Status
	2xLDPC (L_LDPC=3888)	Doubles the LDPC codeword length for improved sensitivity and higher throughput at long range.	Optional	Optional
	Multi-Link Power Management (MLPM)	Allows a STA to signal power state changes across all its MLO links in a single frame instead of one link at a time.	Optional	Optional
	DPS Assisting STA	Enables a client to send an initial control frame to wake a smartphone hotspot AP from low-power mode.	— N/A	Optional



Uplink / Range

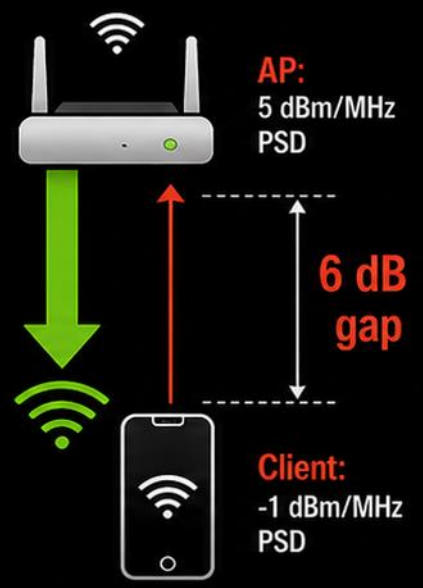


Stop Whispering — Can Distributed RU Turn Up the Volume?

Extreme networks

1 THE 6 GHz UPLINK GAP

Clients transmit 6 dB below the AP



Coverage limited by the weakest direction — uplink

2 TODAY: CONTIGUOUS RU

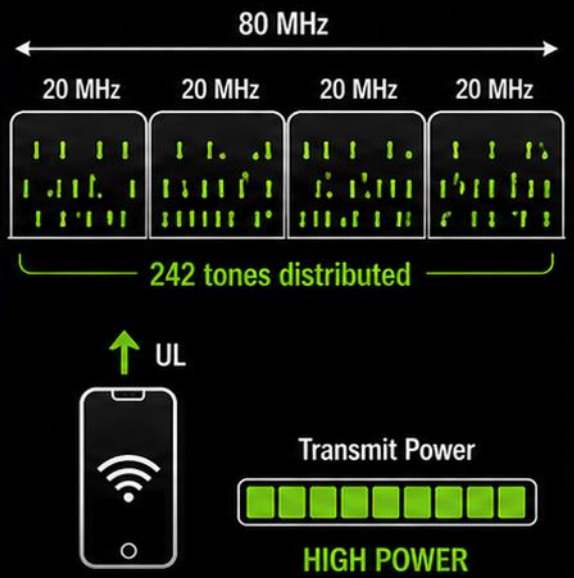
242 tones packed into one narrow block



PSD limit caps power per MHz — narrow RU = low total power

3 WI-FI 8: DISTRIBUTED RU (DRU)

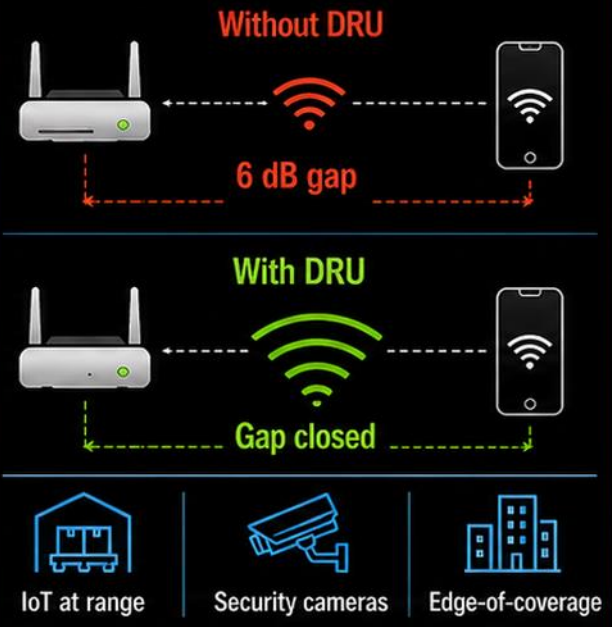
Same 242 tones spread across full bandwidth



Up to 6 dB power gain — 4x the power reaching the AP

4 STRONGER UPLINK, SAME HARDWARE

DRU helps clients use their full power budget

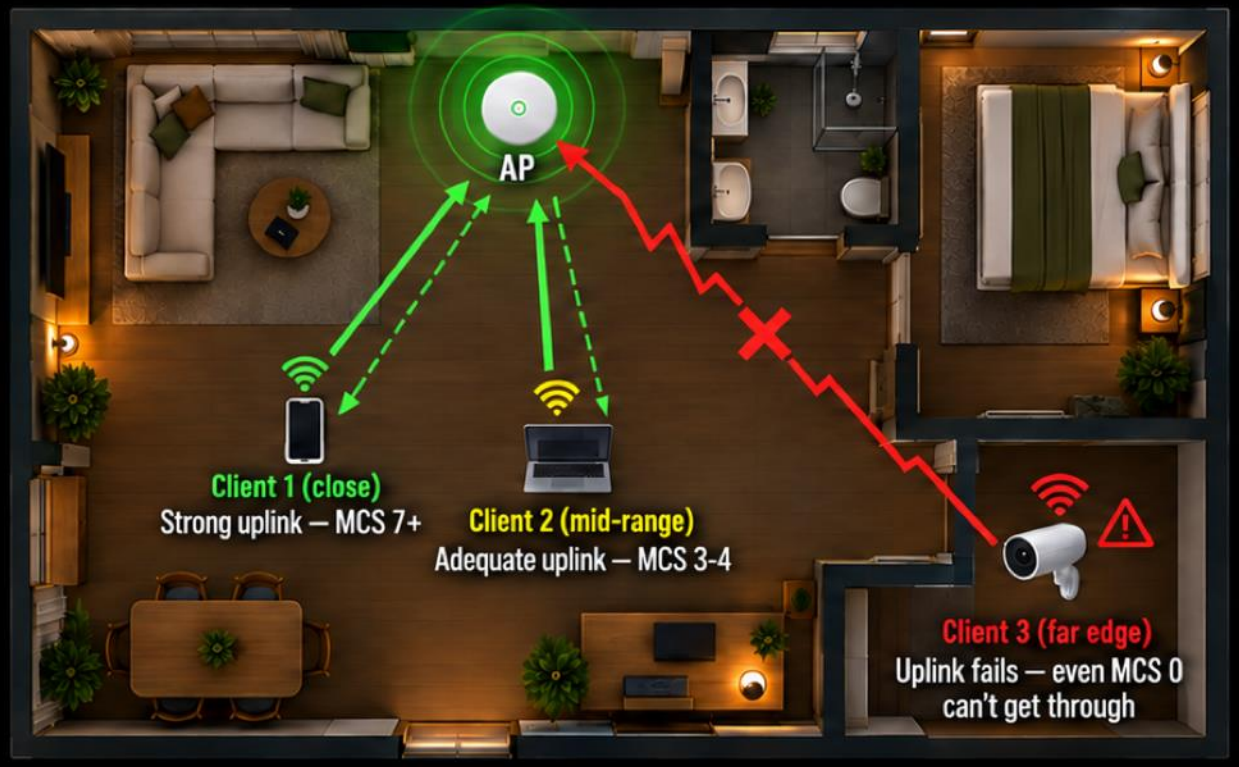


UL OFDMA only — full bandwidth mode — no hybrid DRU/RRU

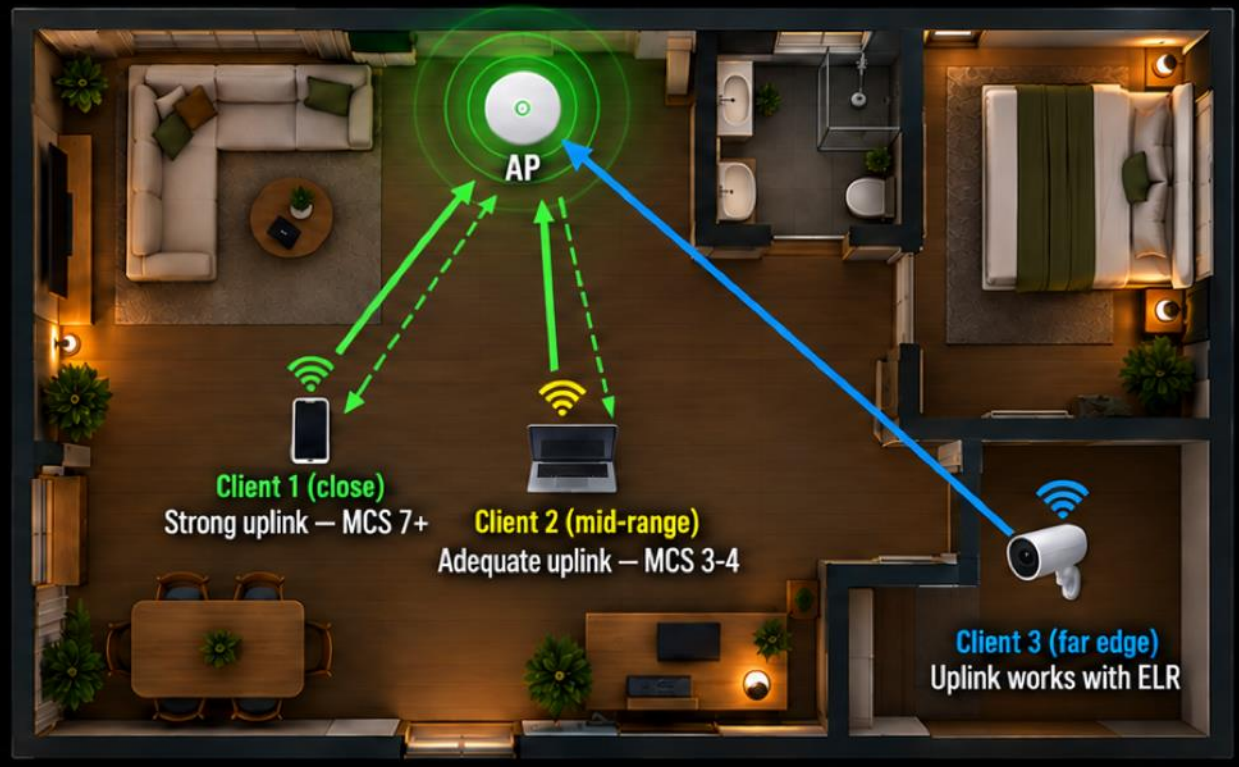
The FCC gave 6 GHz clients a 6 dB handicap. DRU helps recover it.

Enhanced Long Range (ELR)

THE UPLINK PROBLEM AT THE EDGE OF COVERAGE



WI-FI 8 ELR: MAKING THE UPLINK RELIABLE



ELR: MCS 0-1 with extended LDPC — same rates, dramatically stronger error correction

Uplink Only (5 and 6 GHz)
ELR enhances client-to-AP transmissions

Extended LDPC Error Correction
3,888-bit codewords — double Wi-Fi 7's longest

Fixed 20 MHz, Single Stream
All power into the most robust configuration

Consumer & SMB Focus
Mandatory for Wi-Fi 8 APs without WPA3-Enterprise or EasyMesh



Security

Spectrum Efficiency

Multi-AP Coordination (MAPC)

Mobility

Reliability

Uplink / Range

Security

Security in the Wi-Fi 8 era

1 WPA3 REQUIRED

Strong encryption by default.
No legacy fallback.



- WPA3-Personal & Enterprise
- SAE for strong password security
- 192-bit security strength

2 SECURE ROAMING (RSNO)

Consistent security
across transitions.



- RSN Overriding (RSNO) mandatory for STAs
- Maintains security context across APs
- Seamless, secure roaming

3 SECURE CONTROL PLANE

Protects coordination
and control signaling.



- Secure Control Frames
- Built on 802.11mf
  (Protected Management Frames)
- Protects MAPC and other
  coordination mechanisms

4 ENHANCED PRIVACY (802.11bi)

Improved device privacy
and identity protection.



- MAC address randomization enhancements
- Reduced device tracking
- Stronger user privacy

Wi-Fi 8 extends security beyond data to the control plane—protecting what coordinates, connects, and matters.

Robust Security Network Overriding (RSNO)

Extreme networks

From coexistence fix to mandatory roaming security

1 THE PROBLEM (Pre-RSNO)

Legacy clients can't understand modern security options

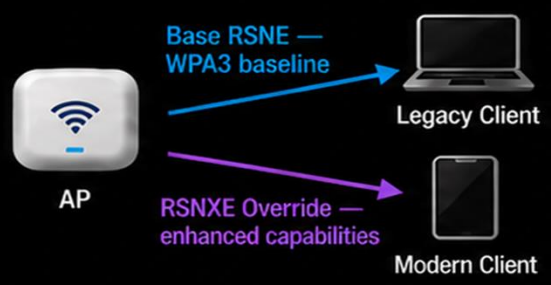


- Legacy client fails or forces downgrade
- AP must choose: security OR compatibility

One size doesn't fit all.

2 Wi-Fi 7 SOLUTION (RSNO Introduced)

Base RSNE for legacy, override for modern clients

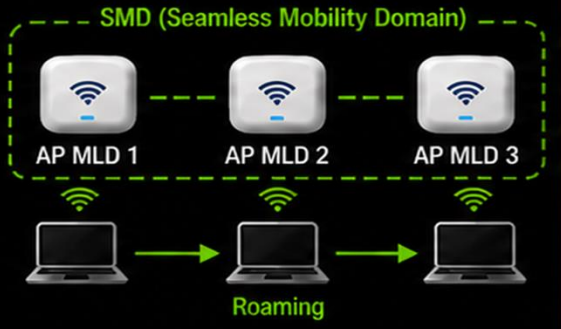


- Both clients connect successfully
- No security downgrade needed
- Optional for Wi-Fi 7

Coexistence without compromise

3 Wi-Fi 8 SHIFT (RSNO Mandatory)

Mandatory for all Wi-Fi 8 clients



- Every AP in the SMD negotiates the same way
- Uniform security across the domain

Predictable security at every AP.

4 WHY IT MATTERS FOR SMD

Security context transfers seamlessly during roaming



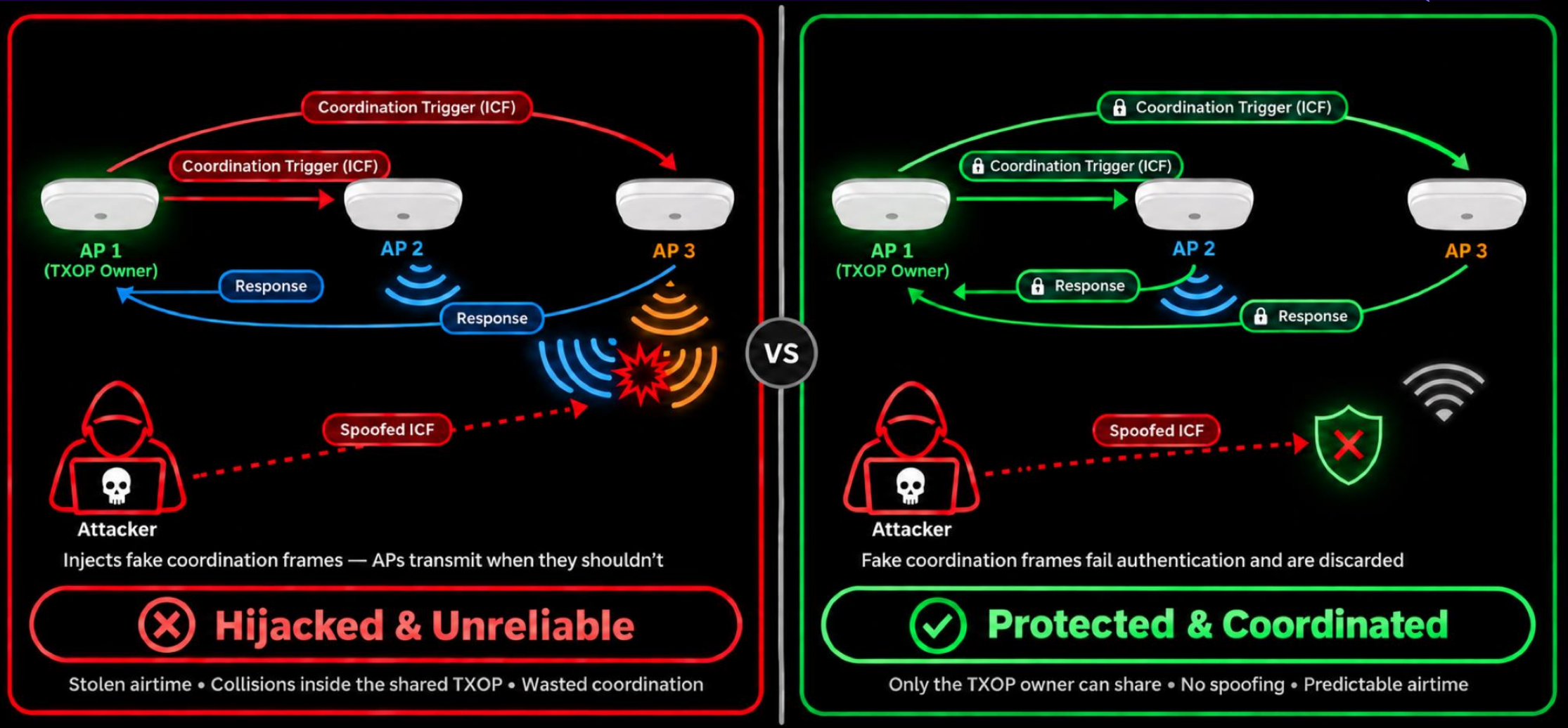
- No renegotiation during roam
- Security context follows the client
- Consistent security across APs

Secure by design — not by luck.

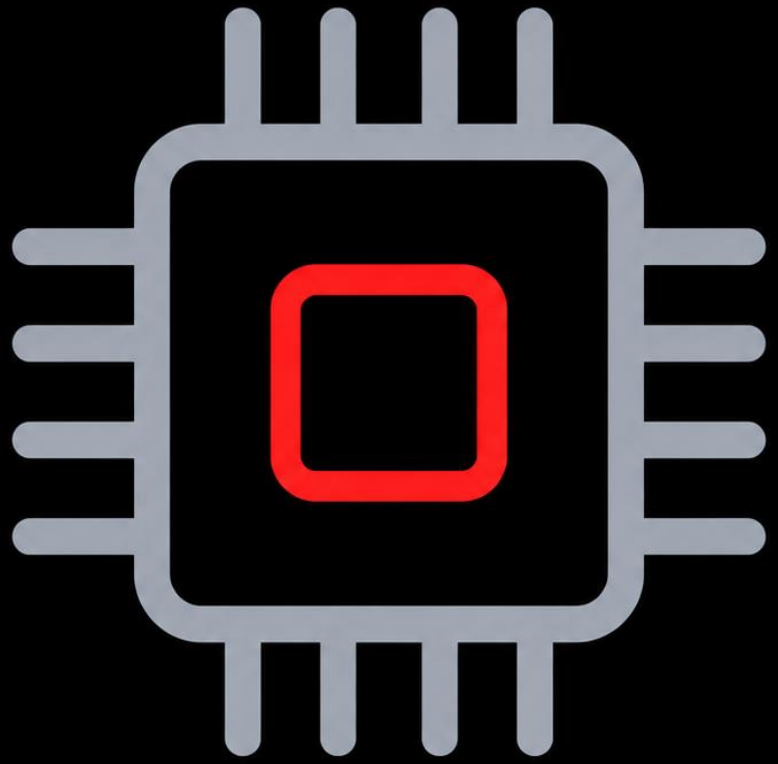
Wi-Fi 7: RSNO was optional, focused on mixed-client coexistence.

Wi-Fi 8: RSNO is mandatory, focused on uniform security across the roaming domain.

Secure Control Frames? – BlockAck and Trigger Frames

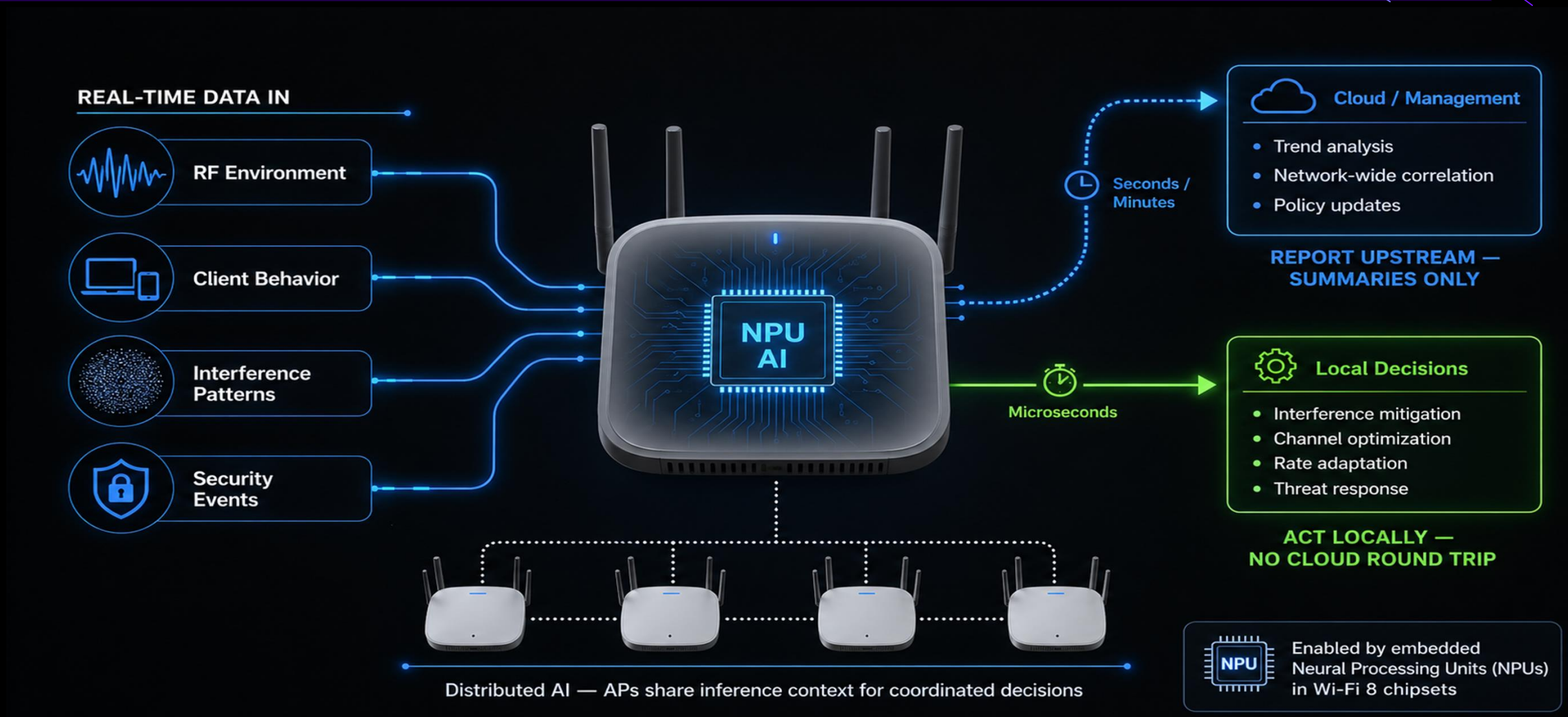


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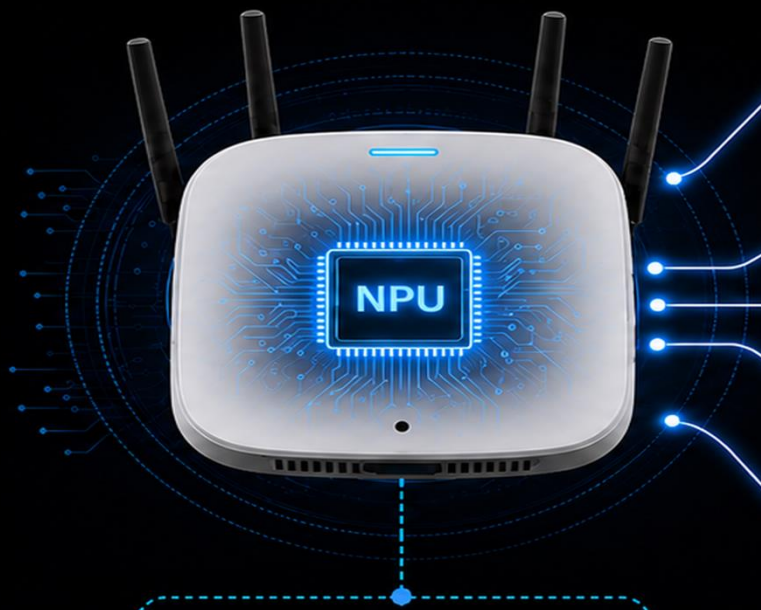


Hardware

Edge AI — Intelligence Built Into the Access Point



Beyond Connectivity – APs as an Edge AI Platform



Video & Visual Analytics
Occupancy counting, queue detection, safety compliance — processed locally

Retail Intelligence
Foot traffic, dwell time, dynamic signage — no PII leaves the premises

Healthcare Monitoring
Asset tracking, patient flow, environmental sensing — acted on at the edge

Smart Building Operations
HVAC, lighting, space utilization — driven by real-time occupancy

Industrial & Logistics
Proximity alerts, workflow optimization, predictive maintenance — sub-second response

Security & Threat Detection
Rogue detection, behavioral anomaly, automated containment — no cloud latency

Already in every room.
Already powered.
Already connected.

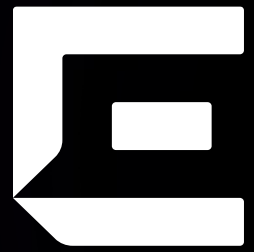
AI

Your Wi-Fi infrastructure is the most distributed compute platform you already own — edge AI turns it into a business application platform

Near-term:
Network optimization & telemetry

Mid-term:
Lightweight edge inference

Long-term:
Customer business applications on AP infrastructure



Extreme®
networks