



WiFi7 vs Private 5G: The Next-Gen Wireless Solution to Navigating Connectivity Horizons

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TODAY'S ENTERPRISE IS MULTI-RAN



LOW-EARTH ORBIT SATELLITE

PUBLIC MACRO CELLULAR

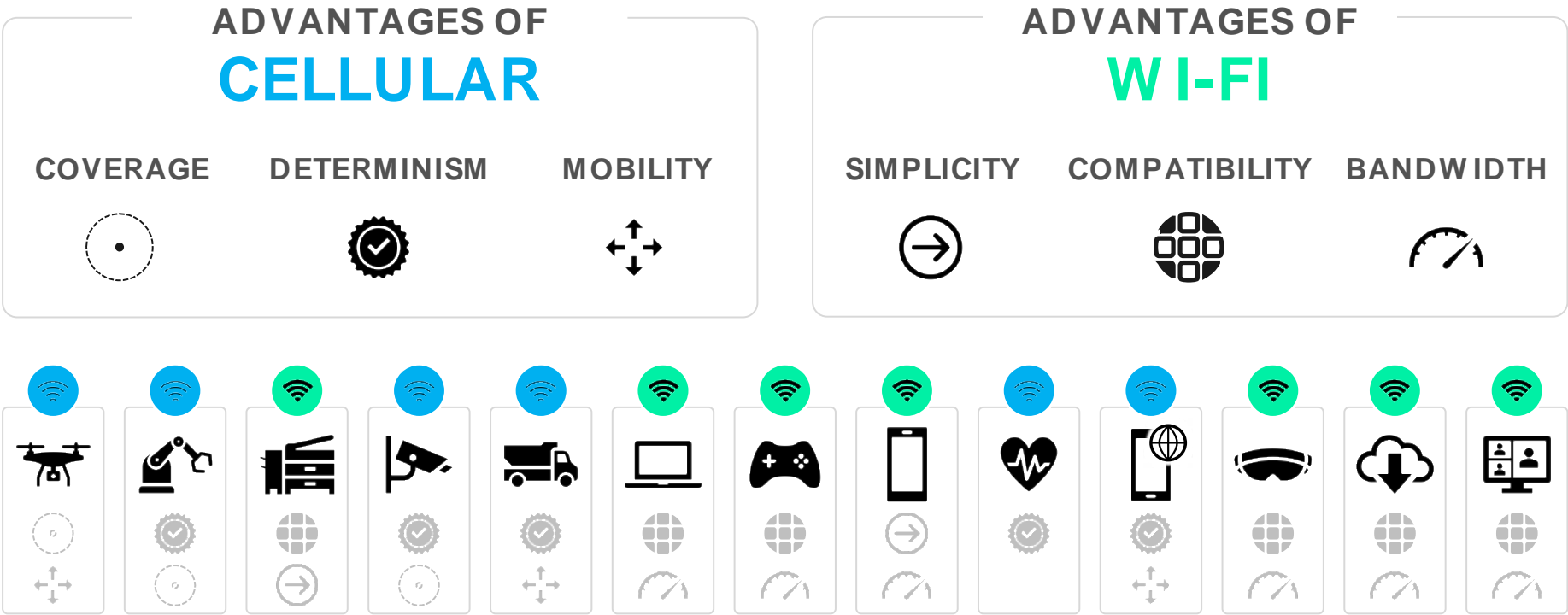
PRIVATE LTE / 5G

PRIVATE LONG-RANGE IOT

SHORT-RANGE IOT

WI-FI

THE POWER OF CHOICE



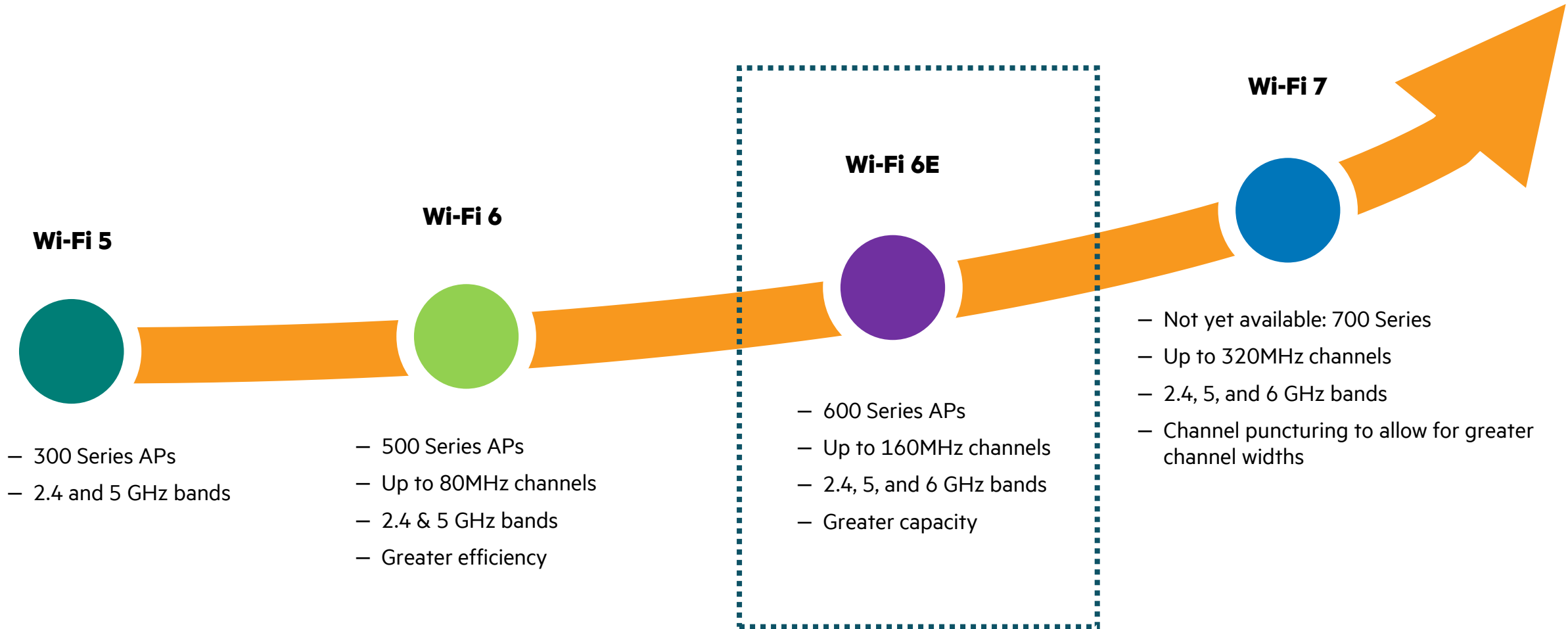
Each device and application uses the best connection type for its wireless requirements

Marcus Burton, Wireless Architect Extreme Networks



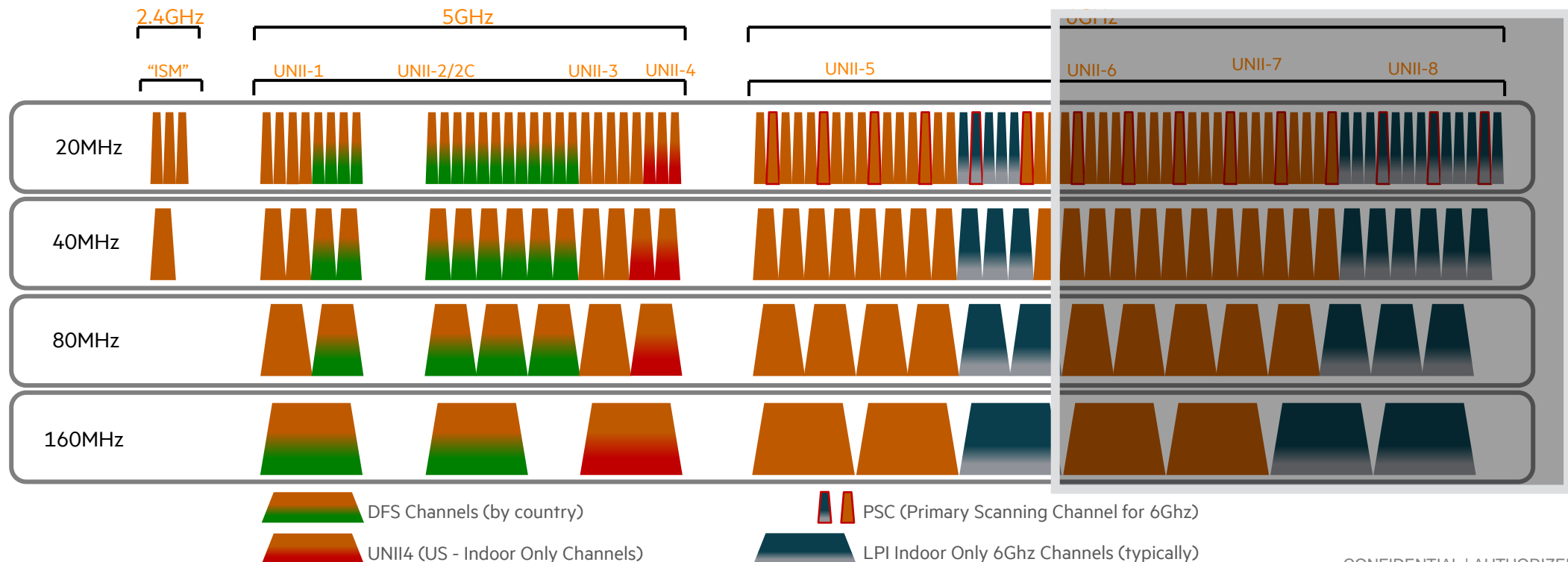
Is Enterprise Ready for WiFi7?

Evolution of Wi-Fi standards



6GHz RF Opportunity

- The 6GHz band spans 1.2GHz between 5,925MHz to 7,125MHz
 - **Potential** for 59 20MHz channels, 29x 40MHz, 14x 80MHz, 7x 160MHz (59 / 29 / 14 / 7)
 - **In some regions/countries** limited to “just” the lower 500MHz (U-NII-5), for 24 20MHz channels (24 / 12 / 6 / 3)
 - Either way, adding the 6GHz band typically more than doubles the total spectrum capacity, and there’s no need for radar detection & avoidance (DFS). ***But there are other elements in 6GHz to be aware of***



6 GHz Unlicensed (License-Exempt) Decisions – Indoor/LPI

This is unprecedented global momentum



As of Nov'23

- AP-655
- AP-635
- AP-615
- AP-605R



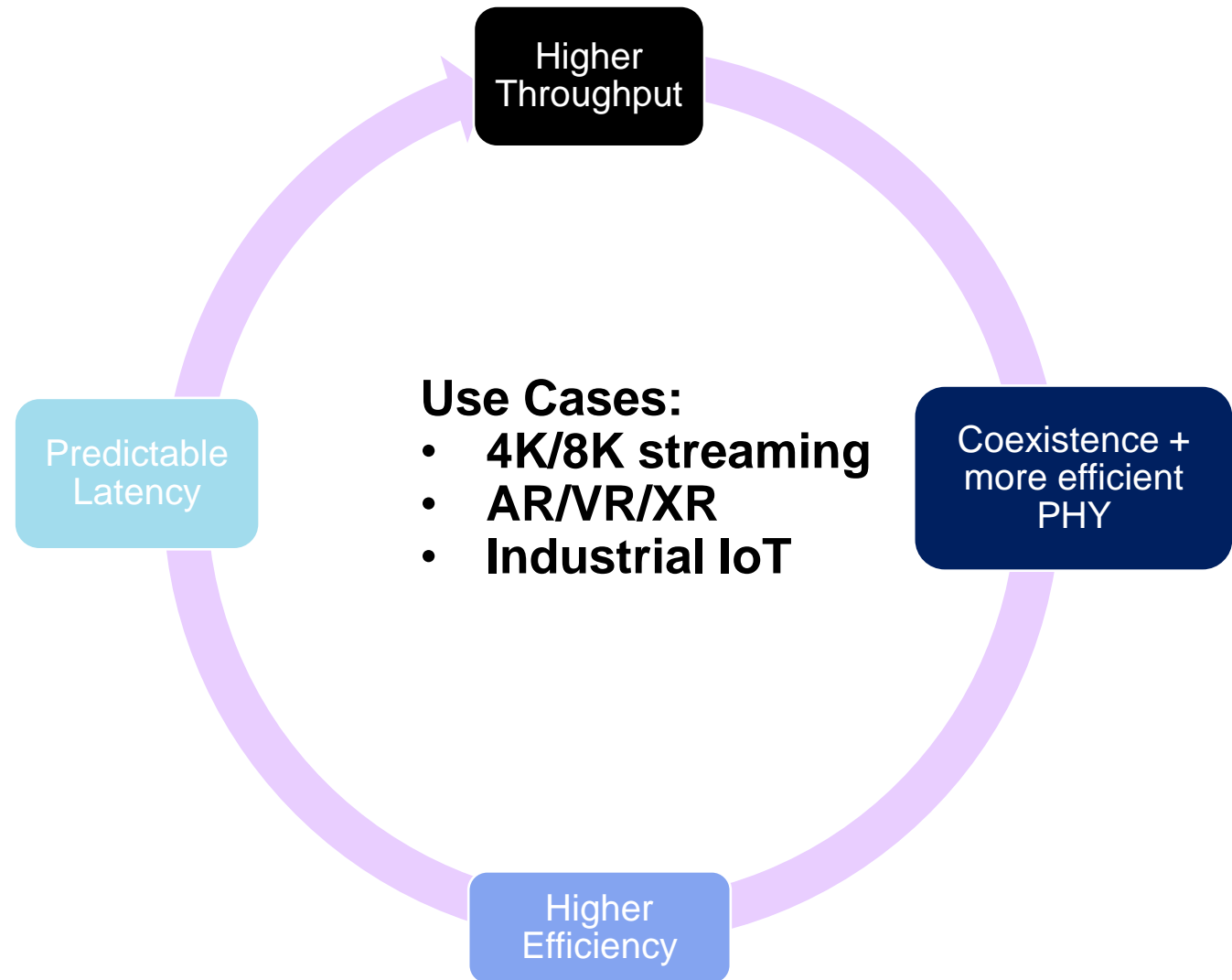
70 Countries
As of 26 Aug 2023

2B+ Citizens **70%+** of global GDP

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Wi-Fi 7 Overview

- The main goal for Wi-Fi 7 is to address use cases such as 8K Streaming, Augmented and Virtual Reality and Industrial IOT.
- New features are introduced to address these use cases by improving performance with respect to throughput and latency when compared to Wi-Fi 6.
- These new features broadly fall into 4 categories:
 - Throughput, Coexistence, Latency and Efficiency



WiFi7 IEEE Timeline

OFFICIAL IEEE 802.11 WORKING GROUP PROJECT TIMELINES - 2023-12-06

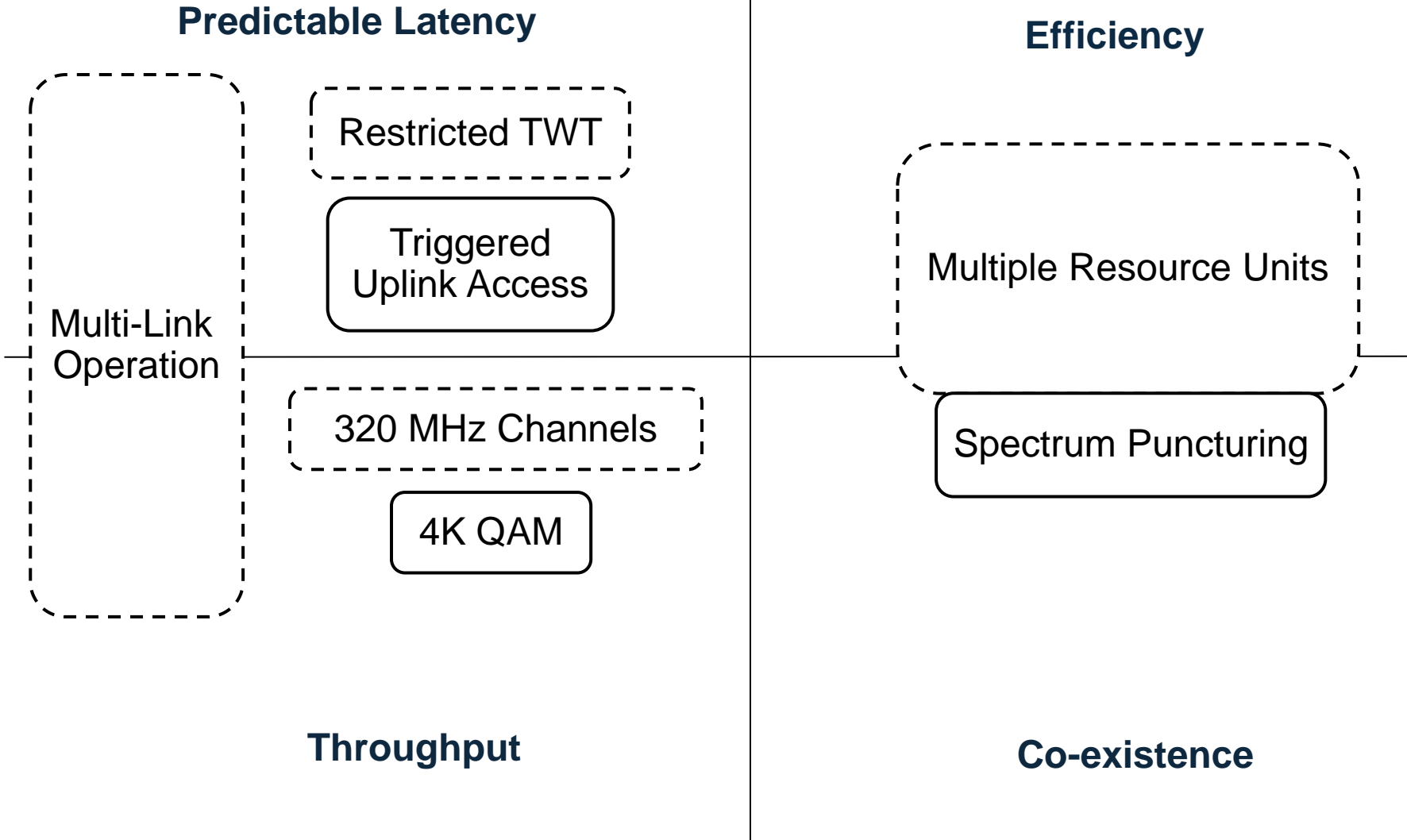
IN PROCESS - Standards, Amendments, and Recommended Practices

IEEE Project and Final Document	Final Doc Type	Project Authorization Request (PAR)	Task Group and Activity	Documentation		Current Status	PAR Approved, Modified, or Extended [Expires]	WG Letter Ballots			Form Standards Association (SA) Ballot Pool / Reform	MEC / MDR Done	IEEE SA Ballots			Final 802.11 WG Approval	Final or Conditional 802 EC Approval	RevCom & Standards Board Final or Continuous Process Approval	ANSI Approved	Superseded or Withdrawn by Standards Board
				Session End Snapshot				Draft	Date	Result			Draft	Date	Result					
				Format & Version	Incorporated Baselines															
IEEE Std P802.11be	A	Extremely High Throughput	TGbe	PDF D4.10	802.11-2020 802.11ax-2021 802.11ay-2021 802.11ba-2021 802.11-2020/Cor1-2022 802.11az-2022 802.11bd-2022 802.11bb-2023	Actual	2019-03-21 [2025-12-31]	D2.0 D3.0 D4.0	2022-07-04 2023-03-02 2023-08-13	64% 80% 90%	2023-10-01	2023-09-01								
					802.11bc 802.11-2020/Cor2 802.11me 802.11bh	Predicted	C	C	C	C	C	Jan 2024	Mar 2024	Sep 2024	Oct 2024	Dec 2024	N/A			

Wi-Fi 7 is tied to the IEEE standard 802.11be, which is still under review. Wi-Fi Alliance is in the process of defining the criteria for Wi-Fi 7 certification, which is anticipated mid to end-2024.

Wi-Fi 7 Feature Map

Pre-requisites for Wi-Fi 7:
Wi-Fi 6 and WPA3



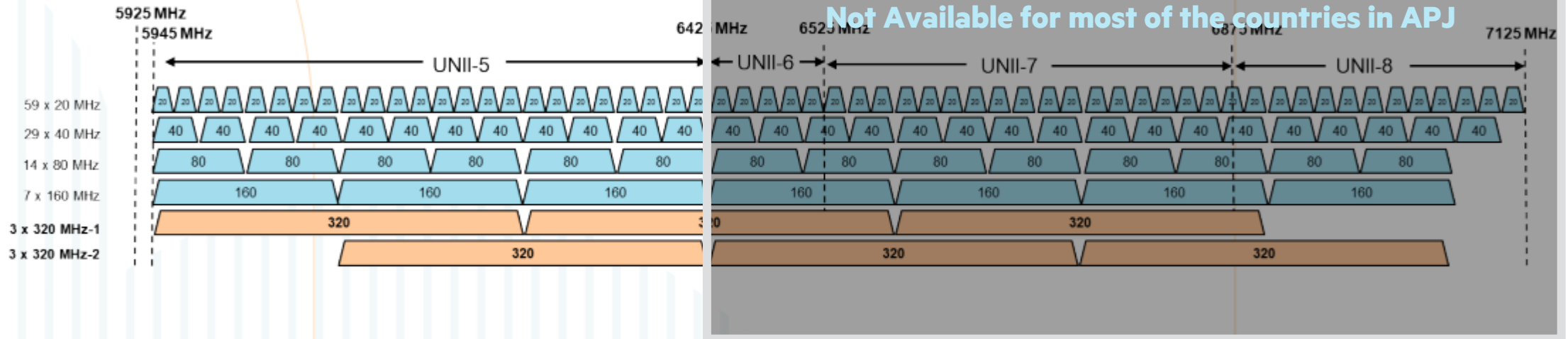
 = Features that may not be useful for Enterprise deployments

 = Features somewhat useful for Enterprise deployments

WiFi7 features

1 320 MHz channels in Wi-Fi 7

320 MHz channels only exist in the 6 GHz band and consist of any two adjacent 160 MHz channels.



320 MHz

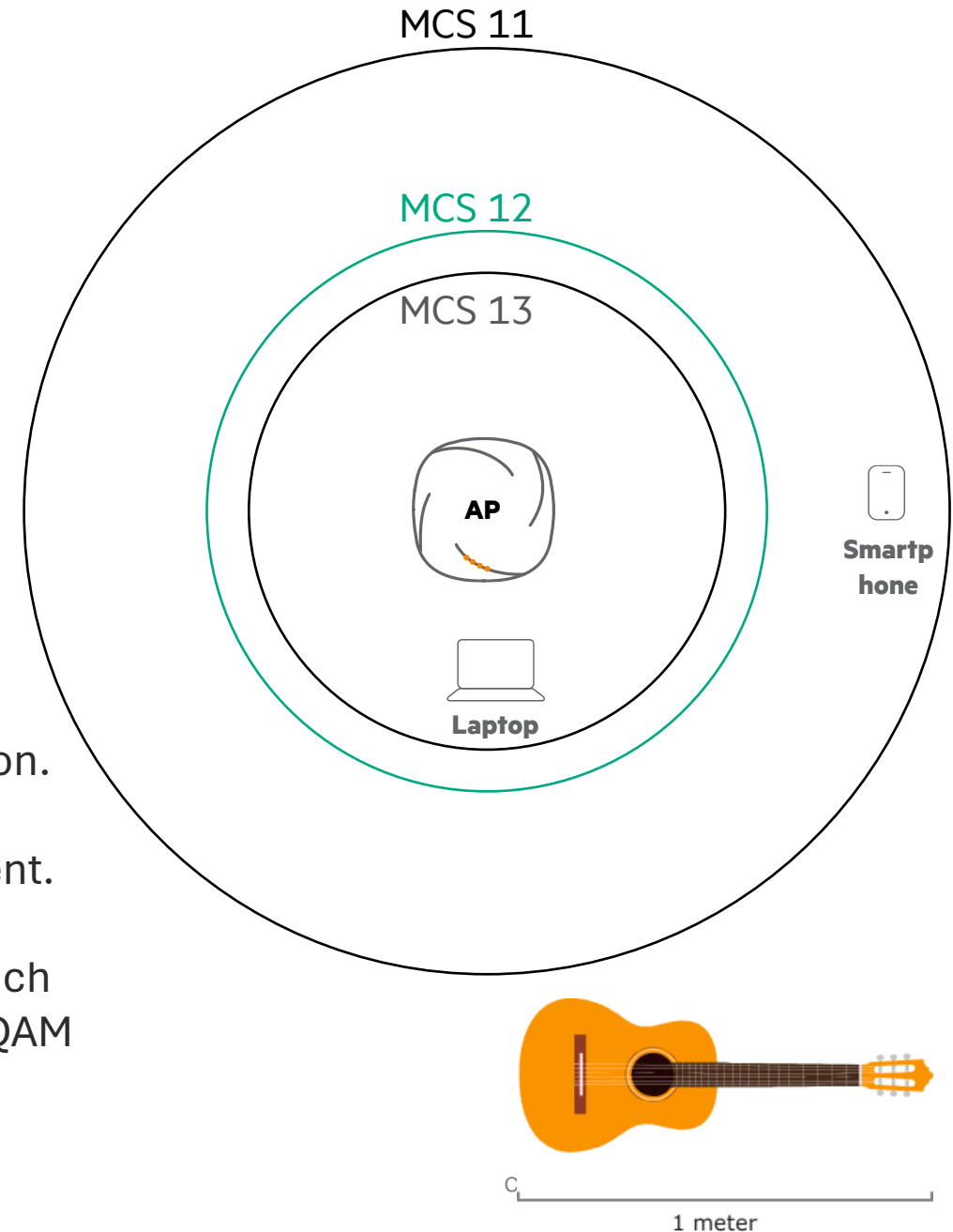
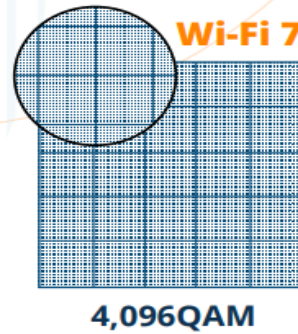
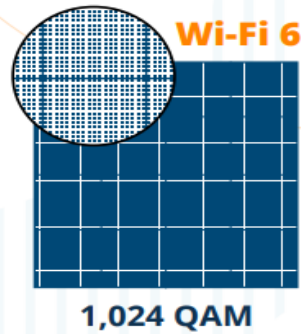
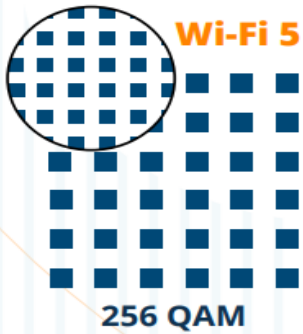
Static puncturing opens up subchannels in 20 MHz increments for workaround interference, incumbents, or other requirements while allowing 320 MHz (or other channels) to freely operate.

*** Only for 6GHz Band**

WiFi7 Features

2 4K QAM

20% higher transmission rates than Wi-Fi 6's 1024-QAM and higher transmission rate enables higher transmission efficiency.



New MCSs 12 and 13 are introduced which use 4K-QAM modulation.

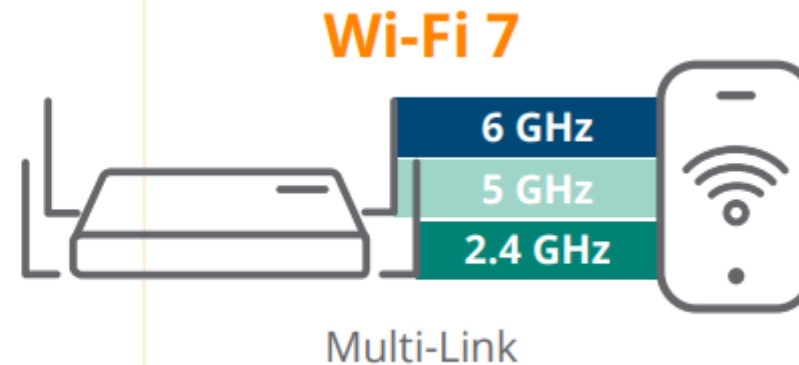
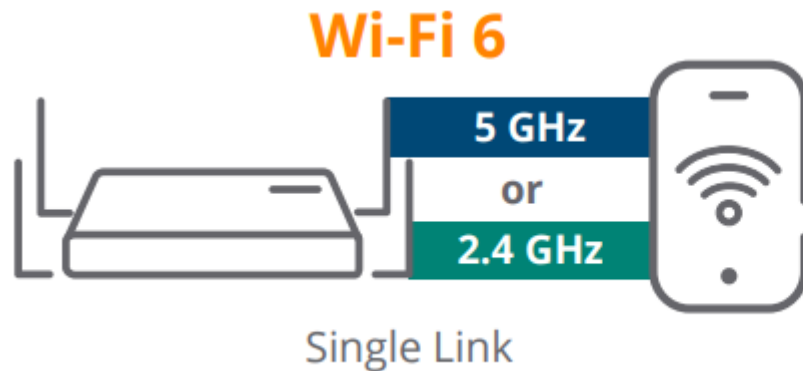
Implementation of MCS 12 and 13 is **optional** on both, AP and client.

Figure on the right gives an idea about the **decreased range** at which MCS 12 and 13 are operational compared to MCS11 because 4K-QAM **requires much higher desired signal level** than 1024-QAM.

WiFi7 features

3 Multi-Link Operation (MLO)

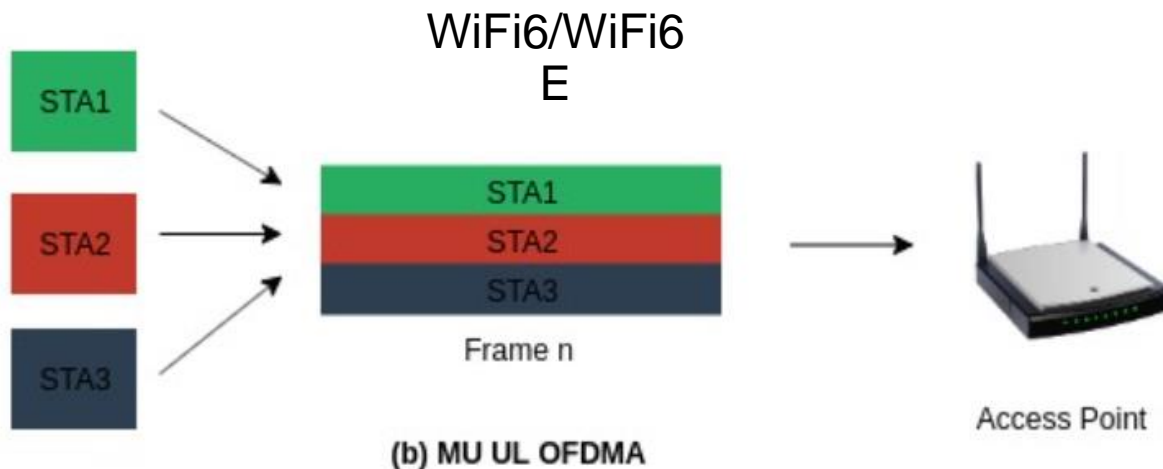
Prior to Wi-Fi 7, devices used a single link to transmit data or support multiple bands. MLO enables devices to combine different channels across frequency bands together, allowing concurrent transmission and reception of data over multiple links.



WiFi7 features

4 Triggered Uplink Access (TUA)

- In Wi-Fi 6/6E, triggered mode of operation was introduced which can reduce latency especially in congested environments. Eg: OFDMA.
- Wi-Fi 6/6E APs rely on **Buffer Status Reports (BSRs)** from STAs to **optimize scheduling** but too many BSRs can incur **overhead** on the medium.
- Additionally, for latency sensitive traffic which is mostly periodic in nature (not always), some more parameters are required for proper scheduling at the AP.
- So, TUA allows **STAs to inform AP of its desired access interval, delay bound, minimum data rate**, etc. to help the AP with its scheduling.



Wi-Fi 6/6E vs Wi-Fi 7 comparison

Feature	Wi-Fi 6/6E	Wi-Fi 7	Advantages of Wi-Fi 7	Usability in Enterprise deployments
Highest Modulation	1024-QAM	4K-QAM	Higher peak data rate	4K-QAM requires stringent EVM and SNR requirements and clients may need to be close to the AP.
Channel Widths (MHz)	20 / 40 / 80 / 160	20 / 40 / 80 / 160 / 320	Doubles the size of widest Wi-Fi 6/6E channel. Additional protection for incumbents in 6 GHz with Static Puncturing + Multiple RU.	320 MHz channels will rarely be deployed in enterprise environments. Static Puncturing + MRU highly useful for 6 GHz operation and incumbent protection.
Multi-Link Operation (MLO)	N/A	Tri-band MLO	Increased throughput, lower latency	Majority of client devices are expected to be single radio multi-link devices with high power saving requirements. MLO may work in environments with ~10s of clients. Environments with higher client count still untested and <i>possibly</i> worse off than Wi-Fi 6/6E.

Wi-Fi 6/6E vs Wi-Fi 7 comparison

Feature	Wi-Fi 6/6E	Wi-Fi 7	Advantages of Wi-Fi 7	Usability in Enterprise deployments
Max client data rate	9.6 Gbps	36 Gbps*	>3x throughput compared to Wi-Fi 6/6E	Only throughput gains are from 320 MHz bandwidth and 4K-QAM (both of which are not useful in most Enterprise deployments). MLO does provide a multiplying factor, but most client devices will be EMLSR and this won't apply.
Triggered Uplink Access	N/A (proprietary implementation in the marketplace)	Available	More predictable latency for uplink multi-user transmissions	Quite applicable. This may initiate more client devices to support MU operations.

Consideration to support WiFi7

1. Switching infrastructure: Need to support 5G or 10G connectivity
2. Power consideration: Need to provide class 4 to class 6 power
3. Cabling: Need to have cat 6/6A cable.

Table 1: Internal cabling parameters to support 2.5G and 5G applications

	2.5G BASE-T	5G BASE-T
Installed Cat 5e	✓	Extended frequencies required
Installed Cat 6	✓	✓
Installed Cat 6A	✓	✓

Figure 5: From "NBASE-T Performance and Cabling Guidelines," NBASE-T Alliance, August 2016

Table 2: ALSNR support risk for 2.5G and 5G applications

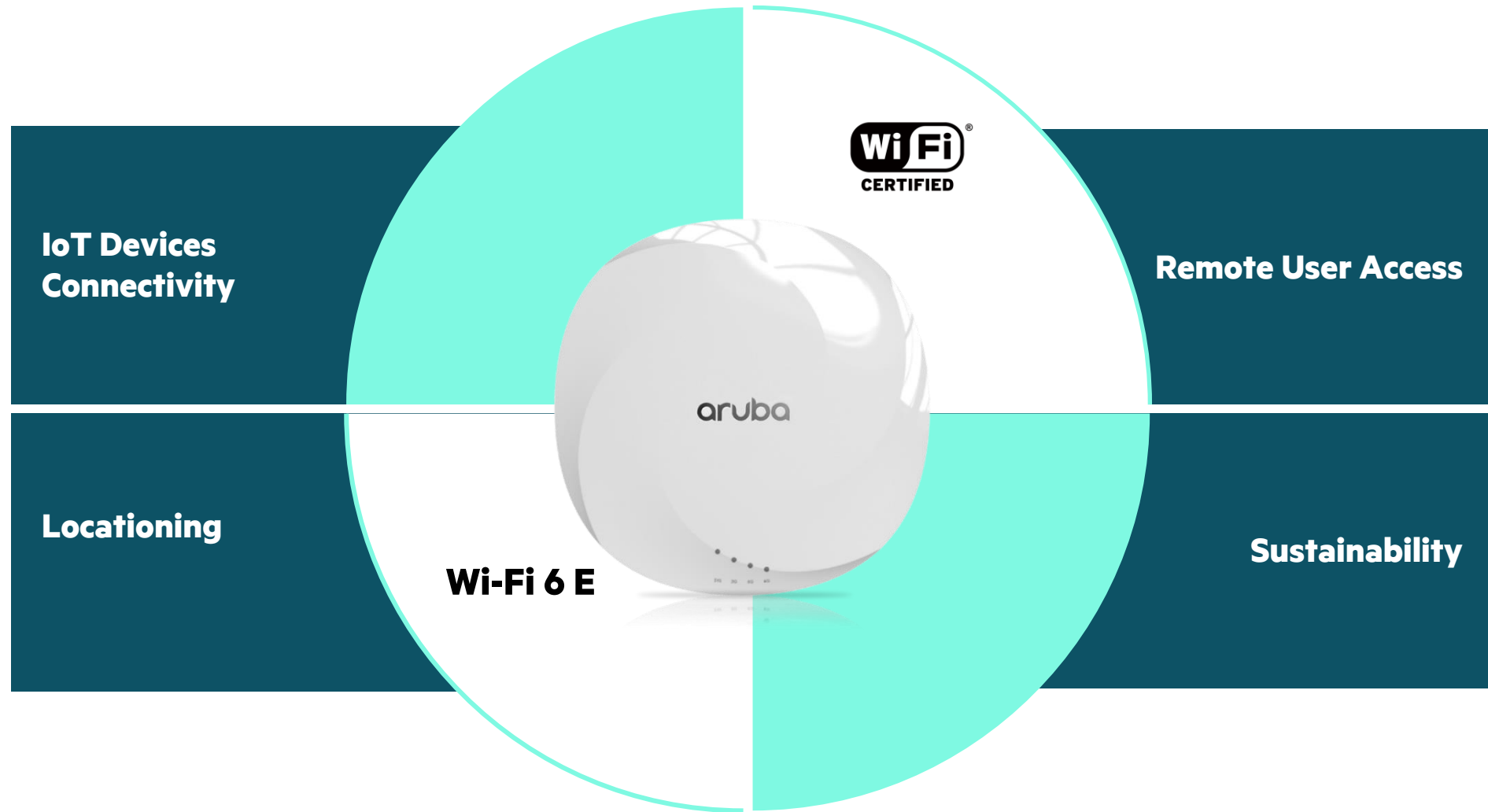
Bundled cabling length 0 m to 50 m	Category 5e	Category 6	Category 6A
2.5G BASE-T			Assured
5G BASE-T			Assured
Bundled cabling length 50 m to 75 m	Category 5e	Category 6	Category 6A
2.5 G BASE-T			Assured
5 G BASE-T			Assured
Bundled cabling length 75 m to 100 m	Category 5e	Category 6	Category 6A
2.5 G BASE-T			Assured
5 G BASE-T			Assured
ALSNR Risk	High	Medium	Low

Figure 6: From "NBASE-T Performance and Cabling Guidelines," NBASE-T Alliance, August 2016

WiFi6E will remain as mainstream WiFi connectivity

1. Wi-Fi 7 features are interesting, but have limited value and impact to large WLAN deployments in Enterprise, Education, Large Public Venues, etc
2. HPE Aruba Networking will be releasing Wi-Fi 7 APs and will be focusing on other aspects to add value to Wi-Fi 7 AP solution.
3. Many elements of Wi-Fi 7 require **client support** of optional features to add significant value, and client implementation quality may not be the best.
4. Need to consider the **overall infrastructure** (Switches to support Smart Rate and UPOE, cable to support 6A or 7)
5. There is no real reason to delay purchase of 6E APs as the value of 6E and 7 (compared to Wi-Fi 6 and earlier) is the addition of the **6 GHz band**.

Expanding **Wi-Fi** use cases



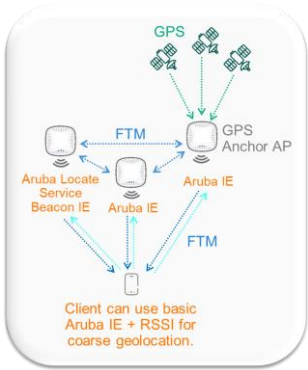
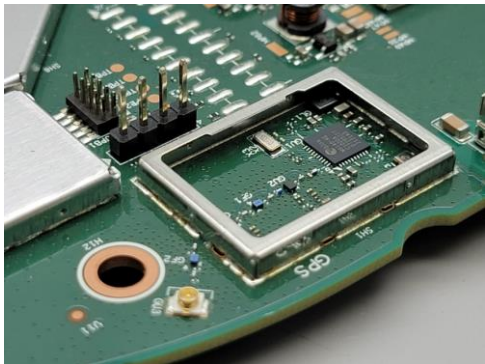
Future-proof your investment and better support existing and emerging use cases with Wi-Fi 6E

Aruba Strategic Investment

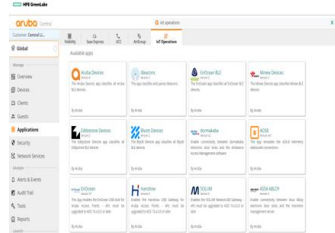
Aruba continue to invest in WiFi Technologies (including WiFi6E and WiFi7) and showcasing technology leadership and value to customers and partners. Some of the uniquely Aruba Value Propositions include:

1. GPS & Open Locate support

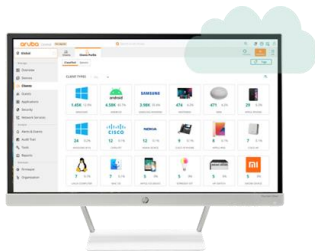
2. IoT Support



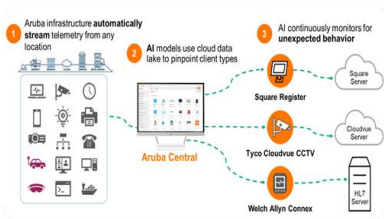
AP as IoT Platform



IoT App Store



Client Insight 99% accuracy

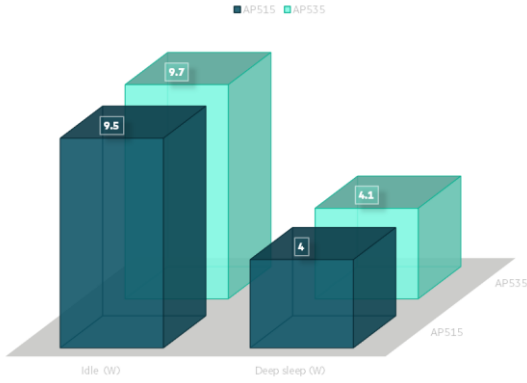
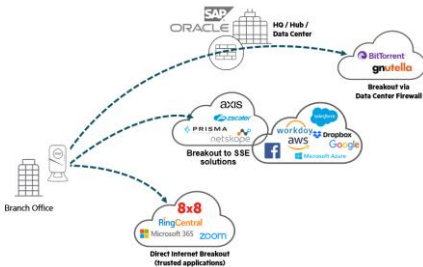
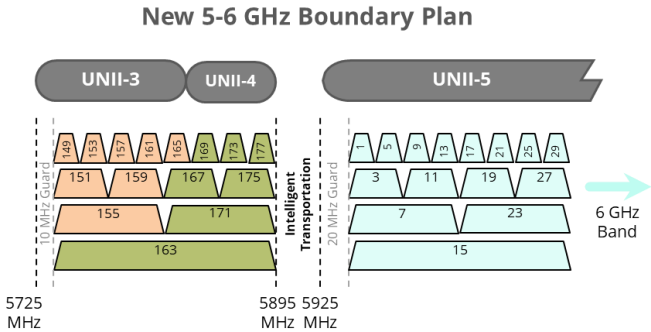


Security: Dynamic Segmentation

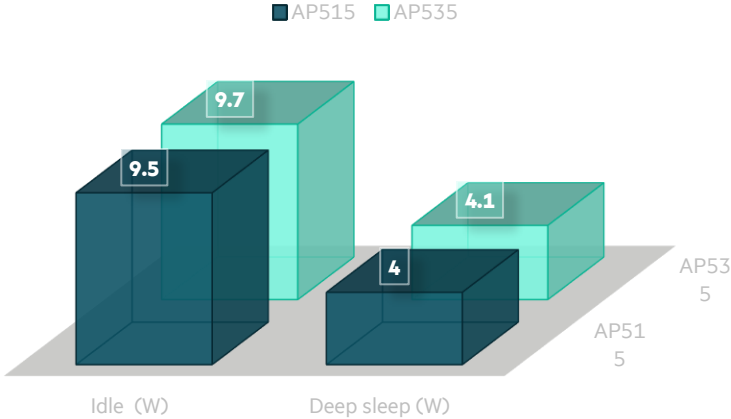
3. Ultra-tri band filter support

4. Microbranch

5. Sustainability (Green AP)

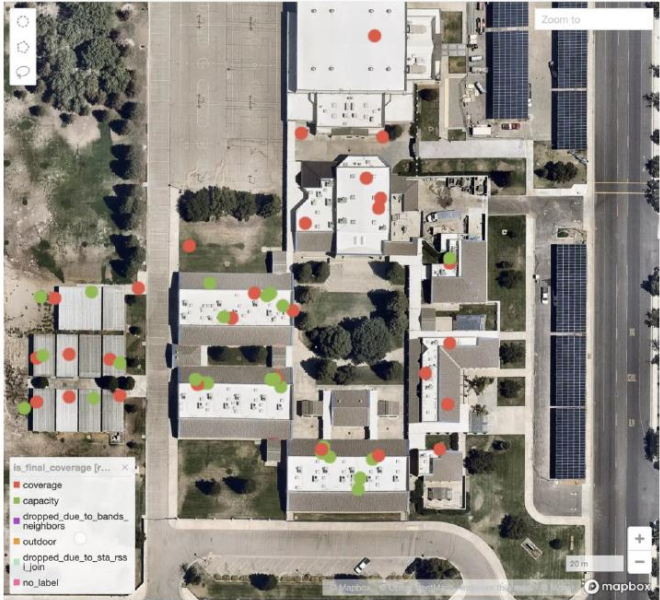


AI-powered Power Save Mode and Visibility



Green AP feature with energy savings >50%

Active Client Load:
Run a bimodal classifier on 12 week historical data



HPGreenLake

arubaCentral

Customer: AI0ps Team...

Yoda2 NI-Test Gr...

Manage

Overview

Devices

Clients

Guests

Applications

Security

Analyze

Alerts & Events

Audit Trail

Tools

Search or ask Aruba

New Central

Summary

List

Config

WLANs

Access Points

Radios

Interfaces

Security

Third Party Tunnel

Services

System

IoT

Configuration Audit

Hide Advanced

Logging

Proxy

IPM

Power Save

This feature requires NTP. Supported only on AOS 10.5+ and newer AP models (5xx, 6xx).

Automatic AI-Driven Recommendations are supported for Sites with AP Count > 20. AI-Driven Recommendations can be pushed automatically only when accurate timezone is configured on the devices. Check AI Insights tab for new recommendations that can be automatically applied when available.

Automatic

Manual

Sustainability Insight Center

Export report

Date range

10/01/2023 - 10/07/2023

Carbon emissions

132,000 MTCO2e

Carbon Emissions (MTCO2e)

Energy consumption

325,000 kWh

Energy Consumption (kWh)

Energy cost

\$48,750 USD

Energy Cost (USD)

Devices

Search

Serial number	Name	Type	Make	Country	Region	Model	Total energy kWh	Avg CPU Util %
Various	--	Networking	HPE	--	US West	Aggregated HPE Aruba access points	1.2	10
8899616987159045	DEV_124_test	Compute	HPE	USA	US West	HPE ProLiant D 380 Gen10	6,400	10
8899616987159046	WVPRODBATCHPROC03	Compute	HPE	USA	US West	HPE ProLiant D 380 Gen10	6,400	20
8899616987159046	PWAPPSRV003	Compute	HPE	USA	US West	HPE ProLiant D 380 Gen10	6,400	20
8899616987159046	FTCUSAMountain_ML350	Compute	HPE	USA	US West	HPE ProLiant ML350 Gen10	6,400	20
8899616987159046	--	Compute	HPE	USA	US West	HPE ProLiant ML350 Gen10	11,011	30
8899616987159046	--	Compute	HPE	USA	US West	HPE ProLiant ML350 Gen10	11,011	30
8899616987159046	--	Compute	HPE	USA	US West	HPE ProLiant ML350 Gen10	51,011	30
8899616987159046	--	Compute	HPE	USA	US West	HPE ProLiant ML350 Gen10	51,011	40

5G MARKET TRENDS

HIGHLIGHTS

The Mobile Private Network Arena

- 5G adoption has been driving industry momentum toward mobile private network
- LTE is still the mainstream though 5G interest is steadily growing
- 5G eco-system (terminals, business model) maturity in build-up phase
- Geographical diversityKey drivers are spectrum by specially the country economical landscape
- Greenfields starting directly with 5G SA (Standalone) to avoid migration from LTE
- Hyper-scalers have made the step into the market while SaaS model is getting pushed across the players
- Logistic , port , airport , mining and manufacturing (outdoor -> 5G make the difference vs Wifi)
- AR/VR , communication, video surveillance, analytics, cranes control, cargo operations,



Athonet

Mobile Private Network

A proven track record in the market

Athonet Software Focus

Network elements covering Core Network, Services and Management



- MPN solution available on the market since 2010
- Won 4 simultaneous Global Mobile Awards at MWC Barcelona in 2019
- Open 5G Core running on AWS, 2020
- Key references with Tier-1 CSPs worldwide
- **MWC Barcelona 2024 Glomo Awards – Mobile Tech**
 - CTO Choice: Outstanding Mobile Technology Award: Athonet, a Hewlett Packard Enterprise Acquisition, Ampliphae and Arqit for The First Quantum-Secure 5G
 - Best Mobile Security Solution: Athonet, a Hewlett Packard Enterprise Acquisition, Ampliphae and Arqit for The First Quantum-Secure 5G

The Mobile Core that works for you

Maturity and Openness

- 10+ years
- 100+ references
- 1000+ deployments
- Any radio
- Any cloud
- Any application
- Open APIs

Flexible and Beyond connectivity

- On-prem
- Private, Public or Hybrid clouds
- Public Safety Tactical Solutions
- An overall portfolio for Mobile Private Networks
- Voice Services
- A control center for management

Field proven and innovative

- Carrier grade
- Ease of use and deploy in 10+ minutes
- Best of breed user plane function with extended Berkeley Packet Filter (eBPF) / eXpress Data Path (XDP)
- A history of awards @Mobile World Congress

Deployment Options for what you need

Same
SW

CLOUD (FULL OR HYBRID) OR DATACENTER

Cloud & Hybrid



Datacenter



All-in-one

ATHONET REFERENCE NETWORK DESIGN

Unified Network Platform



Single Server



Redundancy N+1
(incl. Geo-redundancy)

Multi-edge distributed User Plane

TRANSPORTABLE



BACKPACK 1
RT PROXIMITY
1 SECTOR 1W

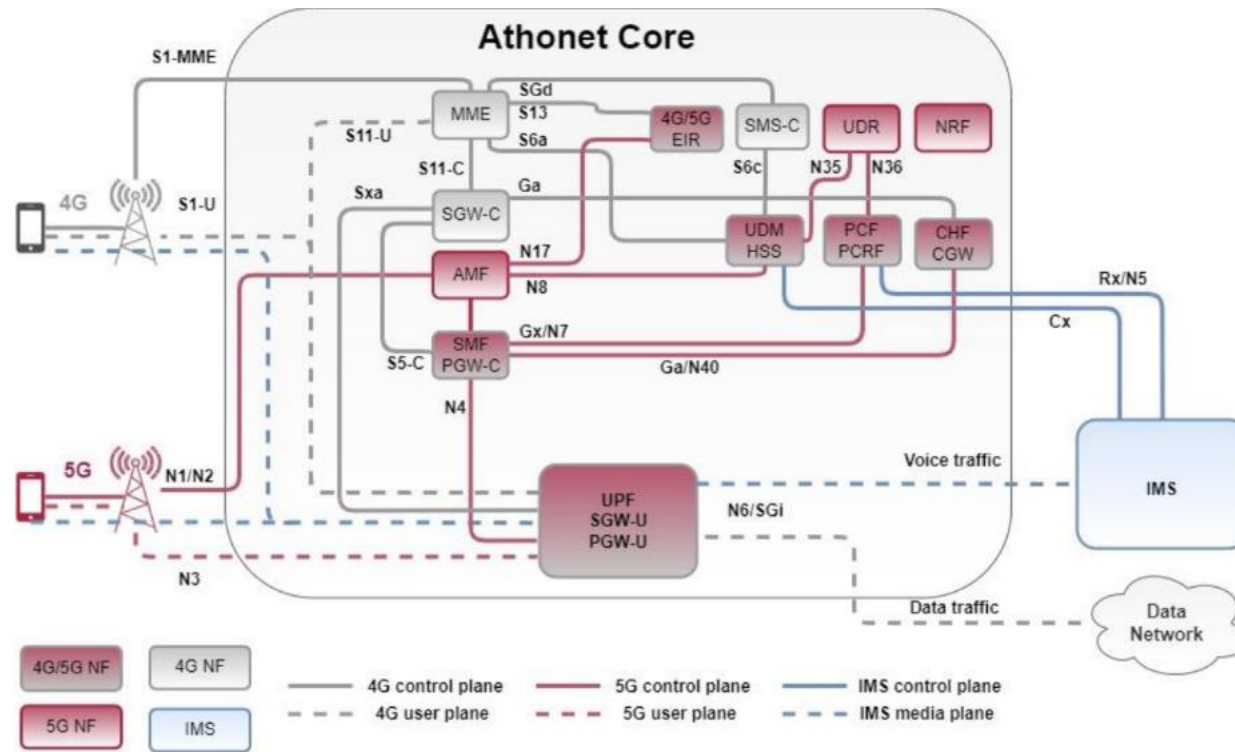


BACKPACK 2
RT INTERVENTION
1 SECTOR 5W



CUBE
RT EVENT
3 SECTORS 20W

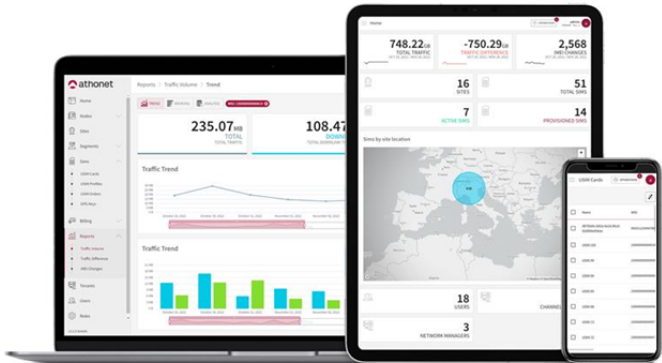
Athonet Core 23.3 Combo Core



- Common UDR , 4G/5G subs profiles
- Combined UDM, HSS
- Combined SMF, PGW-C
- Combined PCRF, PCF
- AMF
- MME
- SGW-C
- Combined UPF, SGW-U, PGW-U

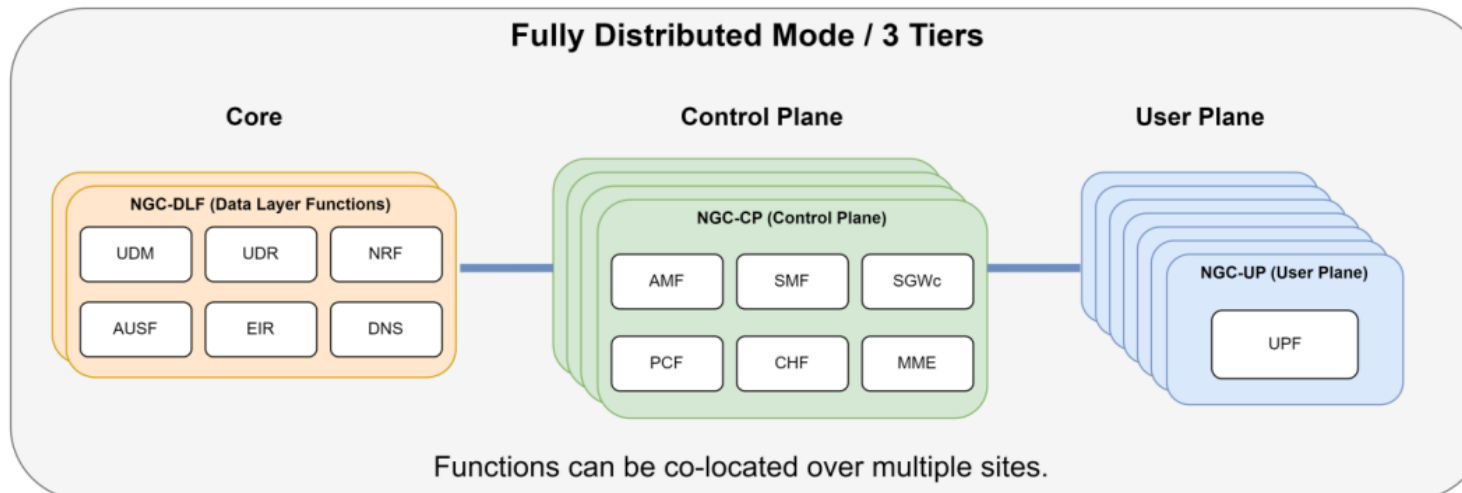
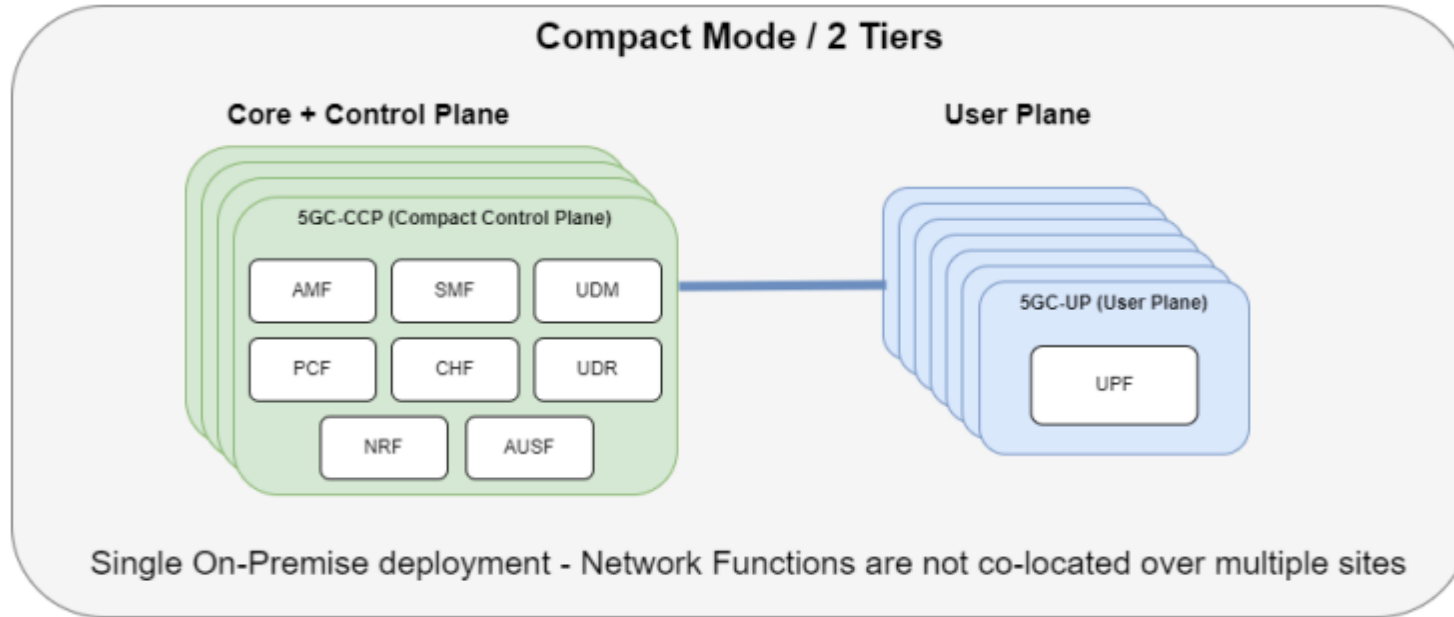
Athonet Dashboard

Manage your private networks



Integration with fulfillment system			
Subscribers' management	Monitoring	Services	Analytics
Data base abstraction (channel partner based)	Network holistic view	APN profile management	Traffic data per subscriber
Business data management (e.g. anagraphic)	Graphical status representation	QoS profile management	IMEI changes report
Offline provisioning and distribution (multiple HSS)	Detailed monitoring element view	APN segmentation	Billing analysis
USIM history			
Channel partner management			

Deployment Model



Use Cases

Mobile Private Network

Enterprise Drivers for Private 5G



 **Deterministic network access**

 **Wide area coverage**

 **High-velocity client mobility**

 **Challenging RF environments**

 **Segmentation of back-of-house traffic**

 **Indoor gaps in public network coverage**

Where do we see Private 5G

Tactical forces



Healthcare



Manufacturing



Sea Ports



Airports



Oil Fields



Emergency Services



Education



Utilities



Event Venues

Growing demands at the Edge will require both Wi-Fi and Private 5G

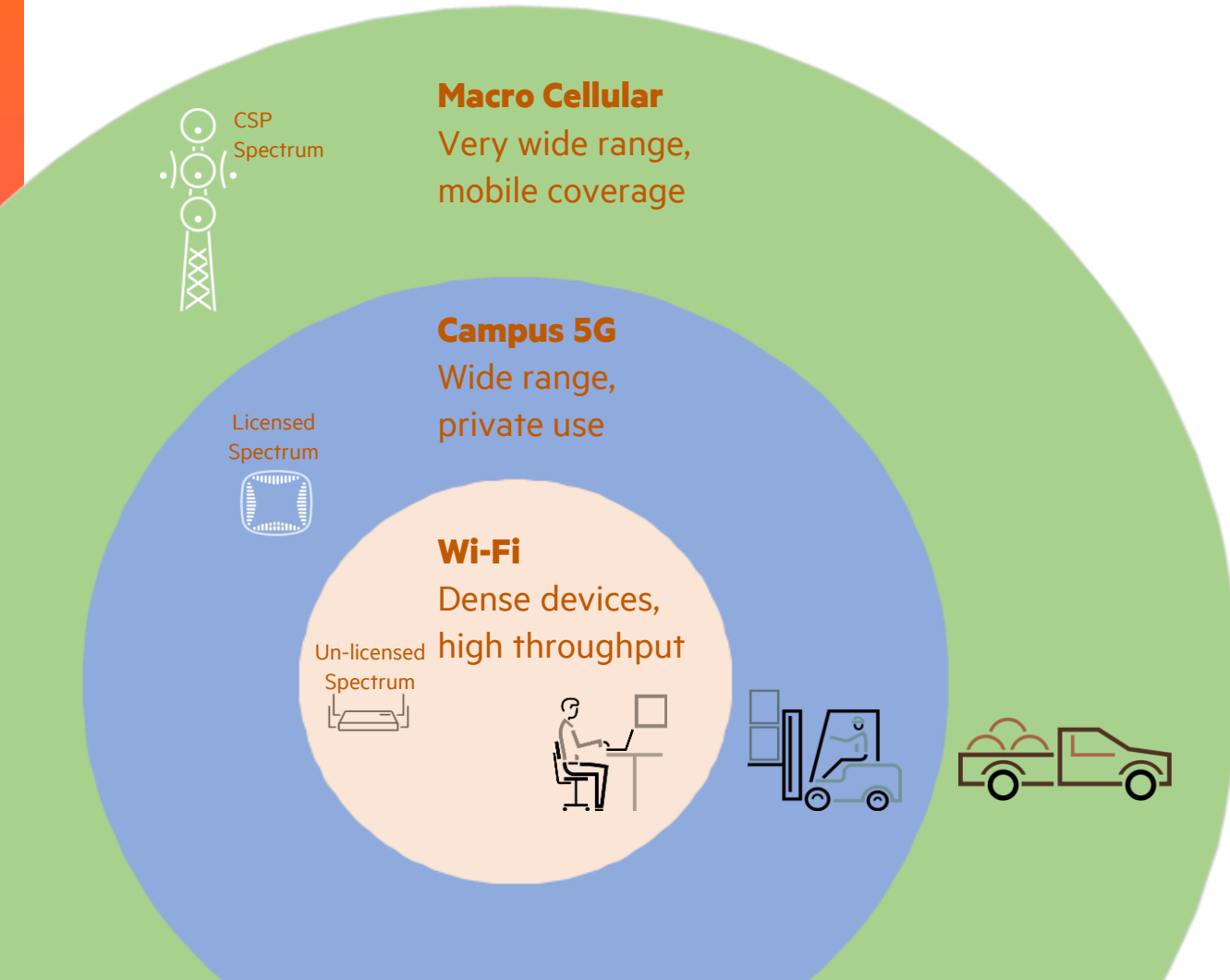


Wi-Fi excels in dense, high-capacity indoor networks



Private 5G brings wider area coverage, high-speed mobility, clean spectrum, and greater determinism

End to End Connectivity – Across Environments

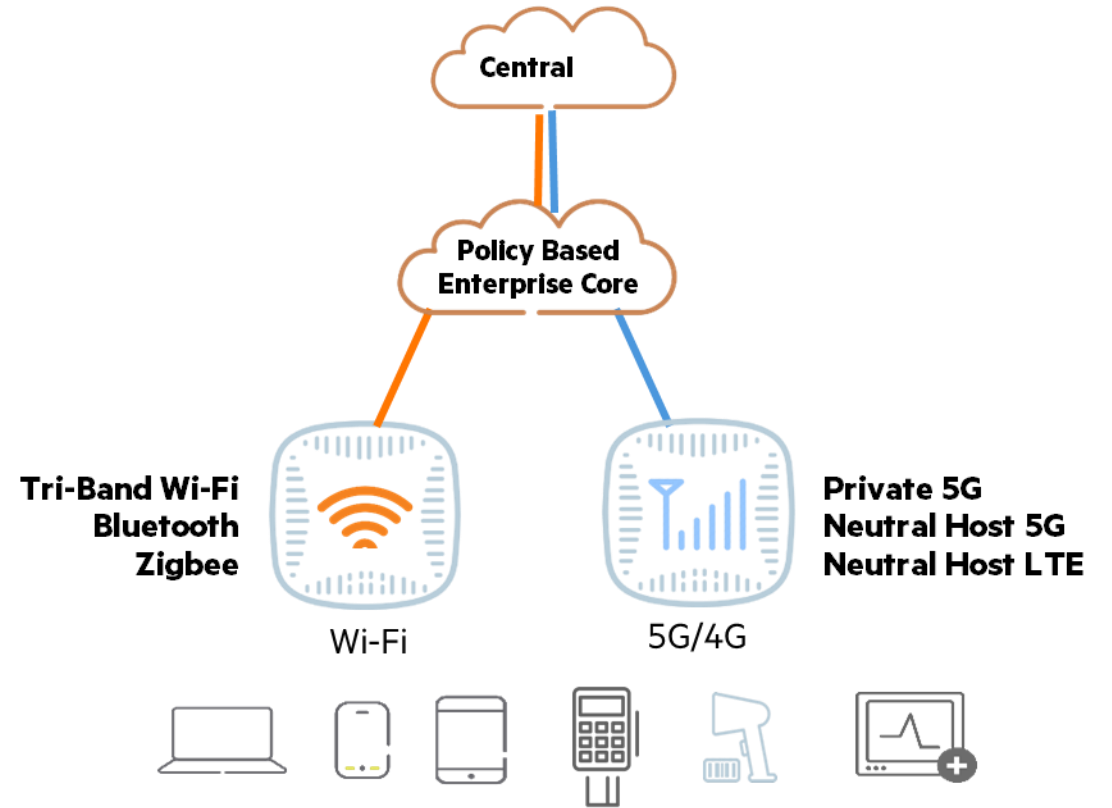


WiFi and 5G, converged

- Seamless interoperability
- Dynamic QoS
- Consistent reliability
- Security at scale
- Broad ecosystem of devices
- Energy efficiency

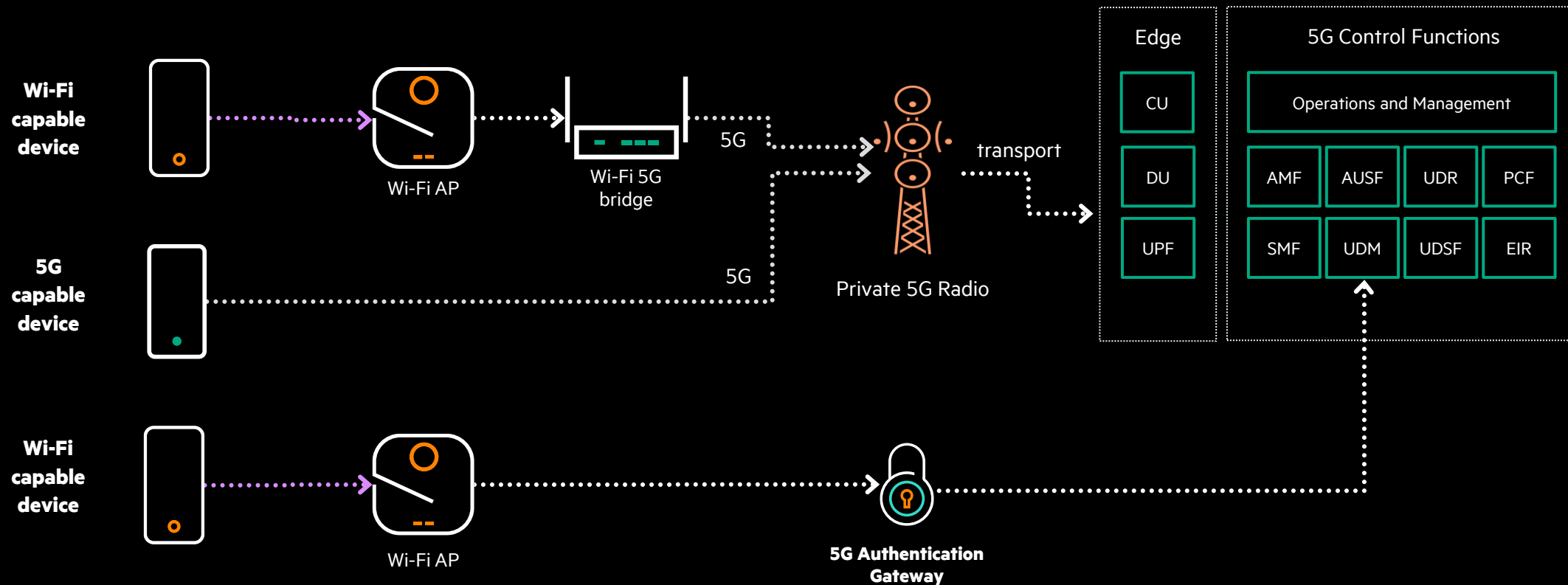
The Private 5G and Wi-Fi Strategy

“Enterprises are not interested in deploying both 5G and Wi-Fi networks in separate silos, there is interest in a combined solution that can help tackle the integration and management issues from a single pane.” IDC

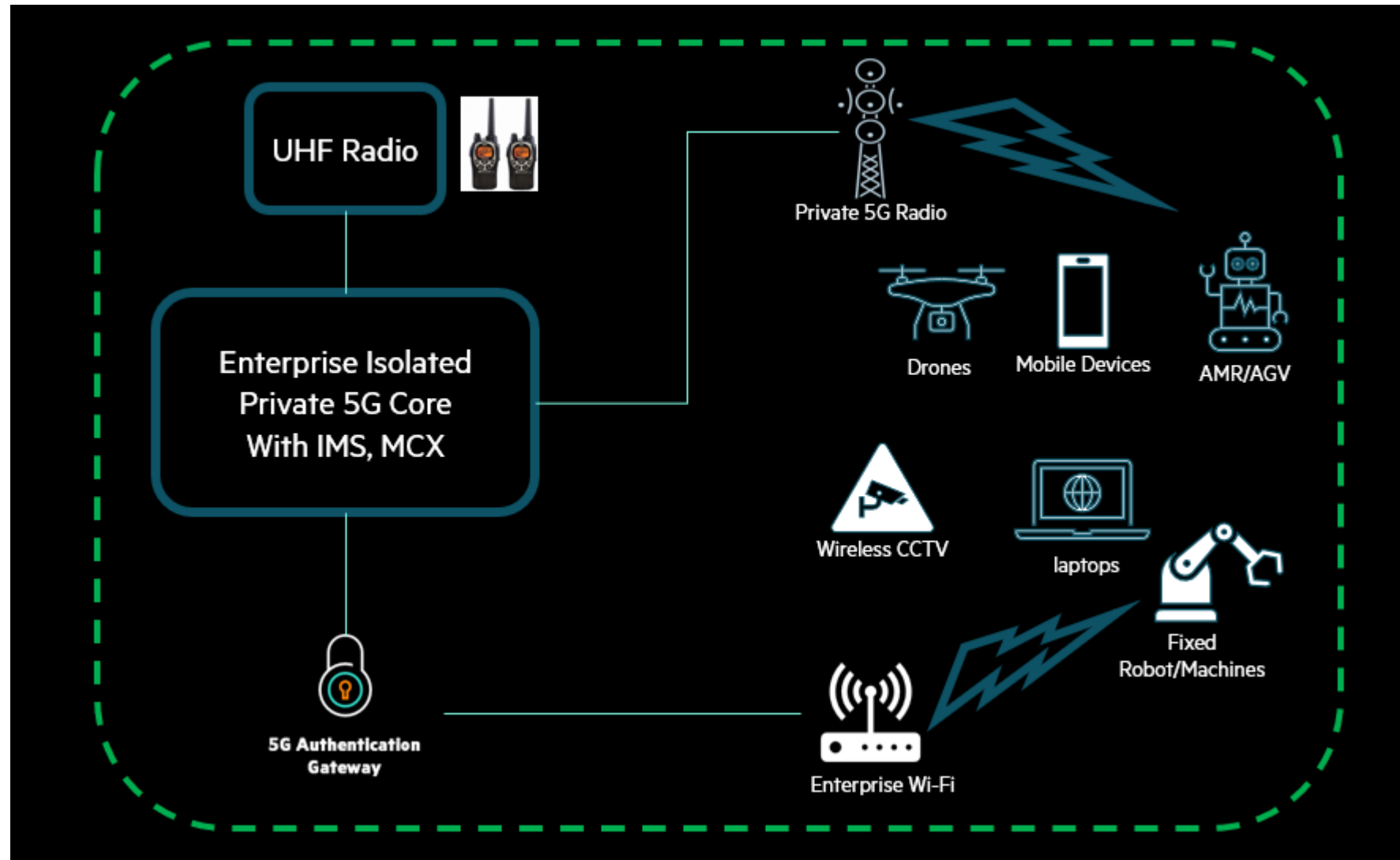


Source: IDC, HPE Acquires Athonet for Private 5G Creating an Opportunity to Integrate Cellular and Wi-Fi Management via an Enterprise Network as a Service, March 2023

Private 5G with seamless Wi-Fi interworking



An isolated P5G for Enterprises



COMBINED POWER OF HPE AND ATHONET

HPE has a 30+ year history in core networks for carriers and a leadership position in OSS. P5G is one of the key growth areas in HPE's telco business.

HPE Aruba Networking began as enterprise-grade Wi-Fi, but with the introduction of HPE switching and Silver Peak SD-WAN has built a near-complete enterprise connectivity offering.

HPE & Athonet

Complete enterprise connectivity with an integrated Wi-Fi and private cellular networking solution offered directly, via carrier, and through managed services

Athonet is a pioneer of private cellular networking, founded in 2005 in Vicenza, Italy with ~120 employees and 450 private network deployments worldwide

Athonet provides mature and scalable cellular core software for private networking that can address the needs of mid-size enterprises and MVNOs





Thank You