Hewlett Packard Enterprise

Upgrade to WiFi6/6E now or wait for WiFi7?

WHAT TO EXPECT AND HOW TO PREPARE?

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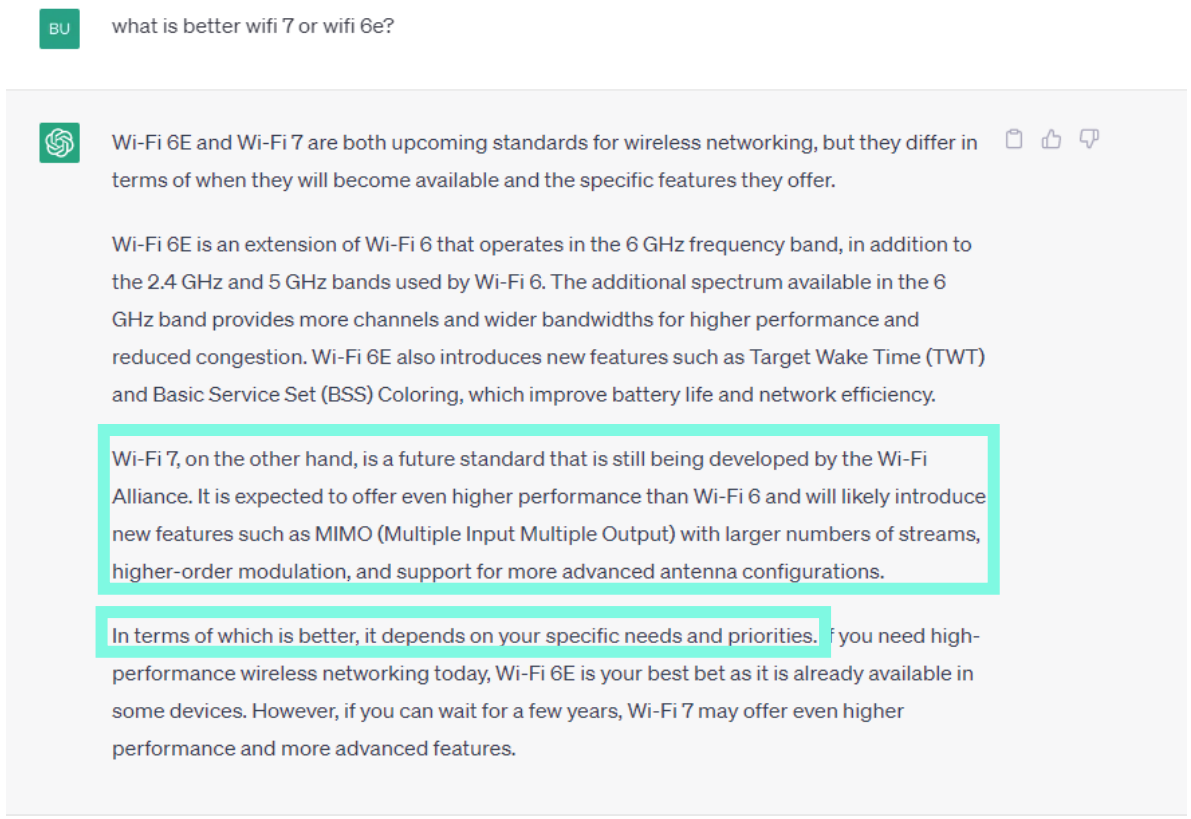
WiFi 7 - First things first

Ask ChatGPT

Ask ChatGPT

What you already know before this session?



Not much relevant information on WiFi7, but…

- 7 > 6
- WiFi 7 will be faster and better -> expect it to appear in the public tenders ;)

WiFi 7

Where we are?

Evolution of wireless LAN

802.11b	802.11a/g	WiFi 4 (802.11n)	Wi-Fi 5 (802.11ac)	Wi-Fi 6 (802.11ax)
(1999)	(a- 1999, g- 2003)	(2009)	(2013)	(2019 and 2021 for 6E)
•Wi-Fi hits the market	• OFDM modulation • Lower cost transmitters and receivers	• MIMO introduced • 40 MHz Channels • 64-QAM Rates • Up to 4 Streams • Beam-forming	• 80 and 160 MHz Channels • 256-QAM Rates • Up to 8 Streams • Beam-forming (explicit) • Multi-user MIMO	• 2.4 GHz and 5 GHz • 1024-QAM Rates • Multi-user MIMO, 8 clients • **OFDMA** uplink and downlink • Better battery life (Target Wake Time) • **Spatial re-use** (BSS color)

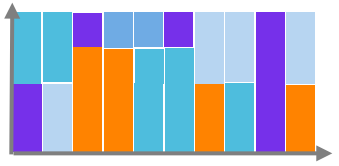
Peak data rate: (theoretical)

11 Mbps → (5x) 54 Mbps → (11x) 600 Mbps → (11x) 6.9 Gbps → (1.3x) 10 Gbps

WiFi 7 – what is coming?

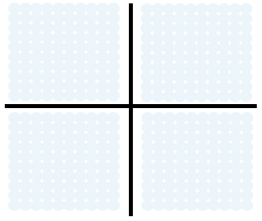
WiFi 7 (802.11be) aka EHT is again about data rates!

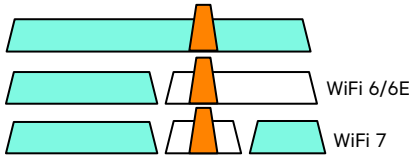
M-RU allocations



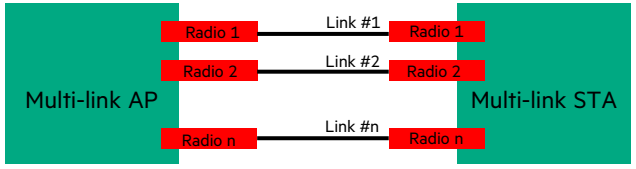
16 spatial streams

4096 QAM

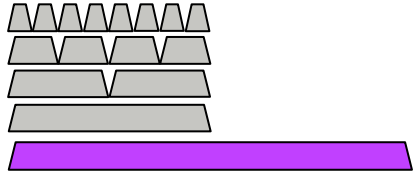




Improved Preamble Puncturing



Multi-link operations



320 MHz Channels

Targeted completion in 2024:

- Operation in 2.4 GHz, 5 GHz, and 6 GHz bands
- Higher throughout – Project goal of at least 30 Gbps; expect 40+Gbps with 320MHz channels, 4096 QAM, 16x16 MU-MIMO
- Support for low latency communications
- Continued improvements in spectral efficiency

Main use cases:

- Very-high density deployments
- Low-latency applications (AR/VR, gaming)
- Very-high reliability and ultra-low latency

First chipsets: Qualcomm (Feb23) and Broadcomm (Apr23) available

WFA WiFi 7 certification program expected to kick off in Q1CY24

WiFi 7 Features – my own view

M-RU allocations

?

16 spatial streams

☒

4096 QAM

?

?

Improved Preamble Puncturing

?

Multi-link operations

320 MHz Channels

☒

My own view:

- Some features upfront not attractive for enterprise environments
- M-RU allocations and Multi-link operations require more complex HW
- Improved preamble puncturing - client support (still) lagging
- 4096 QAM – at least 40dB SNR, pretty much LoS only

Other challenges include: higher AP costs, switching infrastructure (more power, faster uplink, better cabling)

WiFi 7 Features – industry view

Wi-Fi Technology Cheat Sheet

Low Score ○ ◔ ◑ ◕ ● High Score

	802.11be (Wi-Fi 7)	802.11ax (Wi-Fi 6e)	802.11ax (Wi-Fi 6)	802.11ac WAVE 2 (Wi-Fi 5)
Best Cost-To-Performance Ratio	◔	◑	◕	●
Real-World Throughput > 1Gbps	●	●	◑	◔
Real-World Technical/ Business Use Cases	○	◑	◕	●
High-Density Wi-Fi Device Environments	●	●	◕	◑
Challenging/Crowded RF[a] Environments	●	●	◔	◔
Optimized Wireless Device Efficiency	●	●	●	◑
Low Latency (OFDMA)	●	◕	◕	◔

Source: Gartner
[a] RF: radio frequency
776030_C

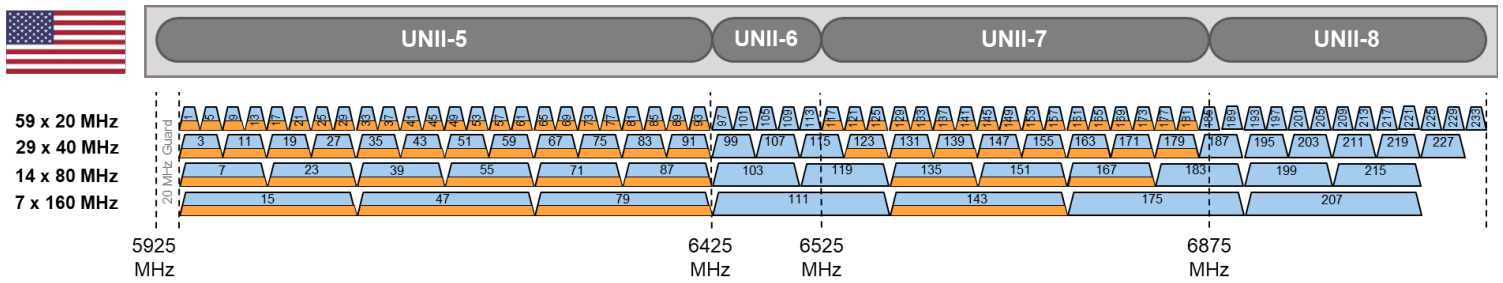
Gartner

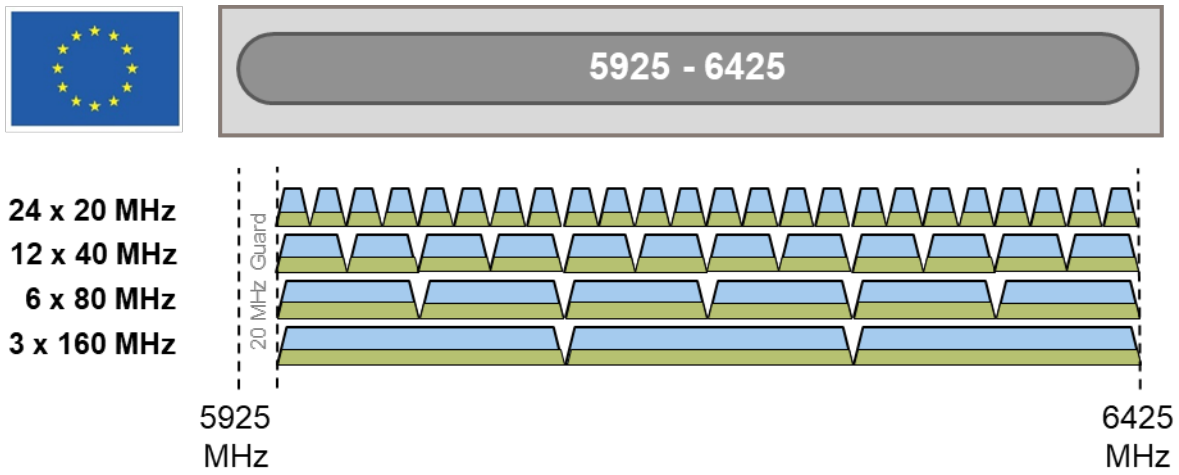
Source: Gartner, Quick Answer: Should I Deploy Wi-Fi 5, Wi-Fi 6, Wi-Fi 6e, or Wait for Wi-Fi 7? 16 September 2022 [1]

6 GHz Band

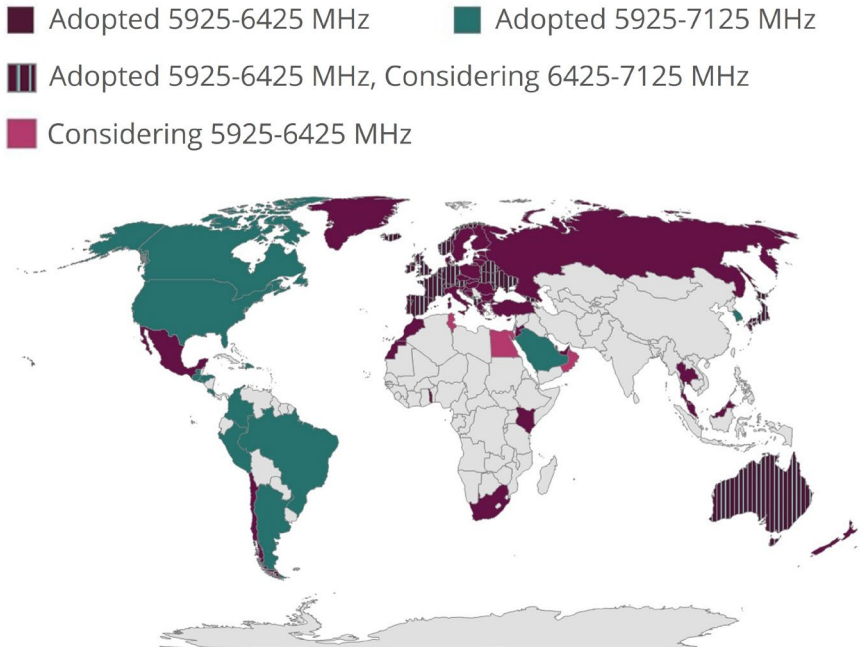
Current regulatory status and outlook

New 6 GHz band: massive increase in capacity





= Low Power Indoor (LPI) Only
= LPI & Automatic Frequency Coordination (AFC)
= LPI & Very Lower Power (VLP)



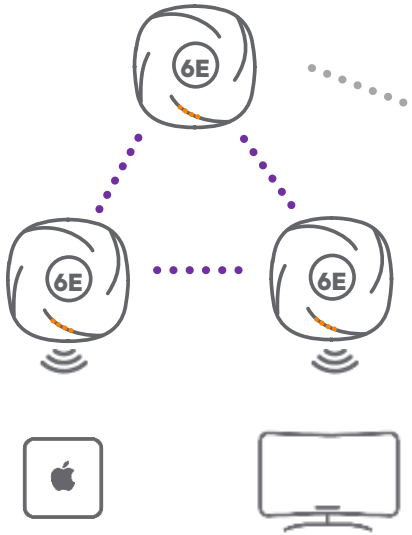
Countries Enabling Wi-Fi 6E | Wi-Fi Alliance
As of October 2023

Bundesnetzagentur: Vfg.55/2021
14th July 2021

Device Classes in 6 GHz

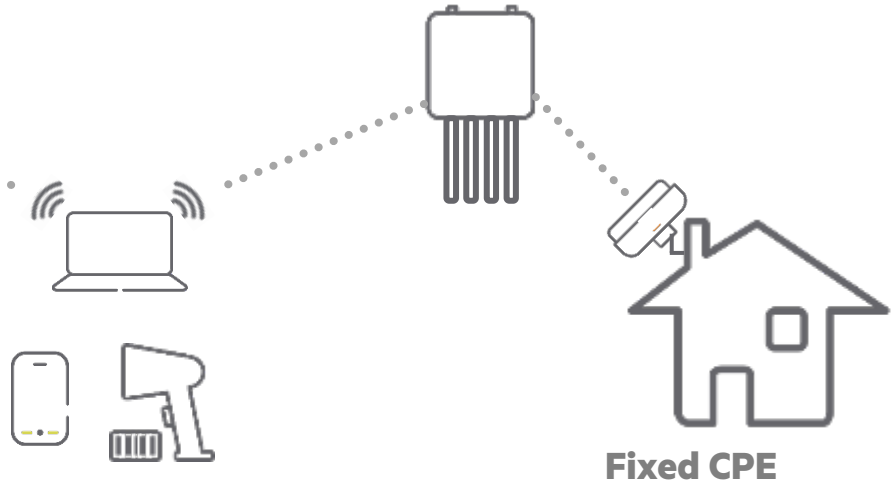
Low Power Indoor (LPI) AP

- Fixed indoor only
- Up to 63X lower energy
- No antenna connectors
- No weatherproofing
- Wired power



Standard Power (SP) AP

- Fixed indoor / outdoor
- Controlled by AFC database
- Automated geolocation
- Pointing angle restriction



Mobile Client

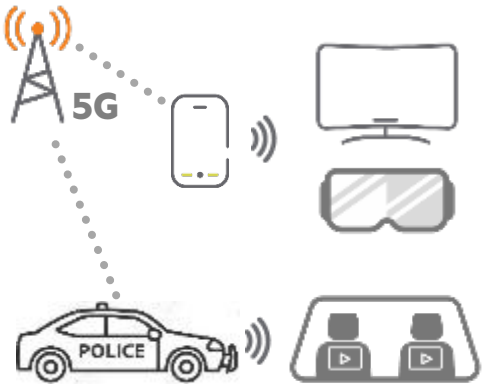
- Indoor / outdoor
- 4X less power than connected AP

Fixed CPE

- To run at full power, must behave like an AFC-controlled device

Very Low Power (VLP) AP

- Mobile indoor / outdoor
- 160X lower energy



~2 Gbps throughput with sub-ms latency at 3m

6 GHz Wi-Fi European Regulations and Standards

CEPT countries

ECC DEC(20)01

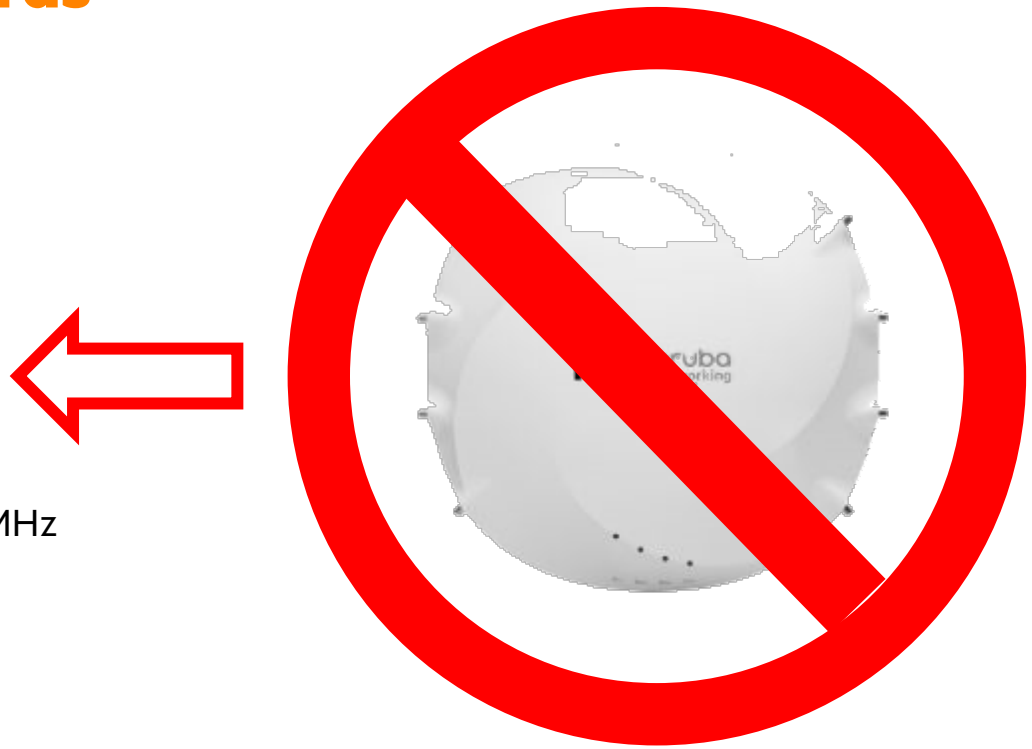
LPI device category 1: An LPI access point or bridge that is supplied with power from a wired connection has an integrated antenna and is not battery powered.

Frequency band: 5945-6425MHz

Maximum mean e.i.r.p. for in-band emissions: 23 dBm (200 mW)

Maximum mean e.i.r.p. density for in-band emissions: 10 dBm/MHz

Maximum mean e.i.r.p. density for out-of-band emissions below 5935MHz: -22 dBm/MHz



European Union

EC Implementing Decision (EU) 2021/1067

Same provisions as ECC DEC(20)01

What to expect in the 6 GHz band?

1. SP + AFC in the lower 6 GHz band (5945-6425 MHz)

- CEPT is studying the conditions for allowing SP + AFC in the lower 6 GHz band (5945-6425 MHz).
- Target date for completion is **June 2024,** but a delay is expected.
- A European regulation would not enter into force before **mid-2025**.

2. Opening of the upper 6GHz band (6425-7125 MHz)

- Scared up by the lack of demand for 5G and declining ARPU, the IMT industry (equipment vendors and MNOs) has been pushing very hard to prevent the 6425-7125 MHz band from being opened for use by Wi-Fi.
- During the last two years, **the discussions about the future use of the upper 6 GHz band have become increasingly political**. User benefits and technical aspects are of secondary importance now.
- The 2023 World Radio Conference (WRC-23) to study the conditions for an identification of the 6425-7125 MHz band for IMT. The CEPT position is not to support an IMT identification but to potentially accept it if certain conditions are fulfilled. If not, **CEPT will oppose an IMT identification**.

Wi-Fi 6E = Wi-Fi 6 in the 6 GHz Band

New Features In 6 GHz

- Native Wi-Fi 6 Transmissions
  - High-Efficiency (HE) PHY/MAC structure
  - Native HE beacons
- 3 methods for In-Band AP Discovery
  - **Active scans on preferred scanning channels**
  - Fast Initial Link Setup (FILS) Discovery announcements*
  - Unsolicited Probe Responses*
  - Greatly reduces the management frame overhead
- Security Enhancements
  - WPA3 Enterprise / Personal required
  - Protected Management Frames (PMF) required
  - Enhanced Open required

*if implemented, and not default behavior

Enhancements In 5 GHz & 2.4 GHz

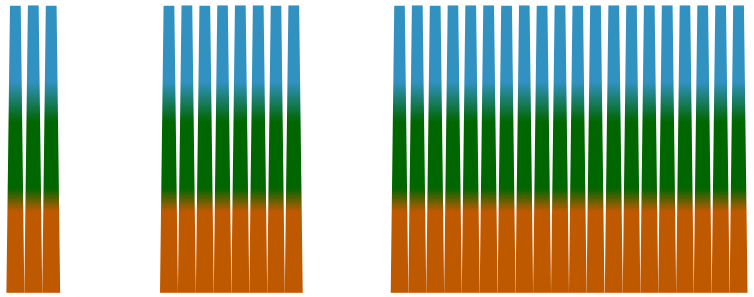
- 2 methods for Out-of-Band AP Discovery
  - Reduced Neighbor Reports (RNR)
  - Access Network Query Protocol (ANQP)*
- Possible Future Beacon Enhancements To 2G/5G
  - Multiple-BSSID Beacons*
- Security Enhancements
  - Expanded requirements for recent WFA standards

6 GHz Offers Wireless Architects Unprecedented Options

Example – Redeployment of SSIDs between bands to optimize experience

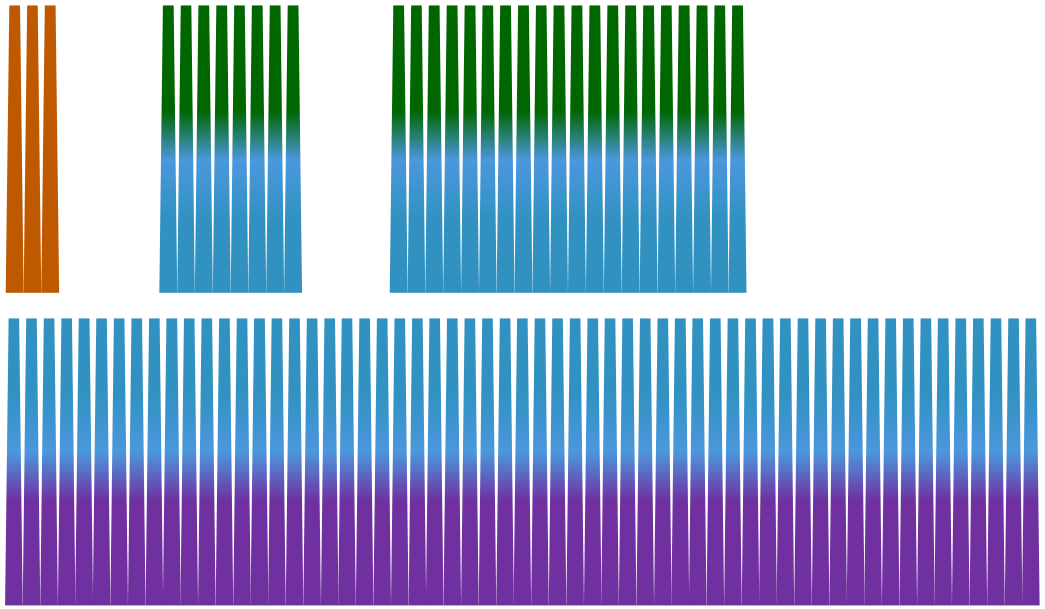
Conventional Dual-band SSID

2.4GHz Radio	5GHz Radio
Corp_SSID (802.1X)	Corp_SSID (802.1X)
Guest_SSID (Open)	Guest_SSID (Open)
IOT_SSID (PSK)	IOT_SSID (PSK)



Tri-Band 6E SSID Strategy

2.4GHz Radio	5GHz Radio	6GHz Radio
	Corp_SSID (802.1X)	Corp_SSID (802.1X)
IOT_SSID (PSK)	Guest_SSID (OWE)	Corp_SSID_6Only (802.1X)



- Dual-Band ends up with 2-3 SSIDs across all bands
- Tri-Radio allows the network to design for 6Ghz as the next high-performance zone, with 5Ghz as the general access, and leverage 2.4Ghz for IoT/IIoT

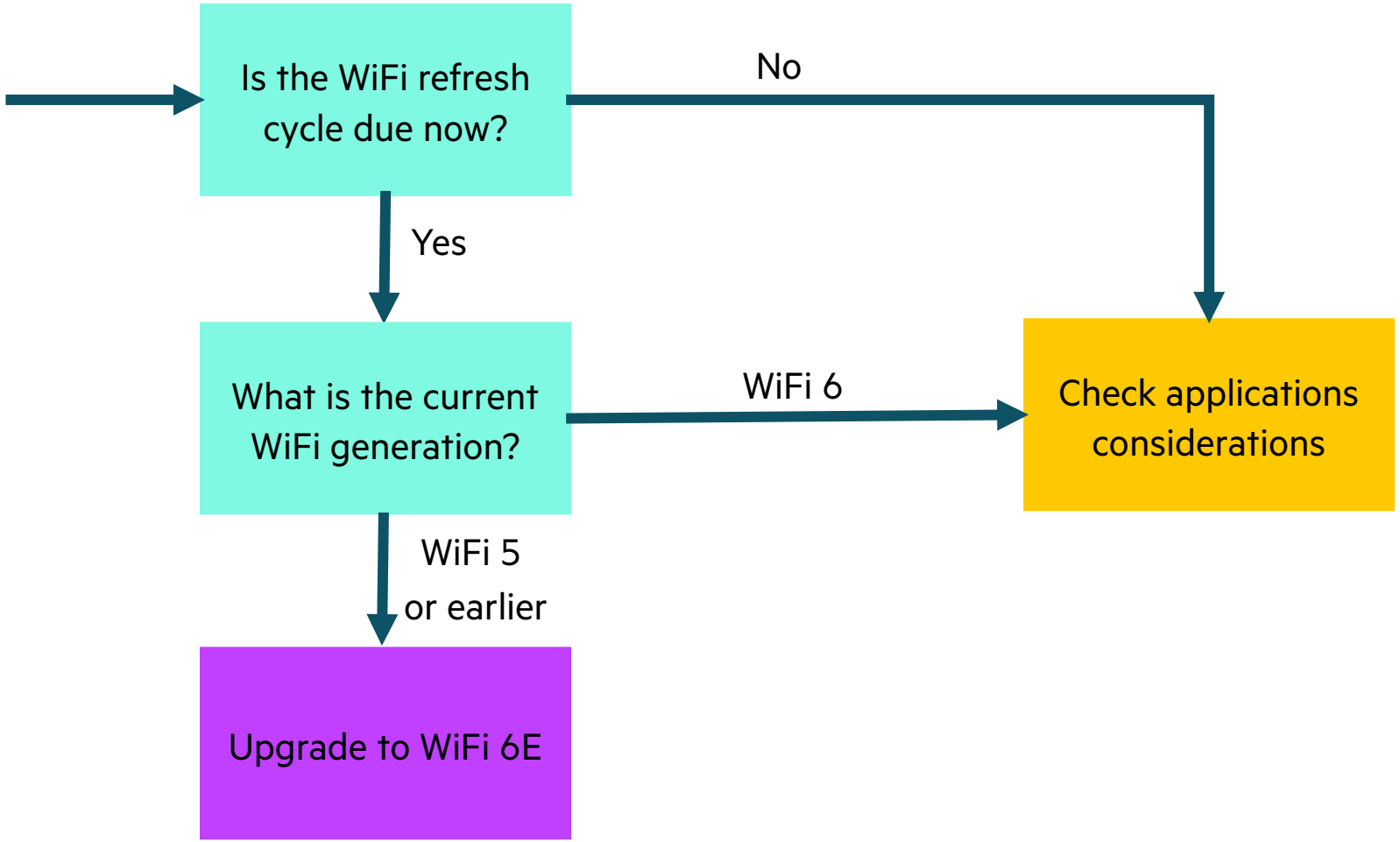
Eduroam and WiFi6E: https://markhoutz.com/2023/01/10/wifi-6e-eduroam/ [2]

WiFi 7 or WiFi6E/WiFi6

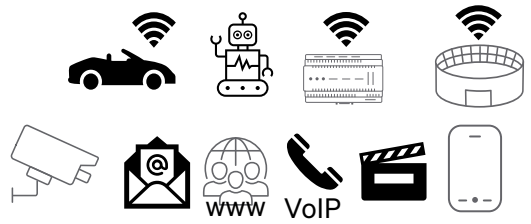
How to make the decision?

(Also see video [3] for more information)

WiFi 6E or WiFi7 – refresh cycle



WiFi 6E or WiFi7 – applications considerations



Is current WiFi sufficient?

No

Upgrade to WiFi 6E

Yes

What is the current WiFi generation?

WiFi 6

Need extremely high throughput or ultra-low latency?

Yes

Check end-device ecosystem considerations

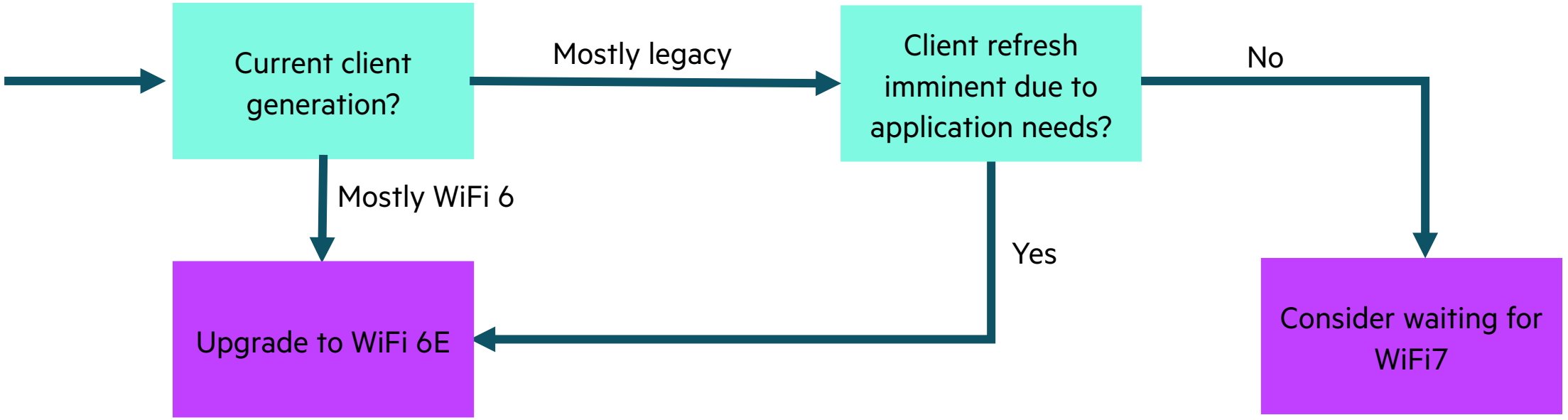
No

Consider waiting for WiFi7

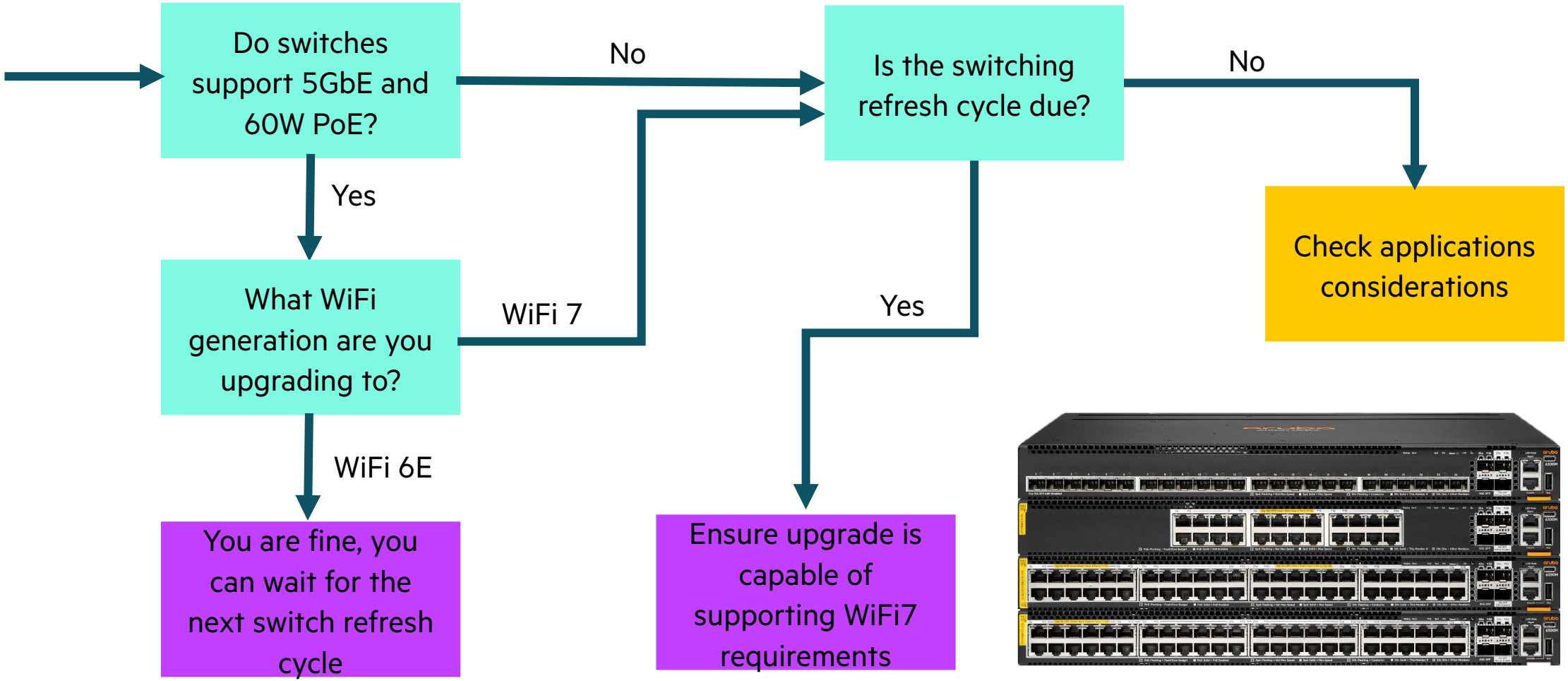
WiFi 5 or earlier

Check infrastructure considerations

WiFi 6E or WiFi7 – end-device ecosystem considerations



WiFi 6E or WiFi7 – infrastructure considerations



References

1. Gartner, Quick Answer: Should I Deploy Wi-Fi 5, Wi-Fi 6, Wi-Fi 6e, or Wait for Wi-Fi 7?, 16 September 2022
2. Mark Houtz, Wifi 6e + eduroam (Part 1 and 2): https://markhoutz.com/2023/01/10/wifi-6e-eduroam/
3. Jatin Parekh (Extreme Networks) from WLPC Phoenix 2023: https://www.youtube.com/watch?v=qrrZFlnxA_s

SUMMARY

WiFi 7

Interesting features, yet to be determined how enterprise WLAN will benefit from them

WiFi6/WiFi6E

Will coexist together, longer than the previous life-cycles of WiFi products

How to decide?

1. WiFi refresh cycle
2. Application needs
3. End-device ecosystem
4. Infrastructure status

Wir sind gerne für Sie da

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