Wireless
Global Congress

Wireless Broadband Alliance

THANK YOU TO OUR SPONSORS

Time	Presentation
11:20 AM (CDT)	**Moderator and CEO Welcome** Tiago Rodrigues, President & CEO.
11:25 AM (CDT)	**Transforming Healthcare with 6 GHz Wi-Fi** Maureen Gallagher, VP Marketing, Wi-Fi Alliance.
11:40 AM (CDT	**Network Intelligence: Powering Next Generation Networks** Stewart Goumans, Community & Customer Engagement Director, Ekahau.
12:00 PM (CDT)	**How Itaú is Transforming Connectivity Through Wi-Fi and partnership with WBA.** Diego Turi Oliveira, IT Manager, ITAU Unibanco.
12:20 PM (CDT)	**Refining IoT with Ultra Low Power Wi-Fi** Vaseem Kazia, Product Manager - Wi-Fi, Silicon Labs
12:40 PM (CDT)	**ENTERPRISE CONNECTIVITY FORUM: Wi-Fi 7, OpenRoaming and AI - Revolutionizing Enterprise connectivity** Moderator: Alexander Vodola - Director, Business Development – IronWiFi; Diego Turi Oliveira, IT Manager, ITAU Unibanco; Jason Bawcom, VP Systems Engineering; RUCKUS Networks; Dr. Necati Canpolat, Sr. Staff Wireless Systems Architect, Intel Corporation.
13:10 PM (CDT)	**NETWORKING LUNCH**

Wireless Global Congress
Americas

WGC AMERICAS

MAY 19 – MAY 22

Wi-Fi Innovation: Connecting Our Digital World

WESTIN IRVING CONVENTION CENTER, DALLAS

#WGCAmericas | #wifirevolution | #lovewifi
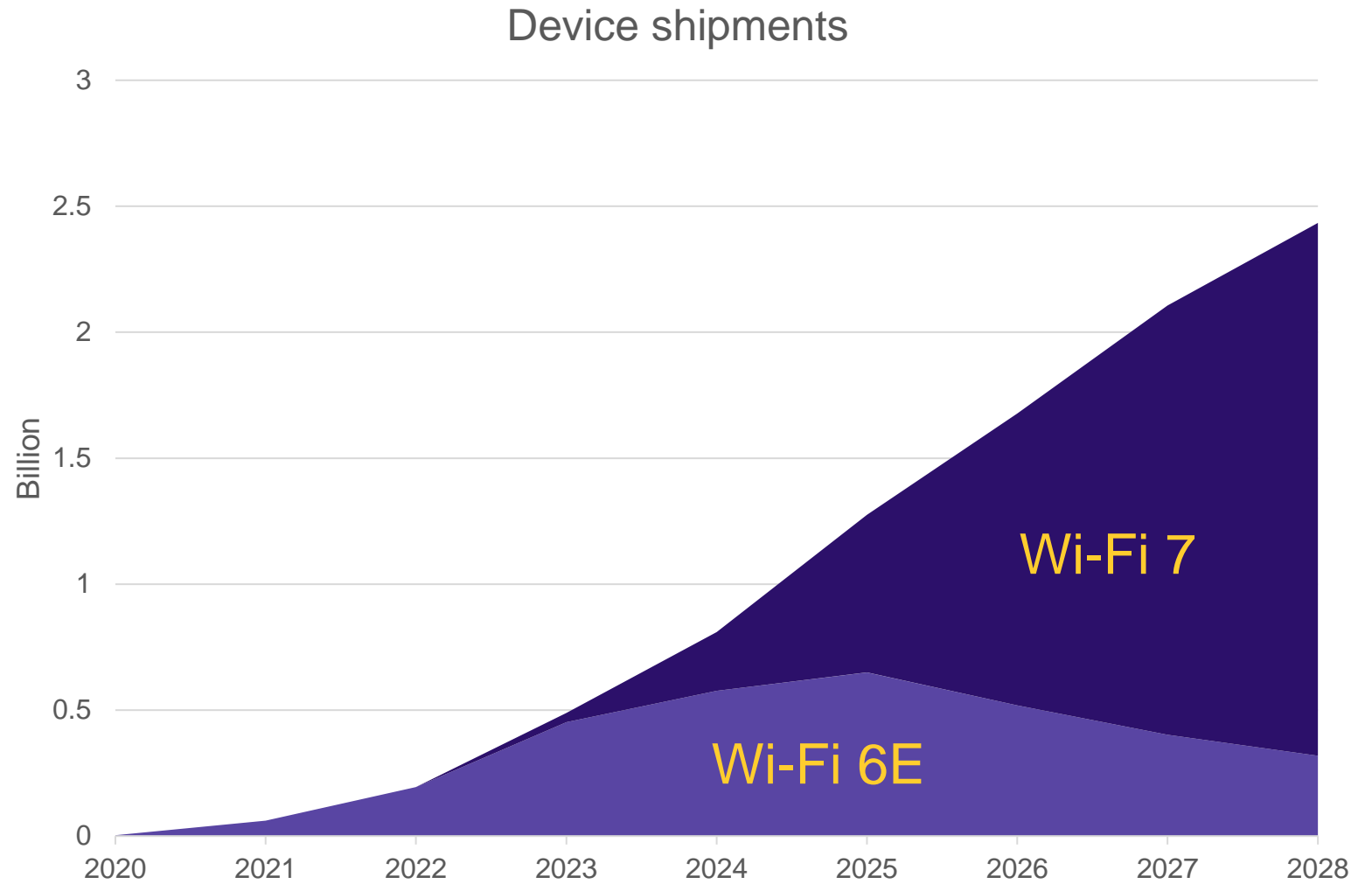
Transforming Healthcare with 6 GHz Wi-Fi®

Maureen Gallagher
VP of Marketing | Wi-Fi Alliance®

May 22, 2025

6 GHz enables Wi-Fi 6E and Wi-Fi 7

Device shipments

Billion

Wi-Fi 7

Wi-Fi 6E

2020 2021 2022 2023 2024 2025 2026 2027 2028

Source: IDC Research, 2024

Value of 6 GHz Wi-Fi to the American economy

Bar chart — Billion USD

Year	Wi-Fi 6E	Wi-Fi 7	Total
2023	$311		$311B
2024	$559.2		$559.2B
2025	$598.5	$194.1	$792.6B
2026	$567.5	$424.8	$992.3B
2027	$409.8	$835.9	$1.2T

Legend: ■ Wi-Fi 6E ■ Wi-Fi 7

41.4%
CAGR for 2023 - 2027

Source: Telecom Advisory Services, 2024

6 GHz Wi-Fi expands access to care, improves clinical outcomes, enhances medical education, and delivers a better user experience to staff, patients, and guests.

6 GHz Wi-Fi capabilities strengthen healthcare

Boosts performance

High throughput, ultra-low latency, expanded capacity, and robust connectivity at scale

Minimizes congestion

6 GHz band is unencumbered with legacy devices and allows segmentation of medical devices, smartphones with patient alerts, and guest traffic

Ensures reliability

Medical devices can use Wi-Fi 7's Multi-Link Operation (MLO) feature to redundantly send critical patient data on multiple frequency bands

Key healthcare use cases for 6 GHz Wi-Fi

Extended reality training

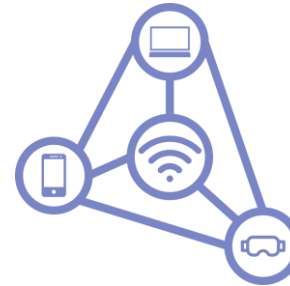Supports immersive simulation labs without congestion

Telemedicine

Offers high bandwidth and reliability required to transmit video, diagnostics, and patient records

Real-time remote patient monitoring

Ensures continuous data transmission with minimal latency

Dense device environments

Allows hospitals to manage device density while avoiding interference

Secure transmission of patient data

Includes modern security frameworks to ensure sensitive data remains protected

Connecting the Internet of Medical Things through 6 GHz Wi-Fi

1 Devices such as **infusion pumps** and **imaging technology** can rapidly upload large volumes of data to the cloud

2 **Smart shelves** track medical supply inventory for real-time management

3 Medical-grade **wearable health monitors** provide alerts for abnormalities

Wi-Fi Alliance and Ramathibodi Hospital in Thailand conducted a 7-month trial to evaluate the efficacy of 6 GHz Wi-Fi in a medical teaching environment.

Use cases tested in the trial

1

Immersive 3-D anatomy visualizations via extended reality

2

200+ students in a classroom streaming and performing file transfers

Trial scenarios and results

Scenario 1

Tested both use cases with access to only the **lower 500 MHz** of the 6 GHz band, resulting in:

- Performance constrained under load
- Latency exceeded 200 ms
- XR apps showed minor disruptions
- Some user discomfort reported

Scenario 2

Tested both use cases with access to the **full 1,200 MHz** of the 6 GHz band, resulting in significant improvements:
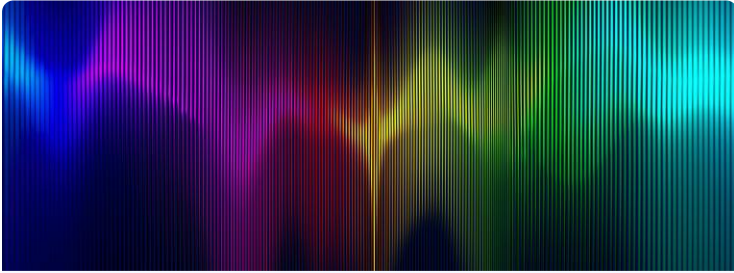
- Doubled throughput
- Lower latency (20-30 ms)
- Smooth streaming and extended reality experiences
- 3X improvement in user satisfaction

"

As a student, the sessions in the anatomy lab using the new Wi-Fi network were very productive.

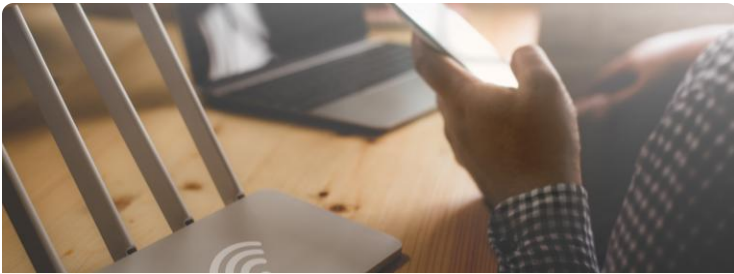# 6 GHz Wi-Fi has transformed connectivity

Greater channel diversity

Emerging use cases with stringent latency and throughput requirements

Gigabit speeds

Low-energy connectivity and minimal infrastructure needs

Standard power increases range and coverage

Narrows the digital divide

Thank you!

Maureen Gallagher

VP of Marketing, Wi-Fi Alliance

www.wi-fi.org

WiFi ALLIANCE™

Unmatched network and connectivity insights

We help organizations optimize networks, enhance digital experiences, and drive better connectivity outcomes.

Better
DATA

A trusted, accurate, multi-source dataset that tells the complete story.

Crowd | Controlled | Mobile | Fixed | Wi-Fi

Walk | Drive | Public | Private | QoS | QoE

Consumer-Initiated | Background | Embedded

iOS | Android | SDK | Browser | Coverage

Capacity | Spectrum | NPS | CSAT | Downtime

Better
INSIGHTS

Unique, cross-platform correlations turn data into meaningful, strategic insights.

- Find and fix issues that single-source solutions miss
- Optimize networks for real-world, experiential improvements
- Troubleshoot cross-functional & third-party issues
- Utilize advanced in-house data analysts & data science teams

Better
OUTCOMES

A relentless drive to improve networks, connected experiences, and ROI.

- Increase customer reach, satisfaction, retention and NPS with unmatched service
- Make meaningful changes that impact the most users
- Partner with industry-defining innovators in connectivity and standards bodies

OOKLA

Downdetector®

150M+ unique users

25M+ mo. problem reports

21K+ services monitored

50+ countries

SPEEDTEST®

600M+ app installs

11M+ daily tests

55B+ tests to date

15K+ global test servers

Billions of daily crowdsourced network performance samples

Tens of Millions of data points on NPS, subscriber ratings, and consumer sentiment

Millions of miles of controlled drive and walk network surveys

Defining the Future of Connectivity

Ookla data is used by governments, regulators, standards bodies, NGOs, academic institutions, trade groups, and analysts to solve the biggest connectivity challenges

FCC · Ofcom · ITU · GSA Global mobile Suppliers Association
ctia · Metaverse STANDARDS FORUM™ · GSMA™
cca · OECD · Wireless Broadband Alliance

The Global Media's Trusted Source

140K+ articles published annually referencing Ookla brands

70B+ unique monthly impressions on publications citing Ookla data

56.3% share of voice for Ookla and Speedtest combined in network intelligence

Global Reach and Impact

90% of the Fortune 500 trust Ekahau networking insights

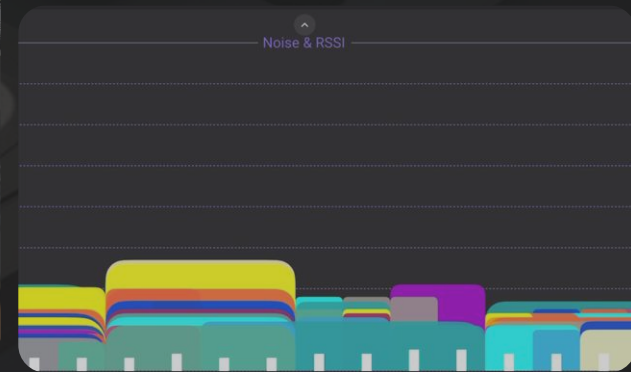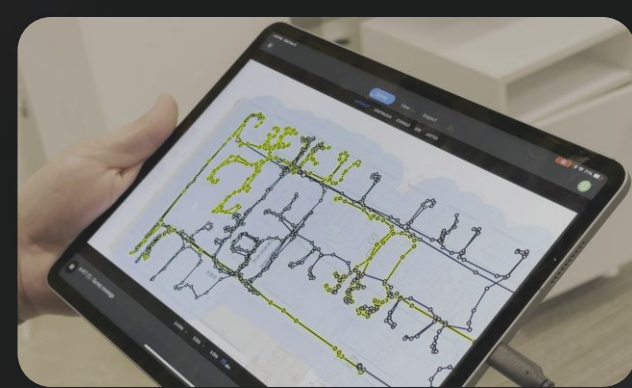**1,500+** Enterprise clients for Ookla in over 150 countries

OOKLA

Network Intelligence: Powering Next Generation Networks

Gathering Requirements

Make it right the first time

Business Requirements 💼

Stakeholders

Wi-Fi Purpose

Wi-Fi Objectives

Defined by Stakeholder

Technical Requirements 💻

AP & Antenna Vendor

Requirement Areas

Regulatory Domain

Defined by Stakeholder & Wi-Fi Engineer

RF Requirements 📊

Coverage & SNR

CCI

Rates

Defined by Wi-Fi Engineer

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How Do I Plan to Upgrade to Wi-Fi 7?

& Avoiding Common Pitfalls

Infrastructure Planning: Verify power and cabling needs, determine if you need Multigigabit switches

Network Redundancy: Implement multihoming for critical connections

Legacy Device Support: You may need to maintain dedicated 2.4 GHz SSID for IoT and other legacy devices
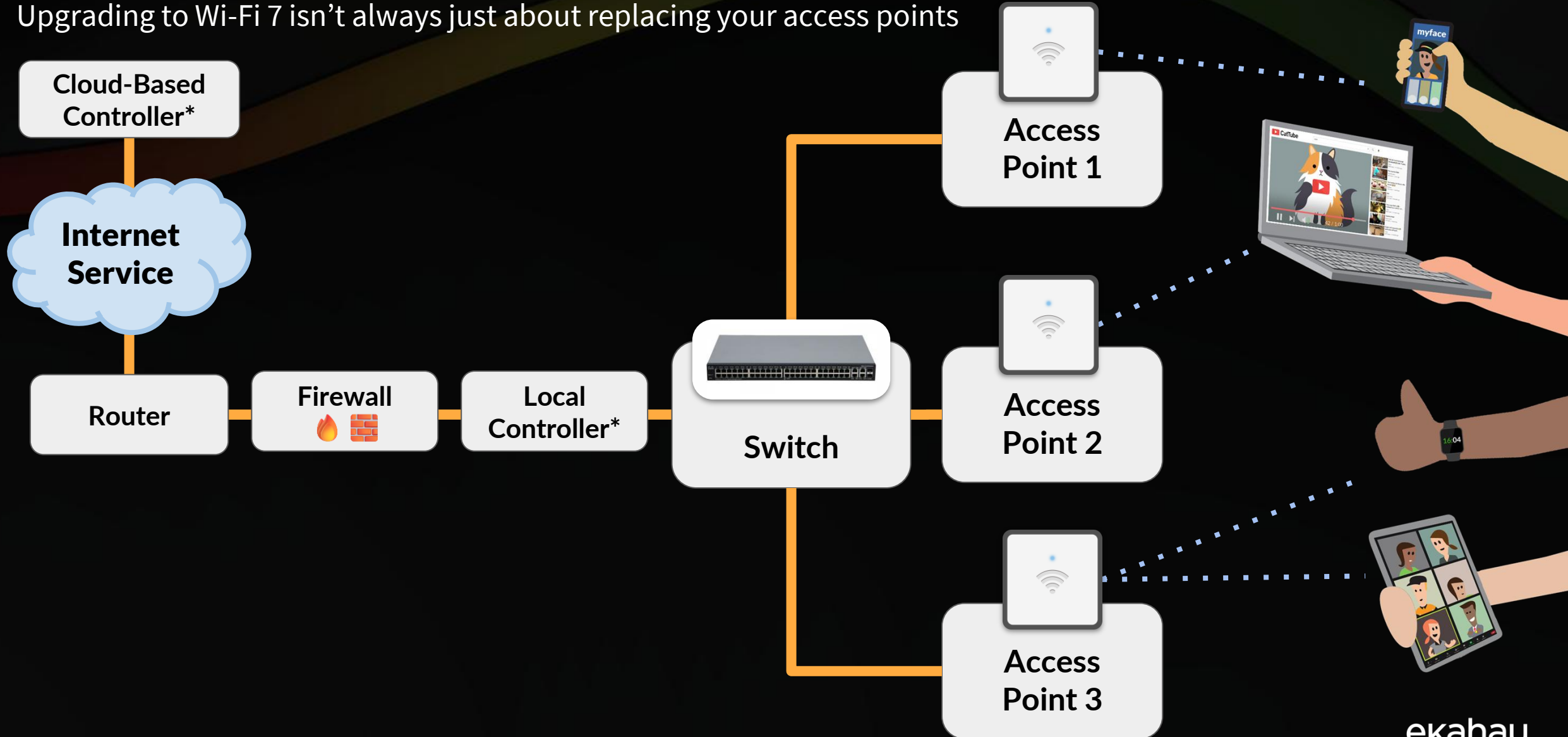
Performance Management: Implement proper QoS policies, prioritize voice and video calls

Bottleneck Prevention: Audit entire network path to ensure each segment can handle increased throughput

Realistic Expectations: Plan for real-world speeds below theoretical maximums

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Assessing Your Current Cabling Infrastructure

Cable Category	Link Class International	Max Speed	Max Distance (at Max Speed)	Power Capability
Cat 5	Class D	100 Mbps	100 meters	PoE
Cat 5e	Class D	1 Gbps	100 meters	PoE
Cat 6	Class E	1 Gbps (10 Gbps*)	100 meters (55 meters*)	PoE/PoE+
Cat 6a	Class E	10 Gbps	100 meters	PoE/PoE++
Cat 7	Class F	10 Gbps	100 meters	PoE/PoE+/PoE++
Cat 8	Cat 8.1 Class 1 Cat 8.2 Class 2	25 - 40 Gbps	30 meters	PoE/PoE+/PoE++

Network Redundancy: Switch, Cabling, and AP Planning
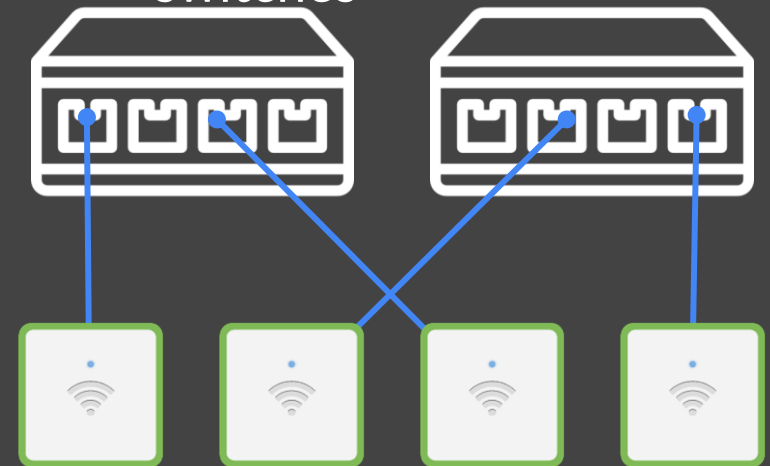
PERFECT

- 2 cables per AP
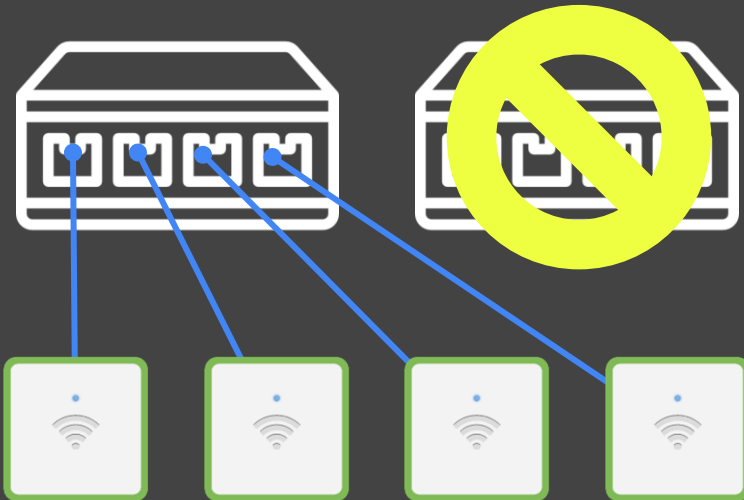 - More expensive
  - One per switch stack
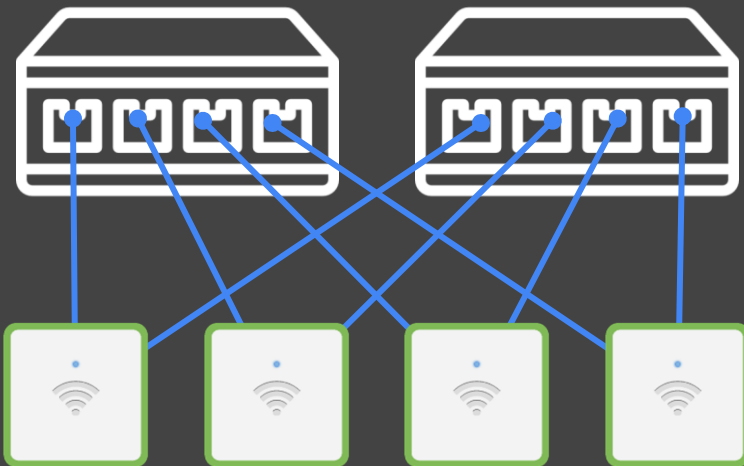
GOOD

- 1 cable per AP
  - Cheaper
  - Staggered between switches

Cabling APs

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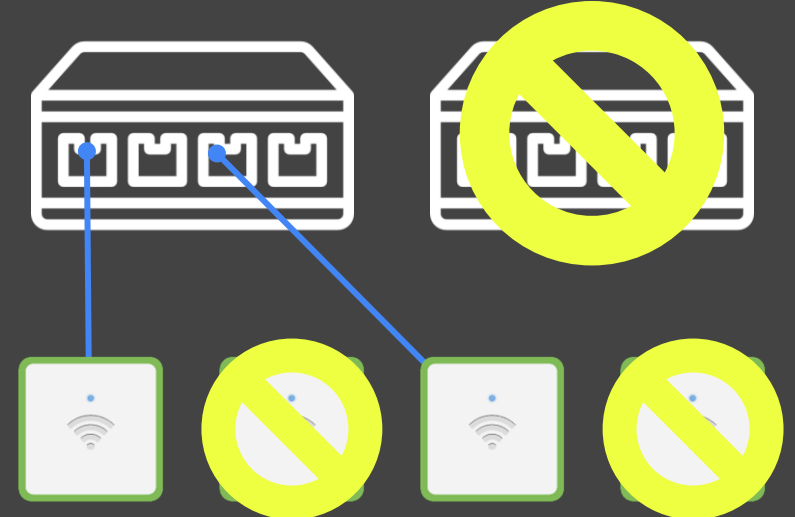# Network Redundancy: Switch, Cabling, and AP Planning

PERFECT

- Switch failure:
  - No change in coverage
  - No change in capacity

Cabling APs

GOOD

- Switch failure:
  - Reduced coverage
  - Reduced capacity

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Coverage

Coverage is all about getting Wi-Fi
signal to the areas you need it.
Secondary Coverage allows for faster
roaming and provides redundancy
in case of AP failure

Tip

You can't judge **how many APs you'll
need** based on the **area of your floorplan.**

HAPPY LITTLE APs!

Common Wall Materials and their *Average Attenuations**

*For accurate measurements, use an Ekahau Sidekick 2!

Drywall
3dB

Bookshelf
2dB

Exterior Glass
3dB

Solid Wood Door
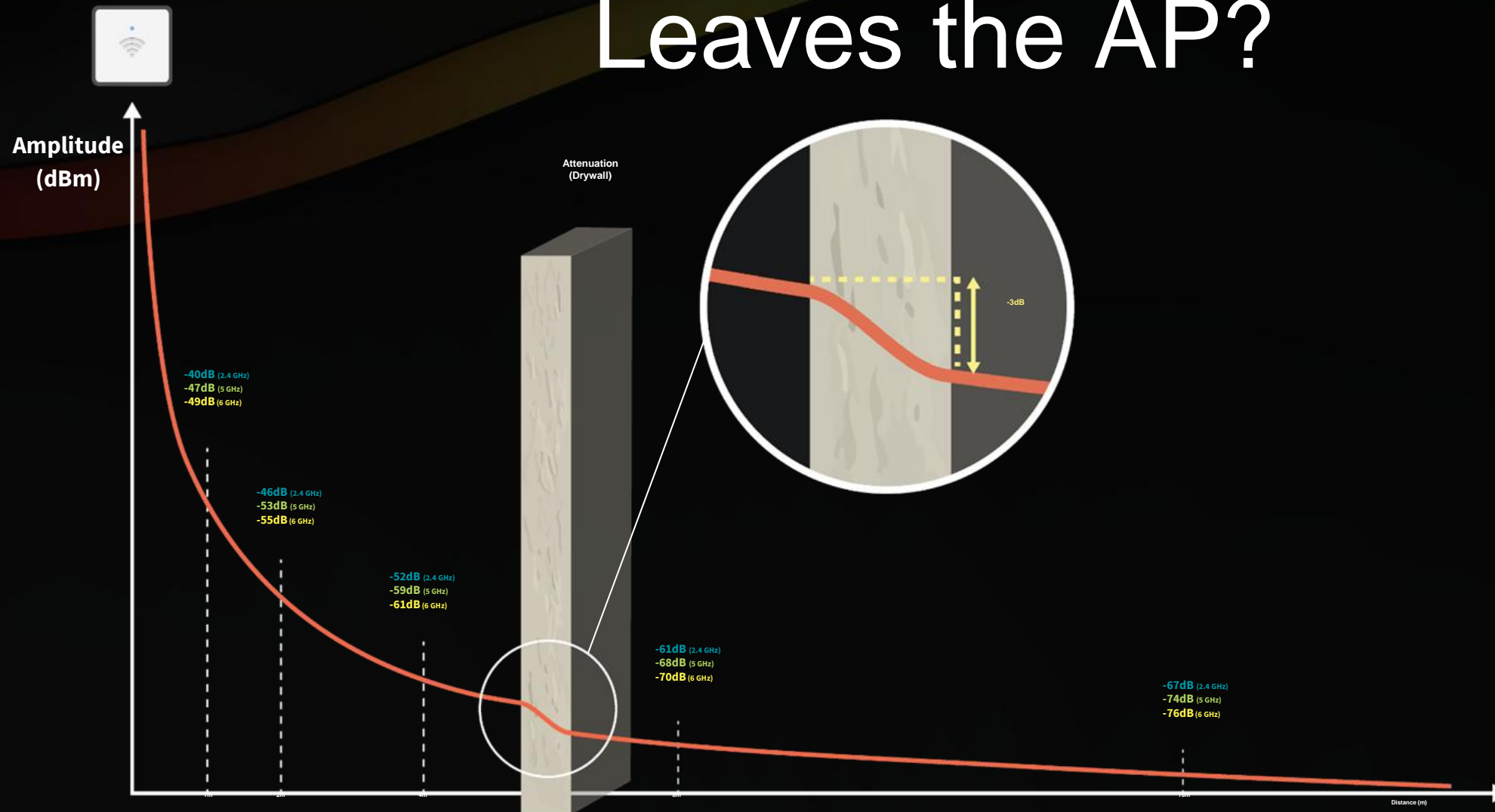6dB

Marble
6dB

Brick
10dB

Concrete
12dB

Elevator Shaft
30dB

What Happens When a RF Wave Leaves the AP?

Amplitude (dBm)

Attenuation (Drywall)

-3dB

-40dB (2.4 GHz)
-47dB (5 GHz)
-49dB (6 GHz)

-46dB (2.4 GHz)
-53dB (5 GHz)
-55dB (6 GHz)

-52dB (2.4 GHz)
-59dB (5 GHz)
-61dB (6 GHz)

-61dB (2.4 GHz)
-68dB (5 GHz)
-70dB (6 GHz)

-67dB (2.4 GHz)
-74dB (5 GHz)
-76dB (6 GHz)

Distance (m)

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Redesign? Start with A Survey

Survey Modes for Every Network Environment

Stop & Go
Stop, collect, move, and repeat. Collects the least amount of data.

Continuous
Tap when you start, when you turn, when you change pace and when you stop.
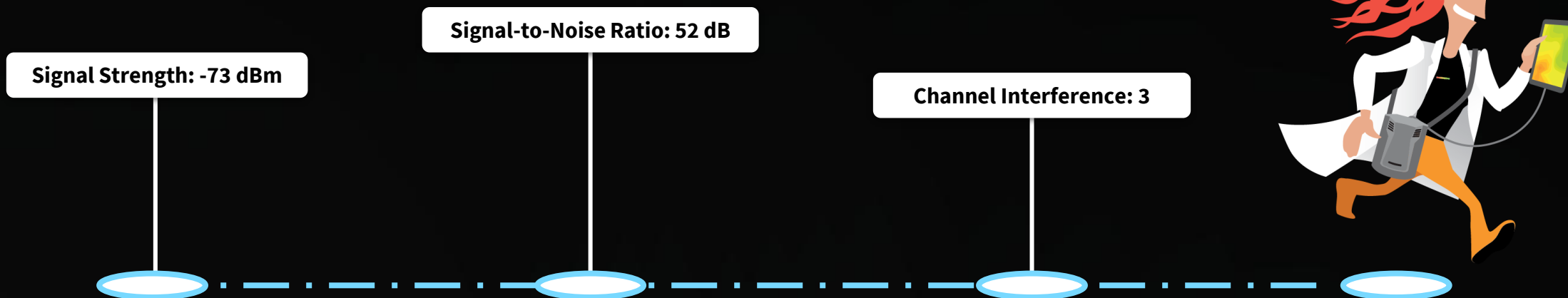
Autopilot
Calibrate your position on the floor plan, and then walk. Survey app understands where you are on your floor plan.

Just Go
Just go, no floor plan needed! Uses LiDAR and Apple ARKIT to scan environment as you walk.

GPS
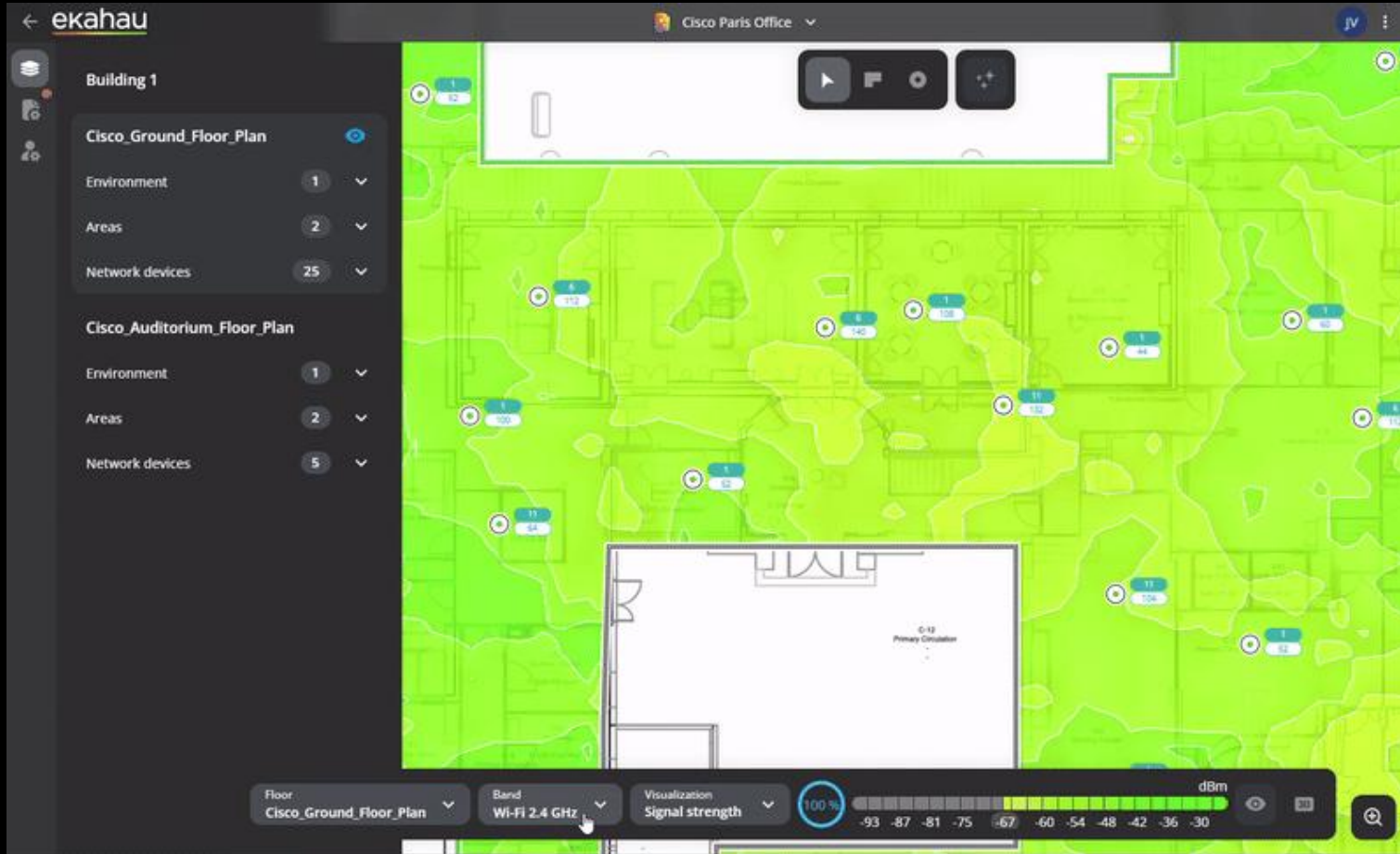Works best for outdoor surveys, requires a GPS-equipped mobile device with a SIM card.

Signal-to-Noise Ratio: 52 dB

Signal Strength: -73 dBm

Channel Interference: 3

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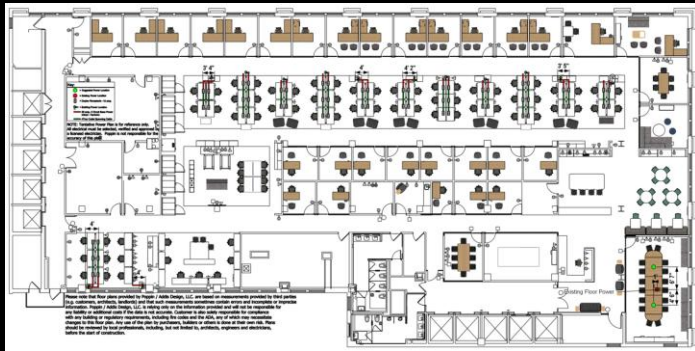# Simplify Your Wi-Fi 7 Upgrade Path

1

Measure your existing network performance by walking with the Ekahau Sidekick 2

2

Transform your survey data into an accurate RF model of your network and instantly visualize Wi-Fi 7

Design Based on a Floor Plan
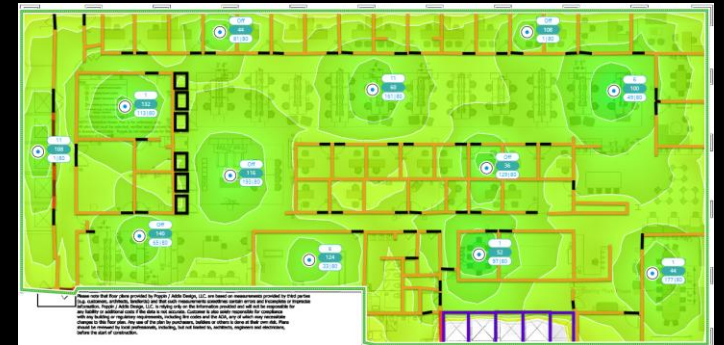

Wall detection ✦

Detects walls from the floor plan image and converts them into functional Ekahau walls.

✓ Walls placed   Place walls

1 Upload the floor plan (CAD, PDF, PNG, JPEG)

2 Automatically detect walls with material recognition, adjust as needed and define your requirements

3 AI-Assisted Planning based on your selected AP type and requirements

Define Network Performance Needs

1 Determine user-defined bandwidth requirements

Video Calls?

Large File Sharing?

Stream HD Video?

Other High-Bandwidth Applications?

2 Select connectivity requirements in Ekahau AI Pro Online

🔵 **Requirement area 1**   ∧   ✕

Area type

| **Requirement** | **Exclusion** |

Properties

Wi-Fi requirements
Basic Connectivity 2024   ∧

Ekahau Best Practices 2024

High Speed Connectivity 2024

Basic Connectivity 2024

3 Determine accurate number of APs for connectivity requirements

High Speed Connectivity

Assisted planning ⁺⁺

Continuously calculates and recommends optimal AP positions based on your environment.

✅ 28 devices to be placed   **Place all**
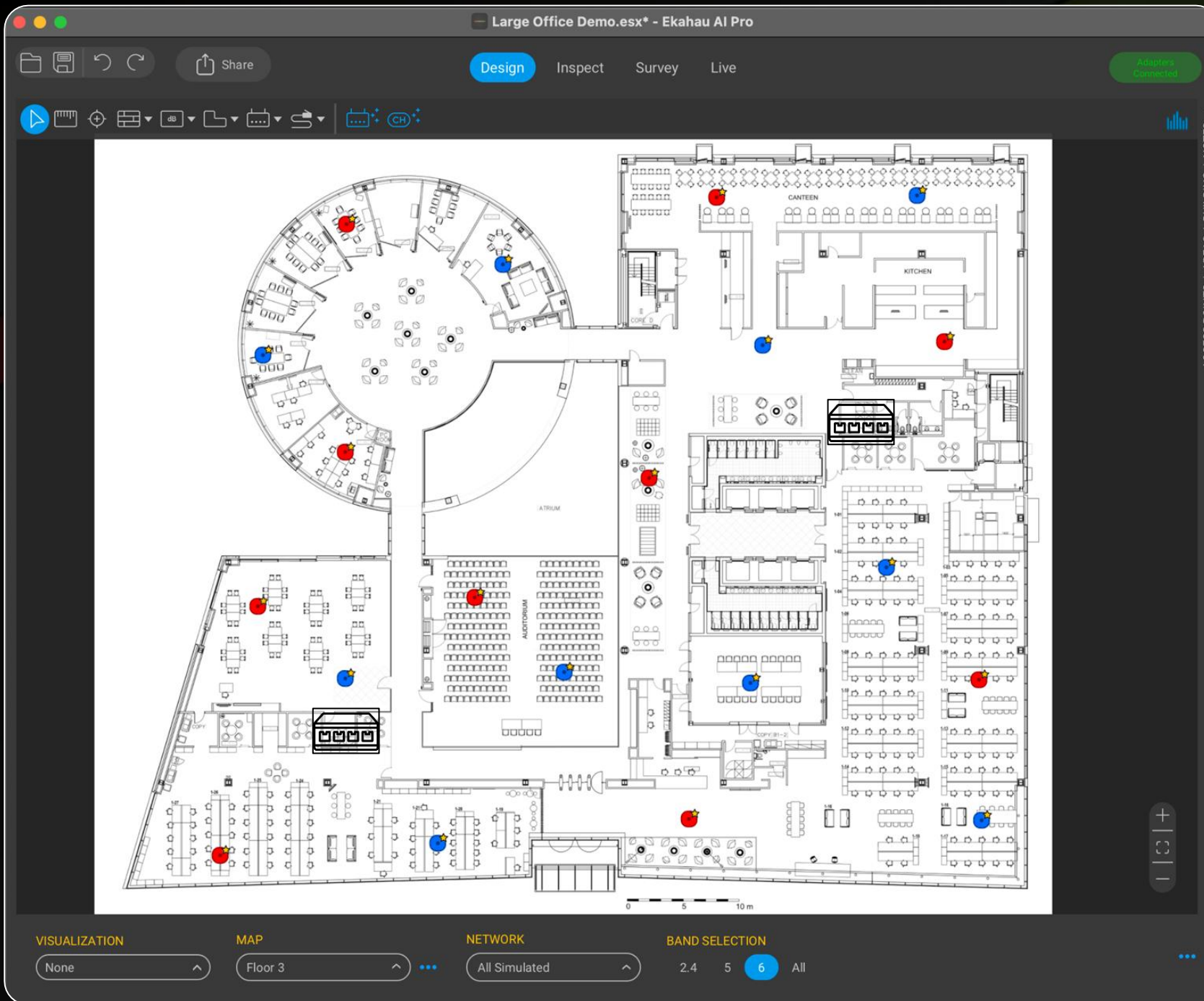
Basic Connectivity

Assisted planning ⁺⁺

Continuously calculates and recommends optimal AP positions based on your environment.

✅ 16 devices to be placed   **Place all**

Plan for Network Outages

Understand the impact of losing a Network Switch & APs in your space

Plan Cabling Paths

Use the cable note tool to visualize cable routes and lengths
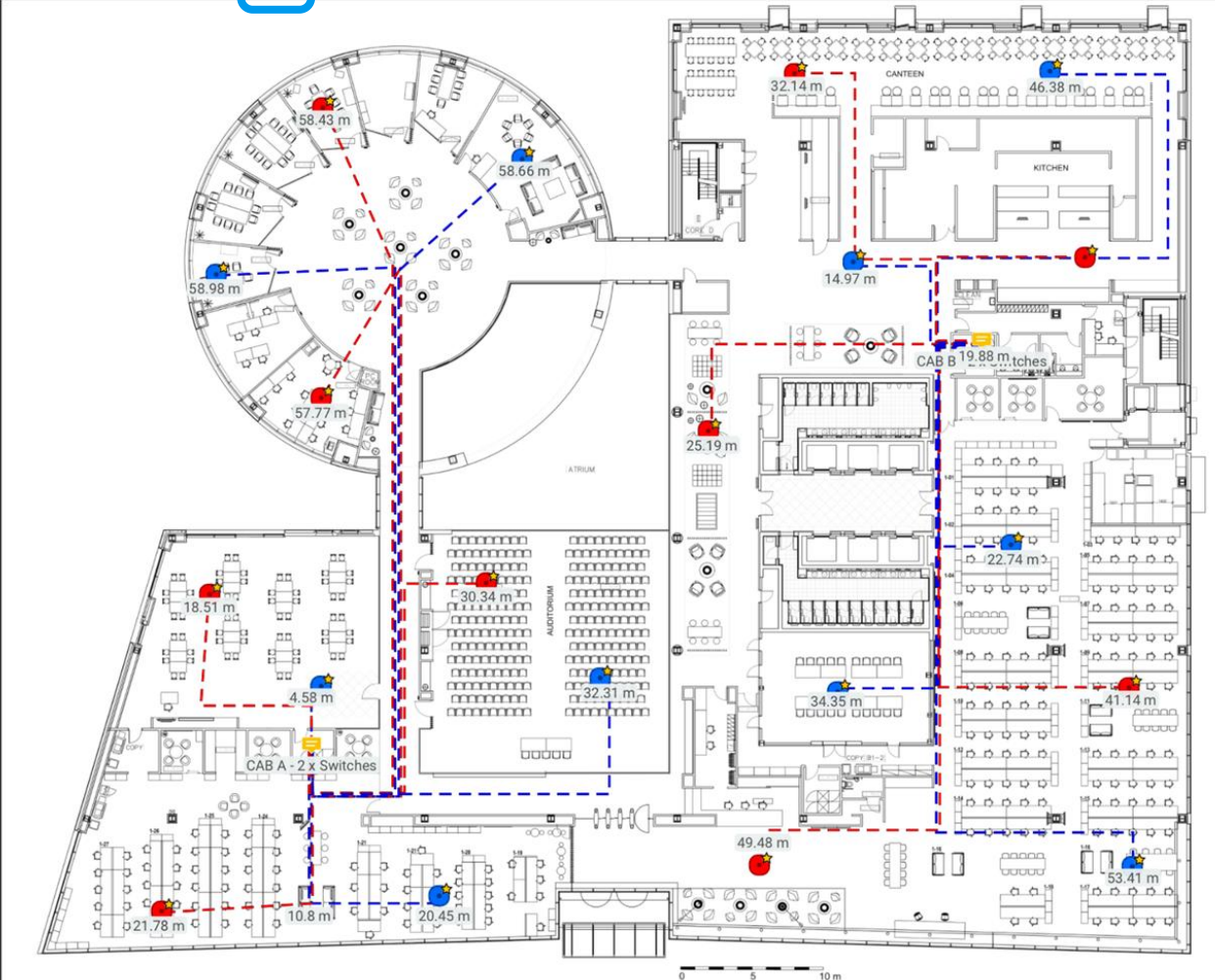
Cable Note

Click on the map to indicate possible cable routes and to estimate the cable length. Once you have drawn the cable route, you can add a text note.

You may view or edit the note later by right clicking the note on the map view.

Hold down the Cmd-key to draw cable routes in any angle.

In case of a scaled map the length of the cable is shown in a separate label.

Keyboard shortcut: C or Cmd-8

Network Redundancy: Visualize Outages
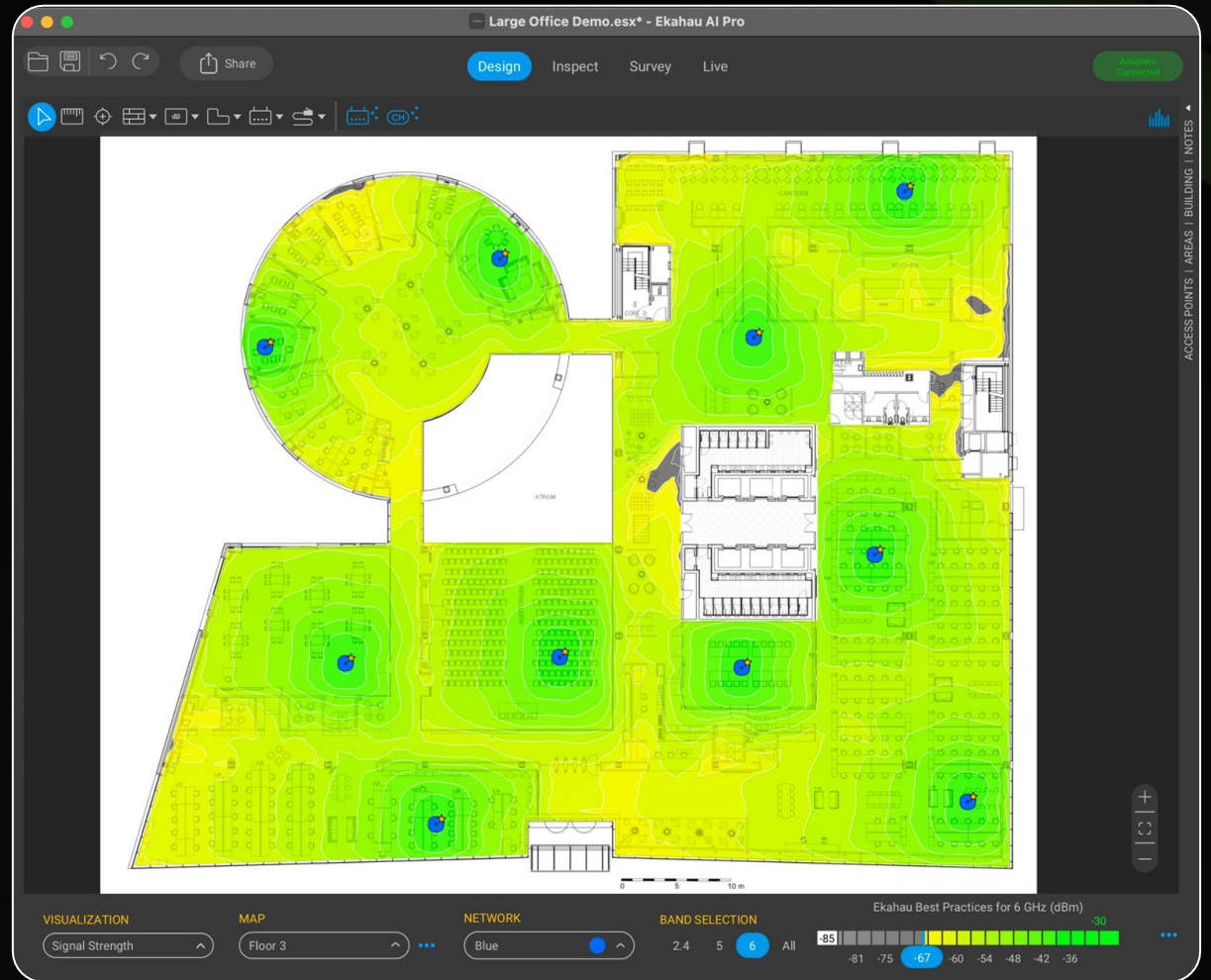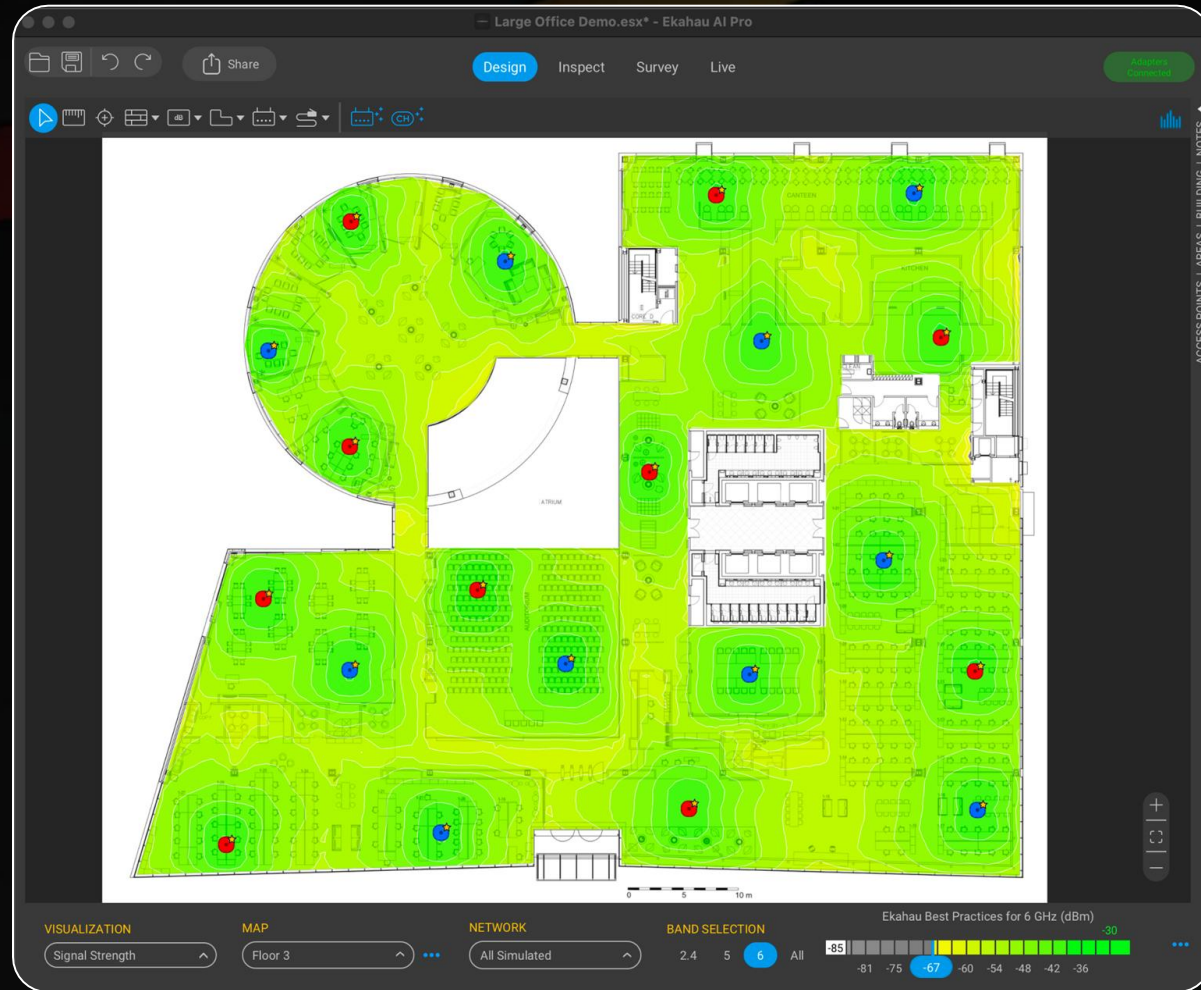
Why Analytics Matter

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Common Complaints about Wi-Fi

Wi-Fi is slow

I can't connect to Wi-Fi

I lose my connection when I walk around

I get disconnected all the time

My voice and video quality is terrible

I think I got hacked

My ping is high

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9 Common Wi-Fi Fails

Coverage

Interference

Channels & power levels

Data rates

Capacity

SSID Config

Security

Design

Upstream devices

The Wi-Fi is slow, mate!

Proprietary & Confidential
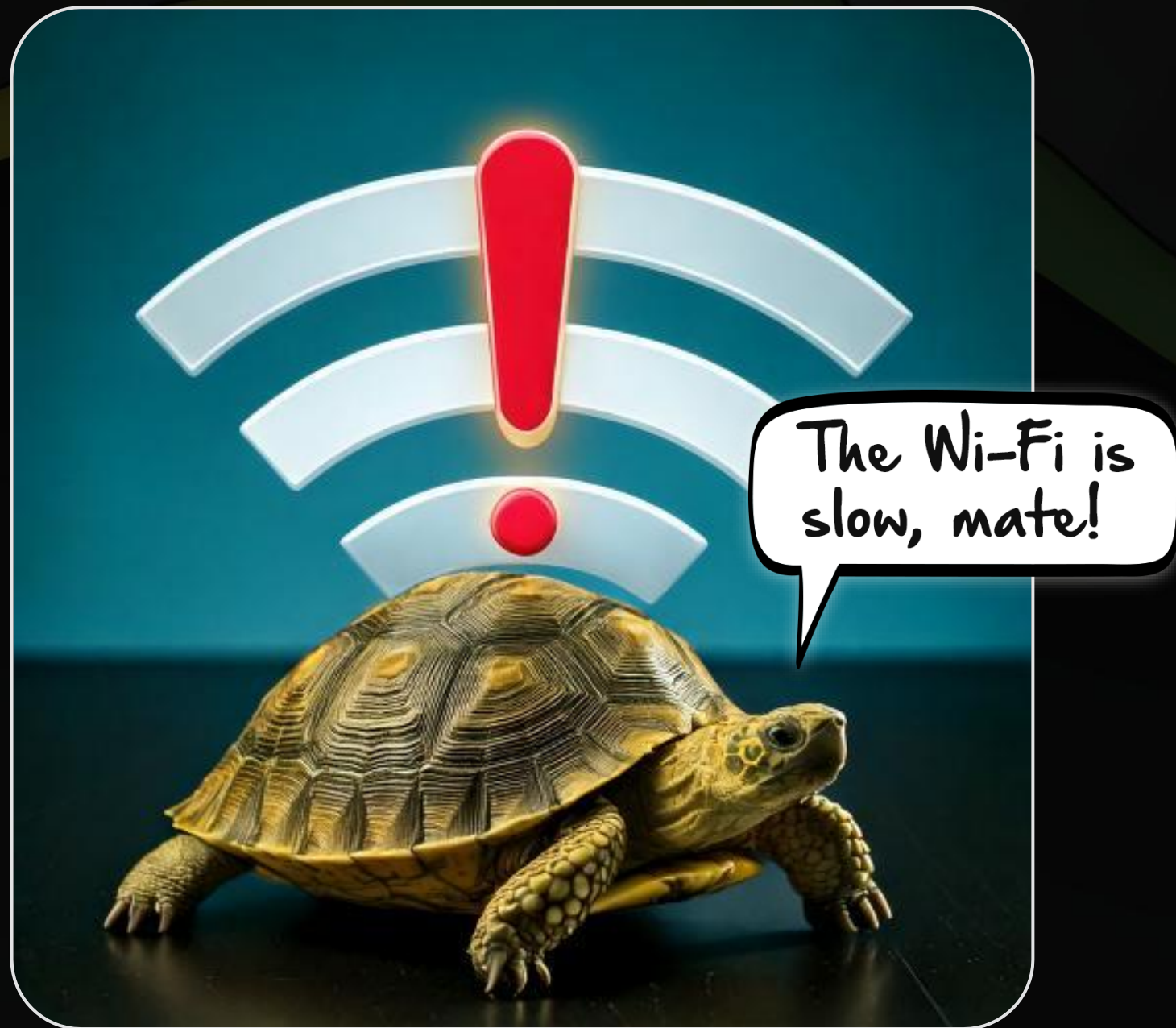
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Ekahau Analyzer + Speedtest

Wi-Fi = Good

ISP = Bad

Understanding the rest of your network is key 🚀

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Speedtest© + Survey App

Easily validate Wi-Fi network and speed performance to ensure a seamless user experience

- Verify actual network performance at specific locations, ensuring that Wi-Fi design translates to usable speeds for end users.

- Identify areas with poor performance or unexpected speed bottlenecks, facilitating targeted optimization efforts.

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Gathering Requirements

Make it right the first time

Business Requirements 💼

Technical Requirements 💻

RF Requirements 📊

Business Requirements	Technical Requirements	RF Requirements
Stakeholders	AP & Antenna Vendor	Coverage & SNR
Wi-Fi Purpose	Requirement Areas	CCI
Wi-Fi Objectives	Regulatory Domain	Rates

Defined by Stakeholder

Defined by Stakeholder & Wi-Fi Engineer

Defined by Wi-Fi Engineer

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One more thing... 💚

↓ **Download the Guide** ↓

Wi-Fi 7 Guide

Thank You

How Itaú is transforming connectivity

through Wi-Fi and partnership with WBA

Diego Turi
IT Manager Itaú Unibanco

itaú

100 years of history

2.821 bi
total assets (R$)

2.8 k
branches

96.6 k
employees

70 M
customers

18
countries in which Itaú operates

63.2 bn
in market value (USD)

8.6 bn
in brand value (USD)

However, with
new Technologies
and hyperconnectivity
**emerging
customer habits
have changed**

Mobility
They do not want to
waste time in traffic

Traveling
They seek **new experiences**
and convenience while traveling

Entertainment
They want access to
custom content any time

Music
They take their favorite songs, playlists,
and podcasts **wherever they go**

Shopping
They want as **many product
and service options as possible**,
whenever they want and as they want

Social Media
They need to communicate with their
contact networks anytime, anywhere

Therefore, we designed a strategy that allows us to **keep the customer at the center of every decision**

Quality

Efficiency

Design
of experience integrated to the teams' daily activities

Technology
Upgrade and focus on quick problem resolutions

Clients

Products
Methodologies to develop products that clients love

Data and AI
Integrated in our work methodology and developments

Speed
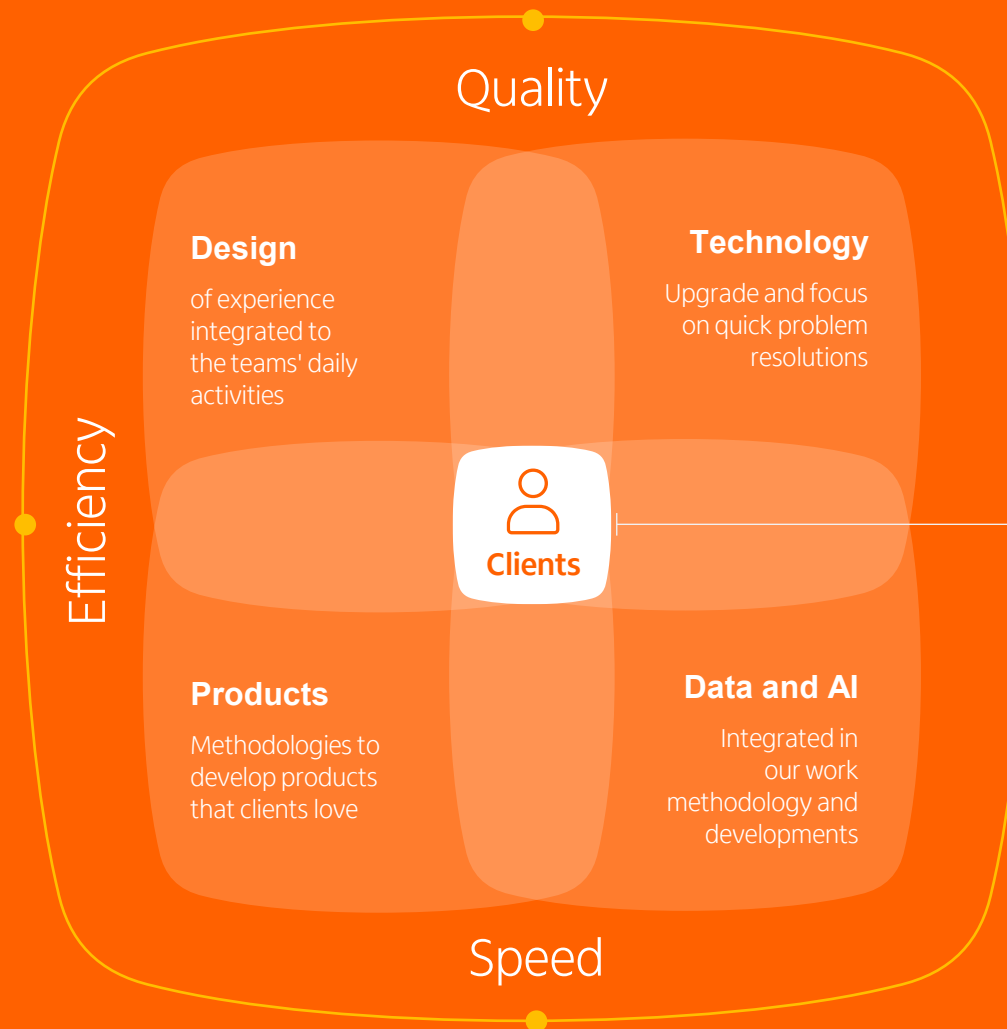
Integrated, they help us **create more value to customers and increase business competitivity**

itaū

50% Of our business services in the cloud

~65% Of our business services in the cloud

Itaú becomes a member of **Zero Outage Industry Standard**

Over a **100 branches** connected to 5G

First bank to adopt **connectivity through LEO in Brazil**

2020   **2021**   **2022**   **2023**   **2024**

First Branch connected to the 5G network

Hybrid model With VPN and full Wi-Fi in our offices

Partnership with WBA and adoption of OpenRoaming

First bank in the world with OpenGateway APIs

Modenrization of physical branches **with SD-WAN and Wi-Fi 6**

Branch Transformation

Users and Systems on premises		Levers		Cloud or Remote Users and Systems
Conventional telephony and video conferencing	→	Hybrid work	→	Full collaboration and telephony virtualization
User without mobility in agency	→	100% of users with laptops	→	Full mobility
Workloads working in the Data Center	→	New way to consume technology resources	→	IaaS, SaaS and PaaS dominance
Majority B2B traffic with end-to-end links	→	Internet access	→	B2B traffic through Internet and/or Cloud Connections
Infrastructure monitoring	→	Observability	→	Monitoring based on user experience, with full view of all elements

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This transformation was guided by our ambition to offer the best experiences to our customers, at any point of contact, through a

Phygital strategy

Modernizing our technology platform, adopting AI at scale and upgrading the infrastructure of our branches with SD-WAN, Wi-Fi 6, and cutting-edge connectivity was a strategic step in this direction.
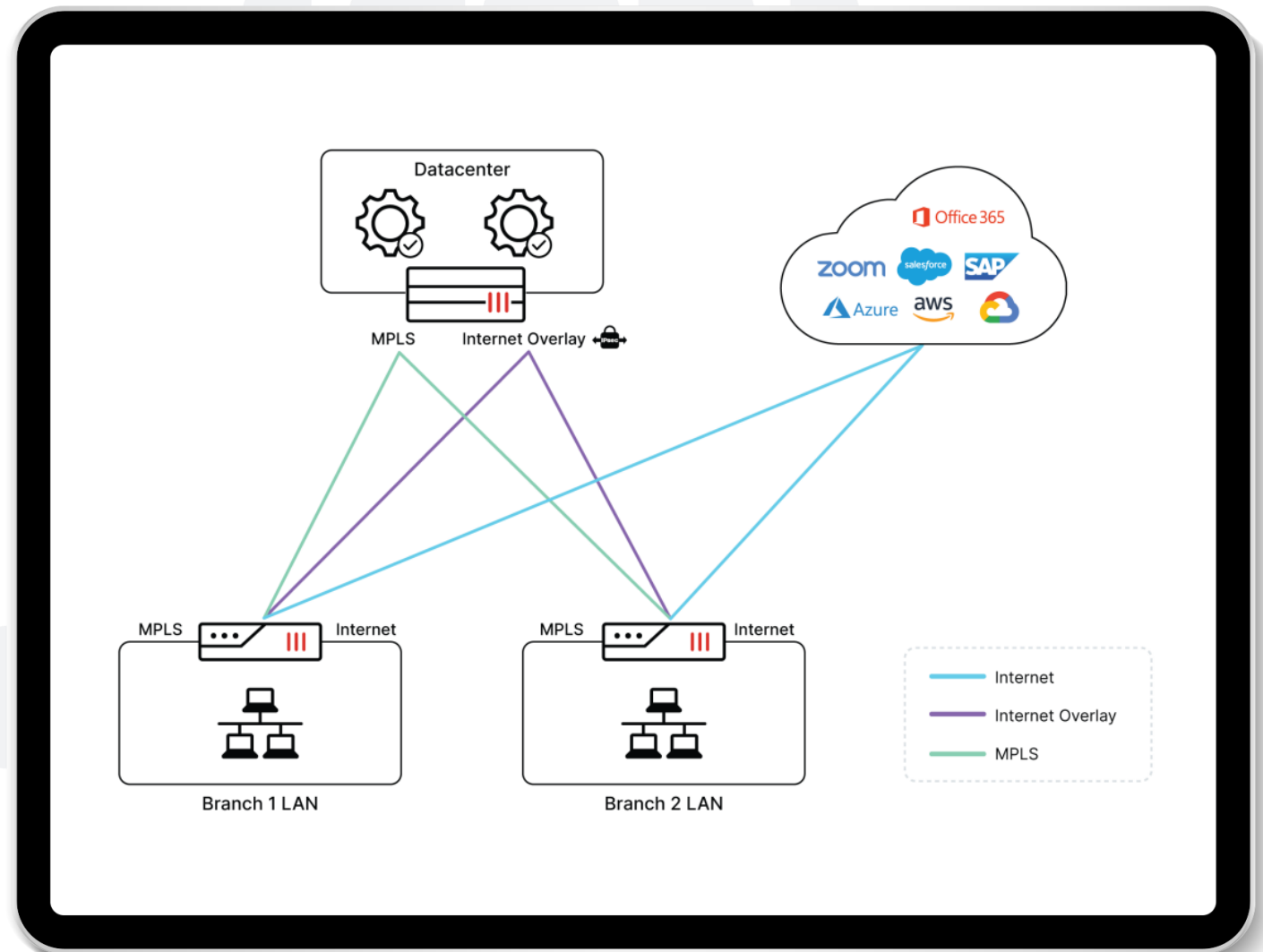
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Through this journey,

state of the art connectivity technology was key

SD-WAN

Helps us ensure smarter and more resilient network management that adapts dynamically to the best traffic routes, reducing latency and improving safety and performance.

Wi-Fi 6

Has brought a significant improvement in the in-branch experience - with more stable connections, higher speed, and capacity for multiple devices to connect simultaneously.

Fiber, LEO and 5G

Helps us ensure high availability even in remote regions, extending our reach and maintaining the same quality standard at all service points.

OpenRoaming

Allows customers to automatically connect to the Wi-Fi in branches without the need for manual authentication, security, enhancing mobility and convenience.

Creating better experiences through **connectivity**

Largest building with more than **18 thousand connections per day**, operating with Wi-Fi 6 and SD-WAN

+150 Thousand connections per day

+12 Thousand Access Points among 3 manufacturers

+96 Thousand corporate laptops

+40 Thousand connections on the VPN per day
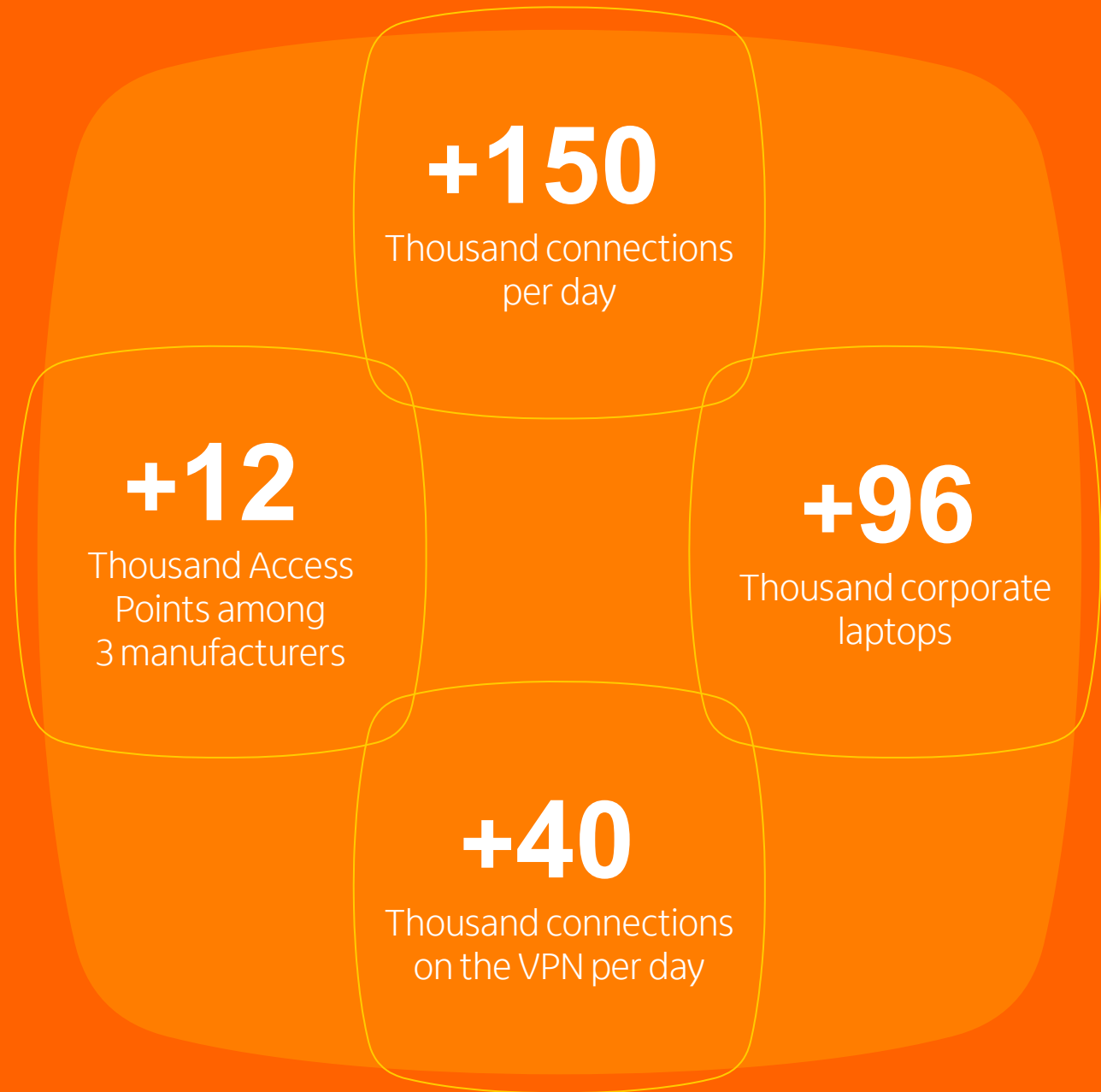
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Itaú and WBA partnership in OpenRoaming

Partnership with WBA since 2023.

The initiative brings real benefits on the path to connecting customers in a transparent and safer way, with **automatic access and visibility**.

We already have OpenRoaming available in our large offices and are in the **process of expanding it to all offices and branches**.

2023

Onboarding
Association to WBA

2024

Pilot
Provisioning of pilot server

MVP 1
Activation of SSID OpenRoaming at our office branches

2025

MVP 2
Activation of SSID OpenRoaming at all branches

Provisioning of new servers and program expansion
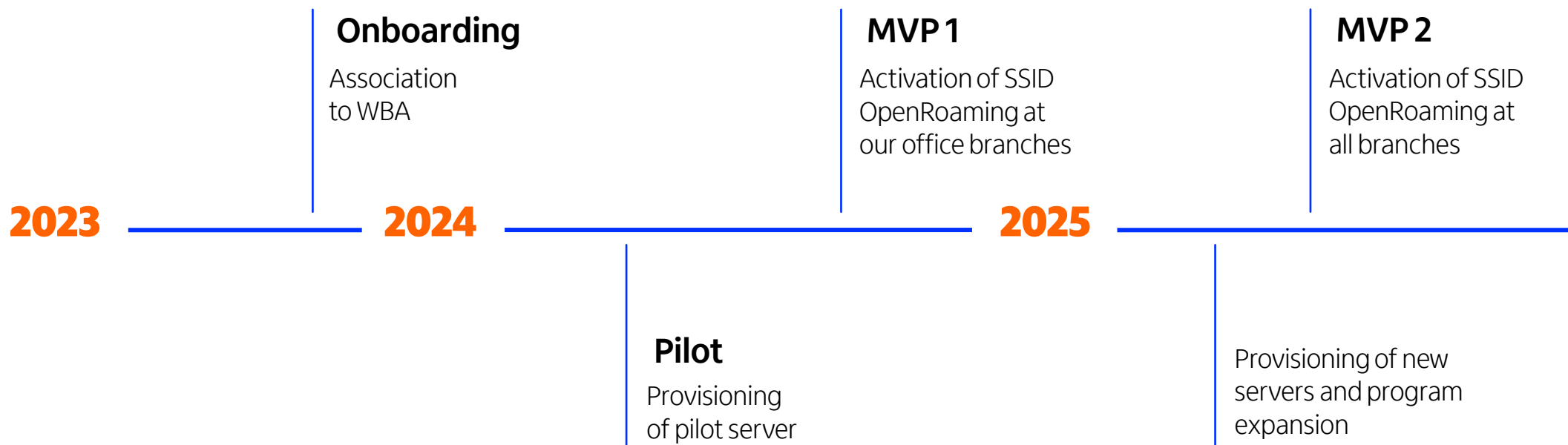
As we make over thousands of new deployments per day,
we keep a close eye on governance, observability and data that helps us
measure our customers' experience

We have an **NPS of 78** for Wi-Fi experience and a **KR** that measures the health of our **connection at 97%** (benchmark).

Partnership with ZOIS for the implementation and evolution of our framework, processes, and tools allows us to be even more agile while preserving the stability of the environment.

More than a technological update, this renewal is entirely connected to our

vision for the future:

An agile, secure network ready to support the bank's next leaps in **innovation - be it with artificial intelligence, hyper-personalization, or increasingly digital services**.

itaū

Thank you!

IoT connectivity challenges and trends

BATTERY OPERATED DEVICES

- Explosive growth in Battery-powered IoT devices (Smart Locks, Sensors, Wearables, etc) with >25% IoT devices shipping today are battery powered
- Demand for Ultra-low power Wi-Fi & Energy harvesting to extend battery life and reduce maintenance
- Devices deployed in hard-to-reach places making it battery life a critical requirement

CONNECTIVITY, POWER AND SECURITY TRADEOFFS

- Balancing Ultra-low power operation with secure connectivity is a core challenge
- Coexistence challenges with multiple other technologies
- Security features add additional processing/power overhead
- Reliable connectivity requires radios with intelligent power management
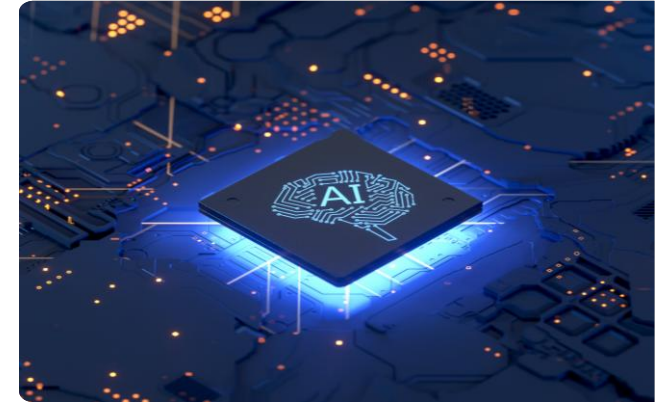
AI/ML AT EDGE & MATTER

- Local processing improves privacy and power consumption, thereby demands on low-power hardware
- Matter standard drives seamless interop, security and easier onboarding
- Edge AI/ML enables real-time Analytics, reducing latency and bandwidth

SILICON LABS

Why Wi-Fi for IoT?

Ubiquity & Pervasive Coverage

- Foundational connectivity technology in homes, offices and public spaces for global connectivity
- More than 20B Wi-Fi devices deployed

Interoperable & Standard-based

- Wi-Fi Certification ensures interoperability and reliable connectivity
- Supports onboarding & management for diverse ecosystems

Security

- Proven WPA3 and other modern security protocols safeguard IoT data and devices
- Supports both homes and enterprise level security for IoT devices

Flexibility & Scalability

- Wi-Fi can interwork with other protocols (Cellular, Zigbee, BLE, etc) for Hybrid solutions
- Scalable Wi-Fi networks for many devices with Wi-Fi Mesh technology

High Data Throughput

- Supports data-heavy IoT applications such as video streaming, etc
- Enables no-cost/low-cost data usage

Low Power Optimizations

- Target Wake Time (TWT) and other improvements as BSSMax Idle improves power consumption
- 20MHz IoT STA enables simpler power efficient design for IoT devices

Wi-Fi: Secure, Scalable and Built for the Future of IoT

SILICON LABS

Ultra-low power Wi-Fi: What's possible?
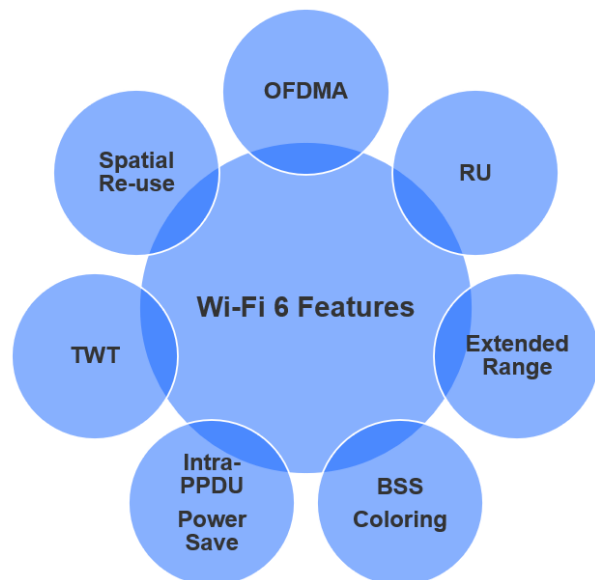
WI-FI 6 INNOVATIONS

Multiple Power saving & Efficiency enhancements including TWT (Target Wake Time), OFDMA, BSS coloring, and more
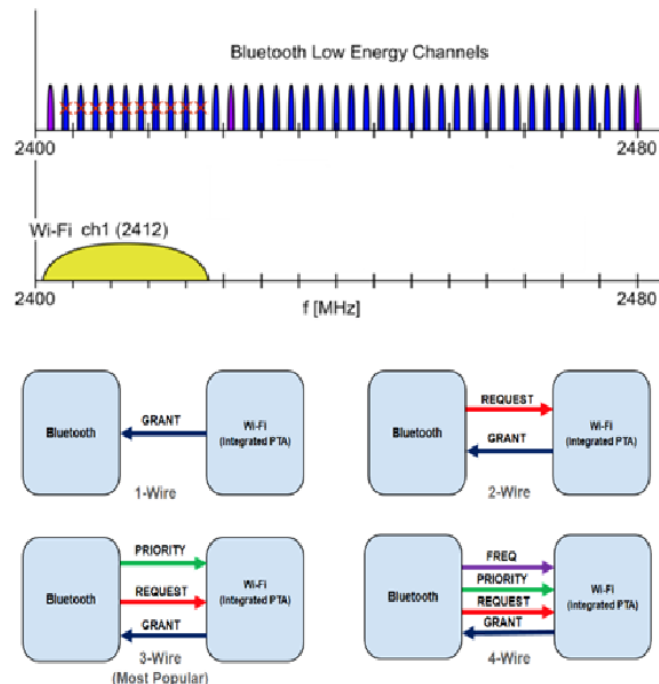
MANAGED COEX

Managed Coex with efficient & dynamic switching between multiple protocols. Packet Transmit Arbitration with external devices

REAL WORLD APPLICATIONS

Battery powered Smart locks, Sensors, Cameras, Trackers and more

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Wi-Fi enhancements to support IoT ultra-low power

Support Denser Environments

OFDMA
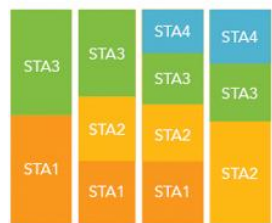
Spatial Reuse, BSS Coloring
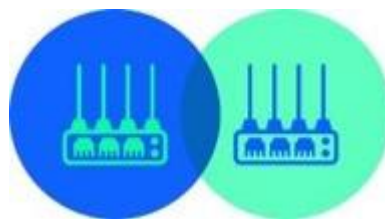
Higher Efficiency, High Density, Lower Latency

Longer Battery Life

Target Wake Time

TWT Negotiation

TWT Service Period (SP)

TWT Service Period (SP)

TWT Interval

TWT Interval
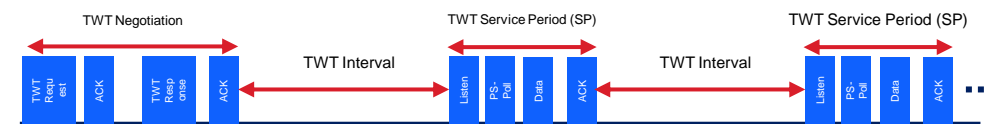
Negotiated longer sleep time

Better Performance

Multi-User (MU) MIMO
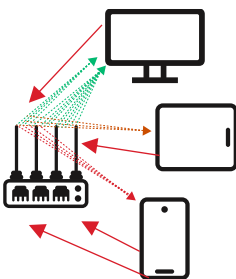
Beamforming

Higher Throughput, Higher Capacity, Longer Range

Extended Sleep time

BSS Max Idle Sleep

Idle / Sleep
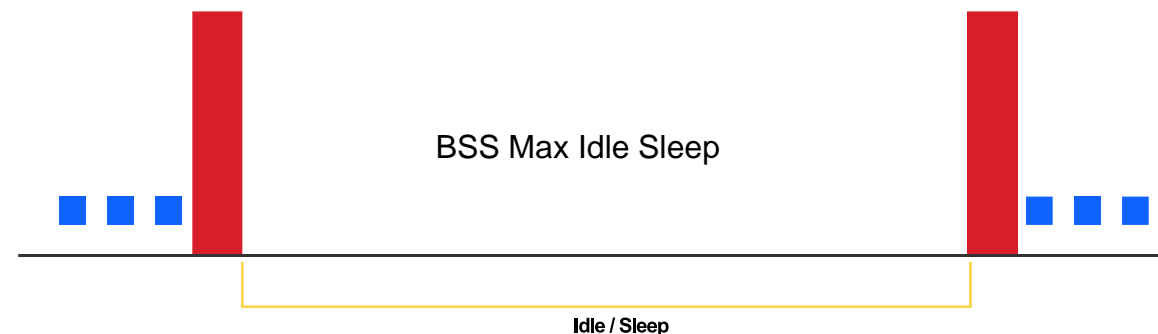
Negotiated longer sleep time

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Shipping today: Ultra-Low Power enabled SiWx917

- Low power Wi-Fi 6 + BLE SoC
  - Minimizes battery replacement and recharging hassle for users with always-on cloud connectivity

- Superior wireless performance and easy device commissioning using Bluetooth LE co-ex

- Security focus: WPA3, TLS 1.3

- Integrated MCU with high memory PSRAM, and application dedicated ARM core

- MVP (Matrix Vector Co-Processor) for ML Applications

- Extensive Wi-Fi Gateway compatibility helps reduce user frustration

- Seamless integration with Simplicity Studio

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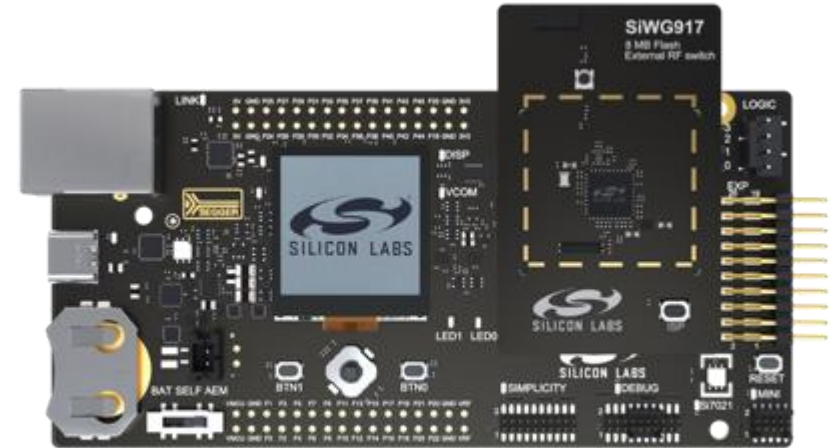
SiWx917: Lowest Wi-Fi Power – Extended IoT battery life

Wi-Fi Standby Current Consumption

Hundreds of µA

Connected standby power consumption (a.k.a. WLAN Standby Associated Mode) is the most critical battery life metric for Wi-Fi IoT devices.

65µA
DTIM10
WLAN keep-alive 30s

65µA
No TWT

22µA*
TWT

Wi-Fi 4 | Wi-Fi 6 No TWT | Wi-Fi 6 TWT

Wi-Fi 4 | Wi-Fi 6 | Wi-Fi 6

Typical Competing Solutions
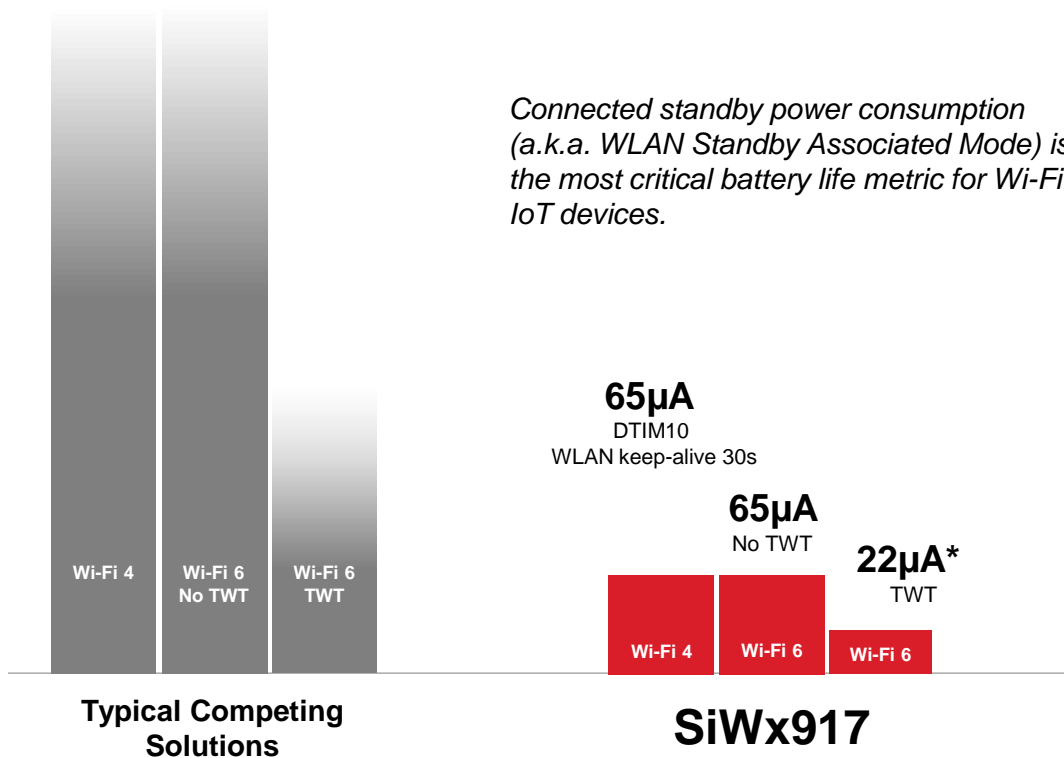
SiWx917

SiWx917 SoC Battery Life Estimation

>2 Years

1000mAh

Estimation Parameters:

- *Associated standby low-power mode*
- *SiWG917 SoC as TCP client maintains socket connection*
- *60 secs TCP keep-alive used.*
- *WLAN keep-alive 30 secs. 352kB NWP SRAM retention*
- *TWT Auto Config feature enabled. TWT Rx latency 60 secs with 8ms wakeup duration*
- *Arm Cortex-M4 in sleep mode (PS4). 320kB SRAM retention*
- *Measurements are taken in optimal conditions (RF chamber)*
- *Battery capacity 1000mAh (example AAA rechargeable battery)*
- *Average current consumption for wireless and application **37µA at 3.3V***

** Wi-Fi 6 TWT with auto-config feature enabled. TWT Rx latency 60s with 8ms wakeup duration**. **WLAN keep-alive every 60s. No TCP keepalive. 352kB SRAM retention. Does not include application MCU operation.*

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Robust performance in real world environments

TEST SETUP

COEX THROUGHPUT

BLE / Wi-Fi Coex TX Throughput Across 10 APS
(Samsung Galaxy S21 Ultra Connected - Idle)
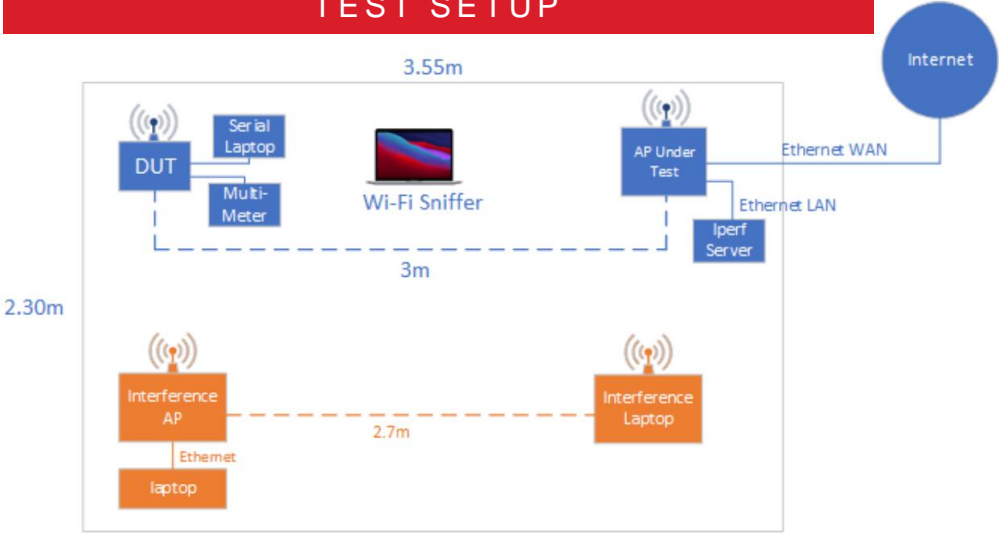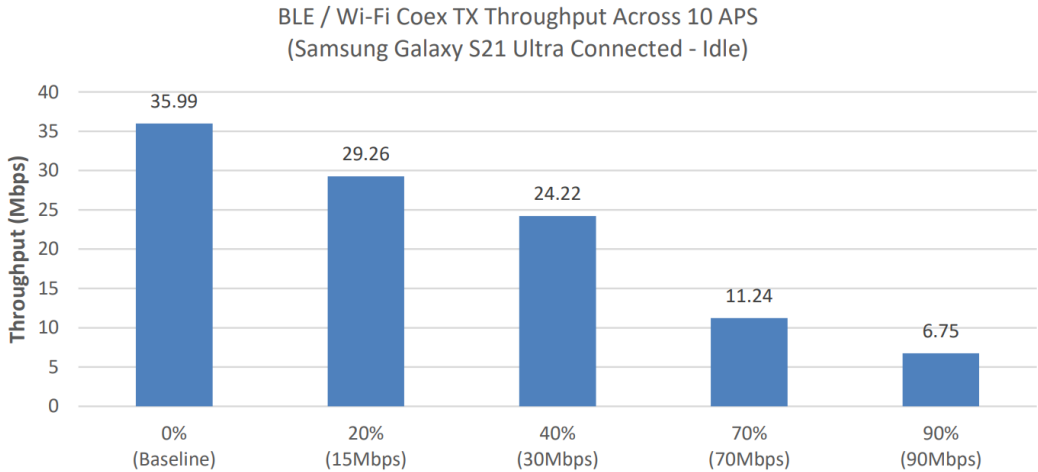
STANDBY ASSOCIATED WITH WI-FI 6 TWT
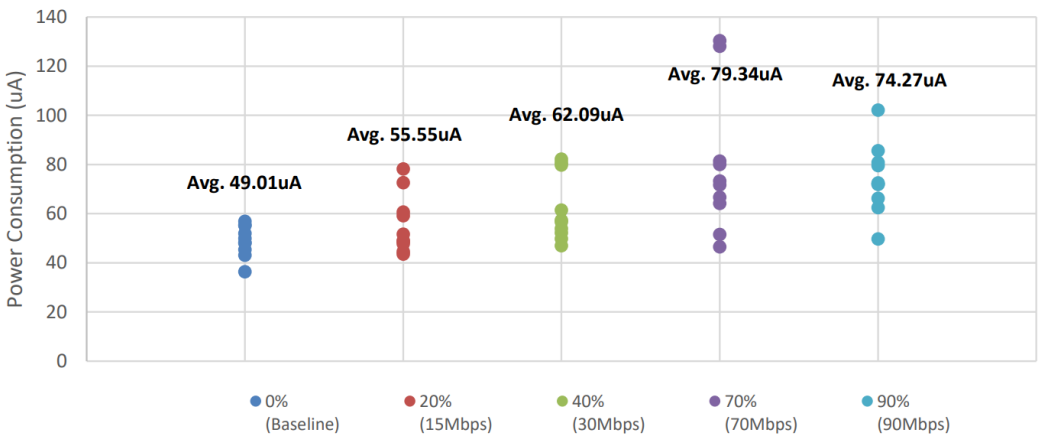
STANDBY ASSOCIATED LEGACY

Standby Associated Power Save - Listen Interval @ 1sec & MQTT Keep Alive @ 55sec (802.11n - 45 APs)

SILICON LABS
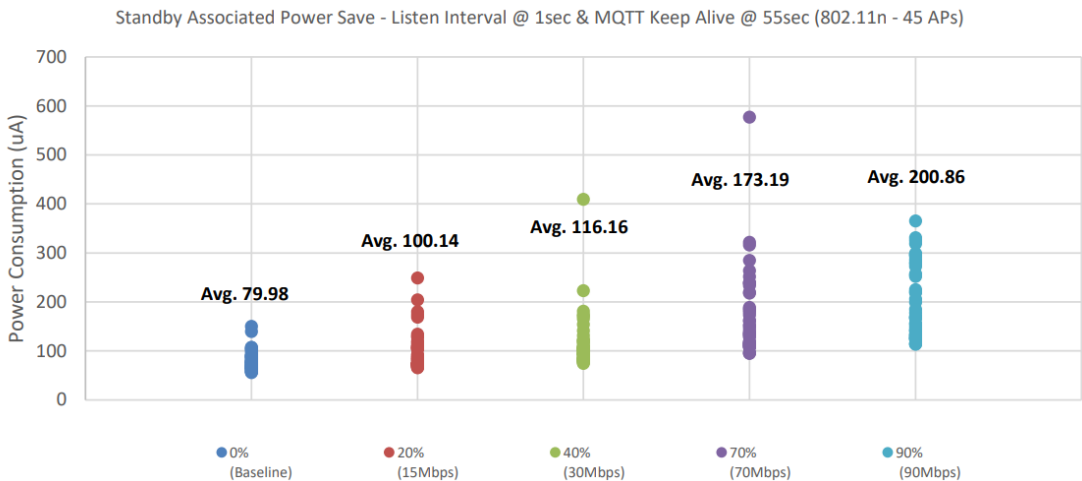
Real world applications (Battery powered camera)

- **Ultra-Low Power Wi-Fi 6 + Bluetooth LE**
  - Multiprotocol SoC with Matter support
  - Integrated application MCU, SRAM, Flash and AI/ML Accelerator
- **Optimized for longer battery life**
  - SiWx917 IoT radio maintains cloud connectivity and keep-alives
  - IoT radio enables wake up based on triggers from external sensors
- **Scalable Architecture**
  - Enables dual-stack architecture and separation of connectivity and streaming stack

Ultra-low Power Wi-Fi6 + BLE architecture providing longer battery life

SILICON LABS
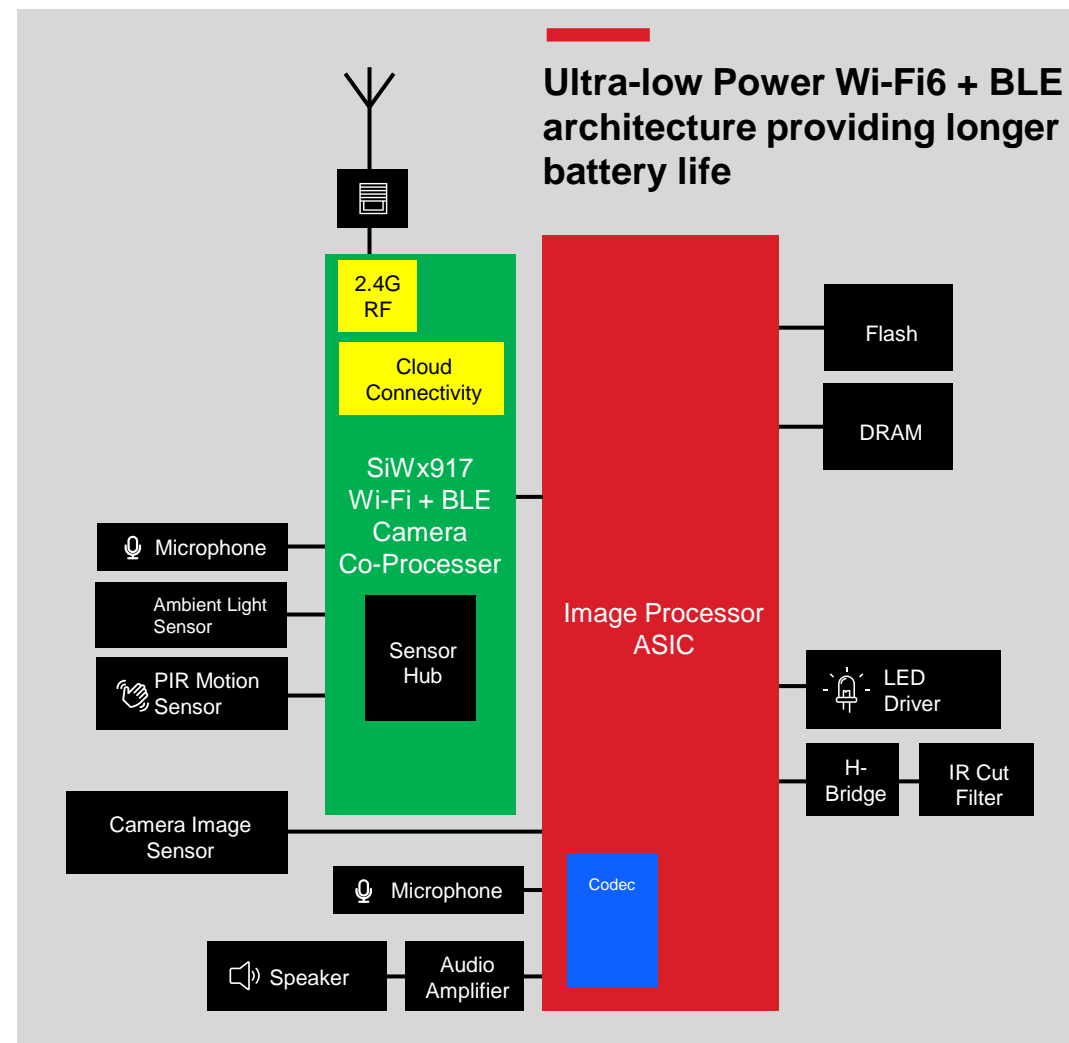
Real world applications (Wi-Fi based tracker)

- **Ultra-Low Power Wi-Fi 6 + Bluetooth LE for Trackers**
  - Leverages Wi-Fi networks and cloud base locationing database
  - Lowers the BOM cost for use-cases without GPS/Cellular
  - Significantly improves the product battery life when using Wi-Fi scanning
- **Enables Tracking without GPS/Cellular connectivity**
  - Indoor location tracking
  - Supports both Connection-based and connection-less based methods
  - Cloud connectivity to report tracking info
- **Rich Peripherals**
  - Multiple peripherals to connect multiple sensors for various real-world applications

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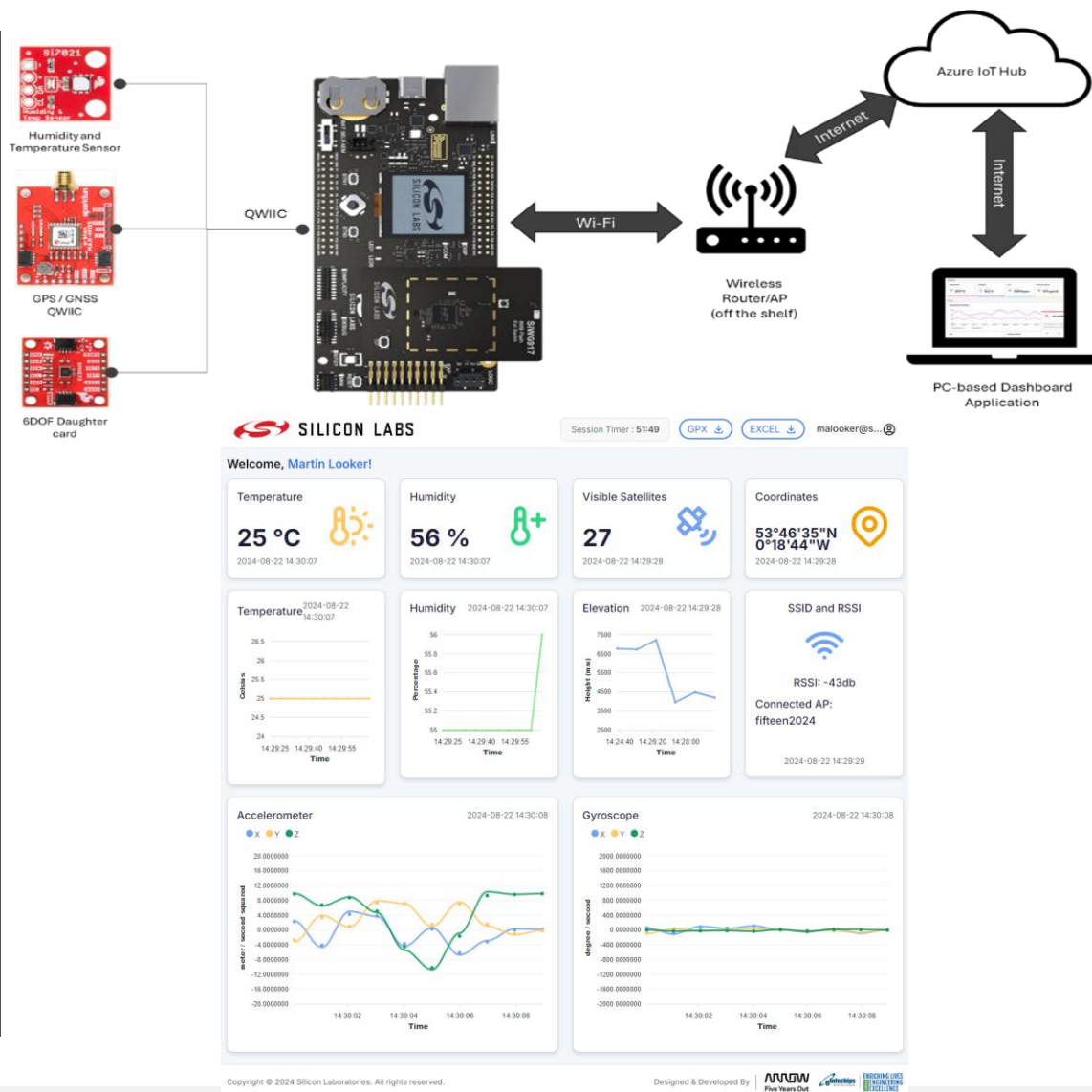
Start your Wi-Fi journey with us…

- **IoT on Wi-Fi 6 is happening now**

- **IoT-optimized Wi-Fi is key**

- **20MHz channel provides a power/bandwidth balance for IoT**

- **Wi-Fi IoT applications keep expanding**

- **Matter is making a difference**

- **AI/ML at the edge optimizes resources**

- **Wi-Fi 7 was primarily designed for high datarate applications and getting expanded to IoT in Wi-Fi 7 R2 revision**

  - Multi-Link Operation (MLO) is Good for IoT

- **Growth continues!**

Wi-Fi Developer Journey
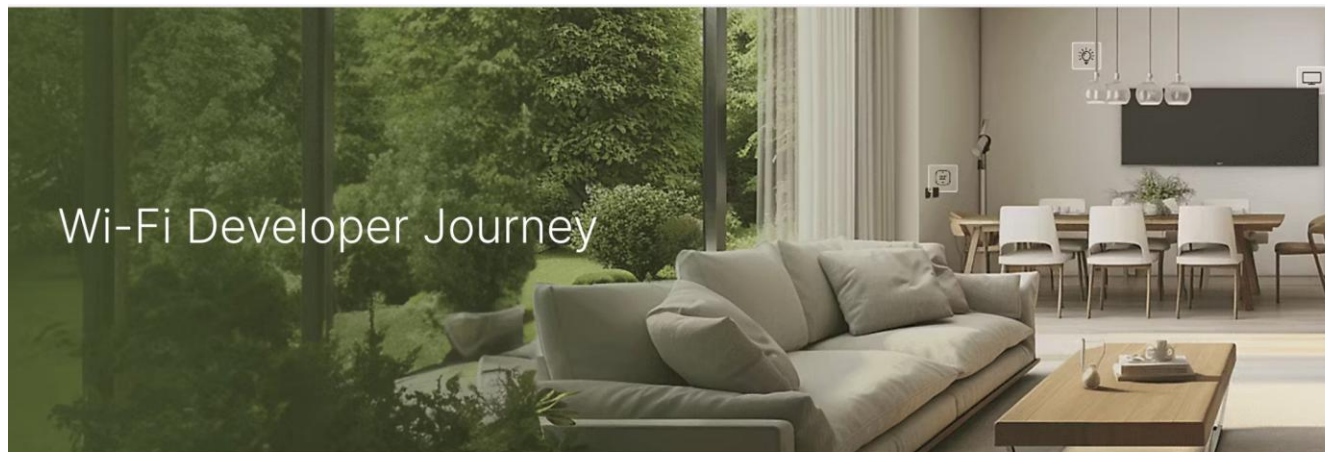
Wi-Fi Developer Journey with Silicon Labs

Silicon Labs can accelerate the development of Wi-Fi devices, starting by outlining each step in the process and helping you along each stage of your p
We are here to simplify your development journey and help you get your devices to market faster and more efficiently.
We have outlined below three key stages of the Wi-Fi Developer Journey, along with what is required to successfully complete each stage.

Getting Started   Resources   Deploy Product

1. Buy Kit: Hardware   2. Download Development Tools   3. Out of the Box Demo

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d learn how they can be disabled. Note that disabling cookies will disable some features of the site.

1. Buy Kit: Hardware

SILICON LABS

Silicon Labs Technology Demonstrations: (At Westin)

- Matter running over WiFi, Thread and Sub G

- AI/ML running in Gateway – Coexistence Optimization

- BLE Channel Sounding for Tracking, Positioning, Locationing

- Gateway Power Consumption Mgmt using Thread / Matter

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CONNECTED INTELLIGENCE

Wireless Global Congress Americas

WGC AMERICAS

MAY 19 – MAY 22

Wi-Fi Innovation: Connecting Our Digital World

WESTIN IRVING CONVENTION CENTER, DALLAS

#WGCAmericas | #wifirevolution | #lovewifi

Wireless Global Congress
Americas

WGC AMERICAS

MAY 19 – MAY 22

Wi-Fi Innovation: Connecting Our Digital World

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Time	Presentation
14:00 PM (CDT)	**Moderator Welcome** Bruno Tomas, CTO, Wireless Broadband Alliance.
14:05 PM (CDT)	**Unlocking the Enterprise Opportunity Through OpenRoaming and Advanced Connectivity** Matt MacPherson Wireless CTO, Cisco.
14:20 PM (CDT	**What Can the Industry Expect from Wi-Fi 8** Robert Stacey, Chair 802.11 WG, IEEE 802.11 WG and Intel Corporation.
14:40 PM (CDT)	**Keynote: Wi-Fi Trends and Impact for Enterprise Connectivity** Dean Bubley, Founder, Disruptive Analysis.
14:50 PM (CDT)	**INNOVATION FORUM : 6G, Road to Wi-Fi 8, "Path to predictable ubiquitous connectivity"** Moderator – Bruno Tomas, CTO, Wireless Broadband Alliance; Matt MacPherson, Wireless CTO, Cisco; Dr. Necati Canpolat, Sr. Staff Wireless Systems Architect, Intel Corporation; Dr. Derek Peterson, CTO, Boingo Wireless; Dean Bubley, Founder, Disruptive Analysis.
15:50 PM (CDT)	**CEO Closing Remarks** Tiago Rodrigues, President & CEO, Wireless Broadband Alliance.
16:00 PM (CDT)	**Event Close**

Unlocking the enterprise opportunity through OpenRoaming and Advanced Connectivity

Mark Grayson
Cisco Fellow
May 2025

OpenRoaming:
Delivering benefits to ALL stakeholders

Enterprises/ANPs

Seamless onboarding of indoor users. Act on insights and extend business outcomes.

90%

of our time is spent indoors

OPENROAMING

MNOs/IDPs

Visibility of users when authenticating onto indoor networks. Delivering cost effective indoor coverage.

80%

of mobile data is consumed indoors

Users:

Seamless and secure indoor connectivity. In built privacy protection.

A renewed focus on indoors with diversity of approaches for serving the enterprise opportunity

	Solution Cost	Enterprise Analytics	Quality of Experience	Deployment Expertise	Security & Privacy	Ease of Adoption
Macro "outside-in"	N/A	No visibility	Limited by building loss	N/A	Standard Cellular	Carrier devices only
Traditional DAS	Expensive per sq.ft	No Visibility	Indoor wireless	Poor – new fiber runs	Standard Cellular	> 100k sq.ft
Carrier Small Cell	Better than DAS	No Visibility	Indoor wireless	Specific partners	IPSec to Carrier	> 25k sq.ft
Private 5G	Same as Small Cell	Enterprise Core/Visibility	Indoor wireless	Specific partners	P5G configuration	Enterprise Device/SIMs
Wi-Fi plus Captive Portal	Low	Full visibility	Intrusive captive portal	Easy	No security/ local Ts&Cs	Easy – Wi-Fi devices

OpenRoaming Technical & Legal Frameworks:
Enabling Seamless Carrier Experiences

Baseline ANP requirements ensure Wi-Fi Calling supported on all networks	OpenRoaming Silver ANP requirements focus on delivering HD streaming	CY2025 Focus: Rich instrumentation of OpenRoaming experience

Connect-Info =   "CONNECT MaxRate:MCS11-2SS / 802.11ax / Channel:37 / Global-OC:131 / RSSI:43 / RSSI-min:80 / Noise:50 / ChanUtil:5 / TxBitRate:150.0 / RxBitRate:150.0 / FrameLoss:3 / FrameRetry:6 / WAN-RTT:20"

OpenRoaming:
The Indoor Scaling Challenge

USA Commercial Buildings by Square Footage

> 5 million Buildings

~ ⅔ of all sq.footage

30,000 sq.ft per gNB

130,000 Buildings

Number of Buildings (thousands)

3000
2500
2000
1500
1000
500
0

1,001 to 5,000
5,001 to 10,000
10,001 to 25,000
25,001 to 50,000
50,001 to 100,000
100,001 to 200,000
200,001 to 500,000
over 500,000

Source: https://www.construction-physics.com
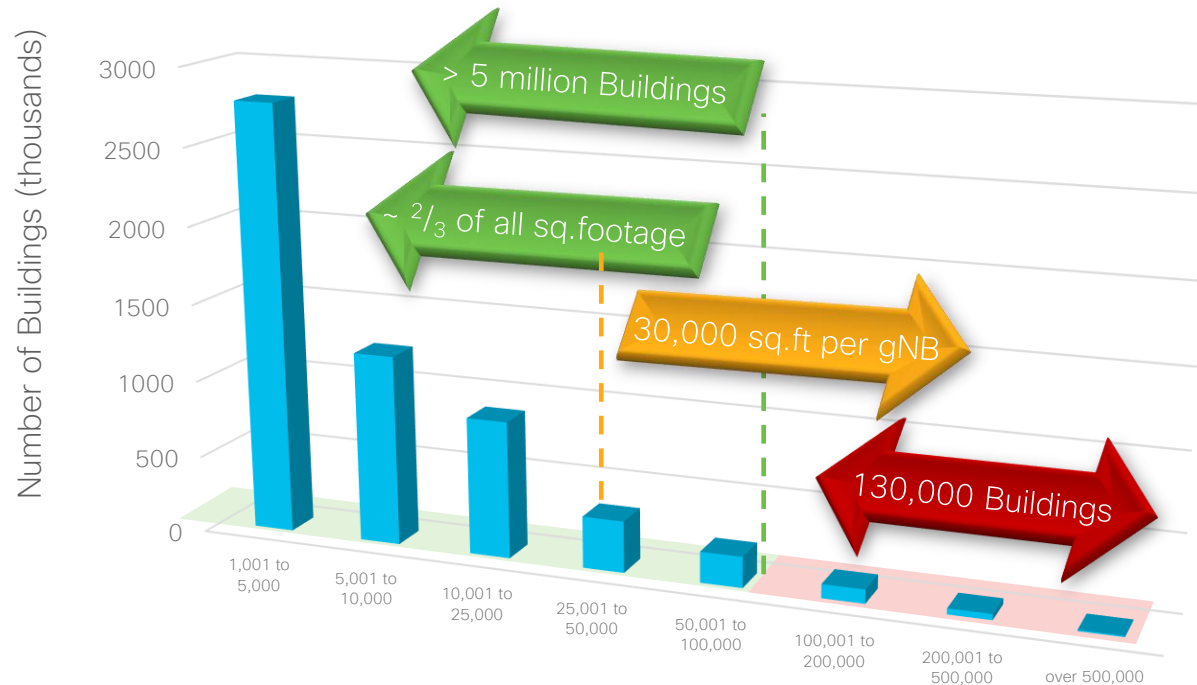
CISCO SPACES
Formerly Cisco DNA Spaces

Licenses Activated ⓘ

8,545,246 APs
3,873 Accounts
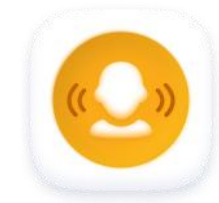
OpenRoaming ANP

Spaces SDK/IDPaaS

Base AP licenses now includes OpenRoaming ANP!
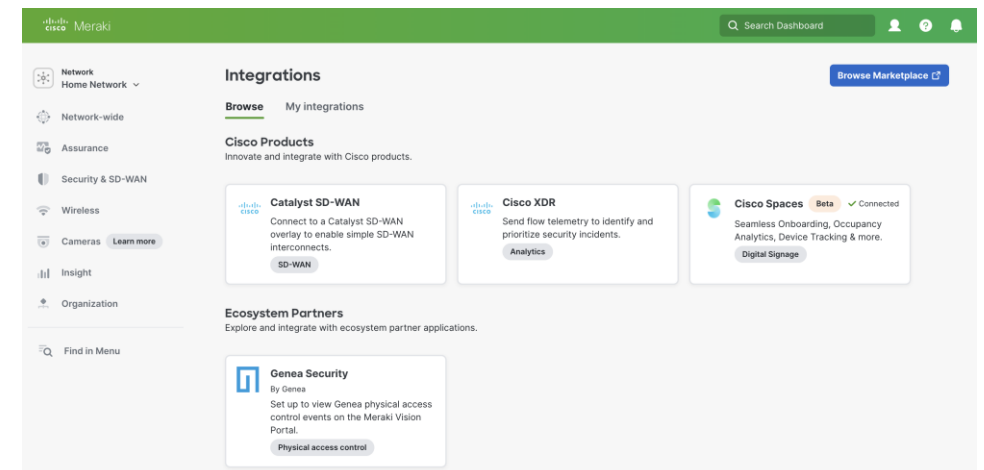
OpenRoaming Federation:
Successfully scaling indoor deployments
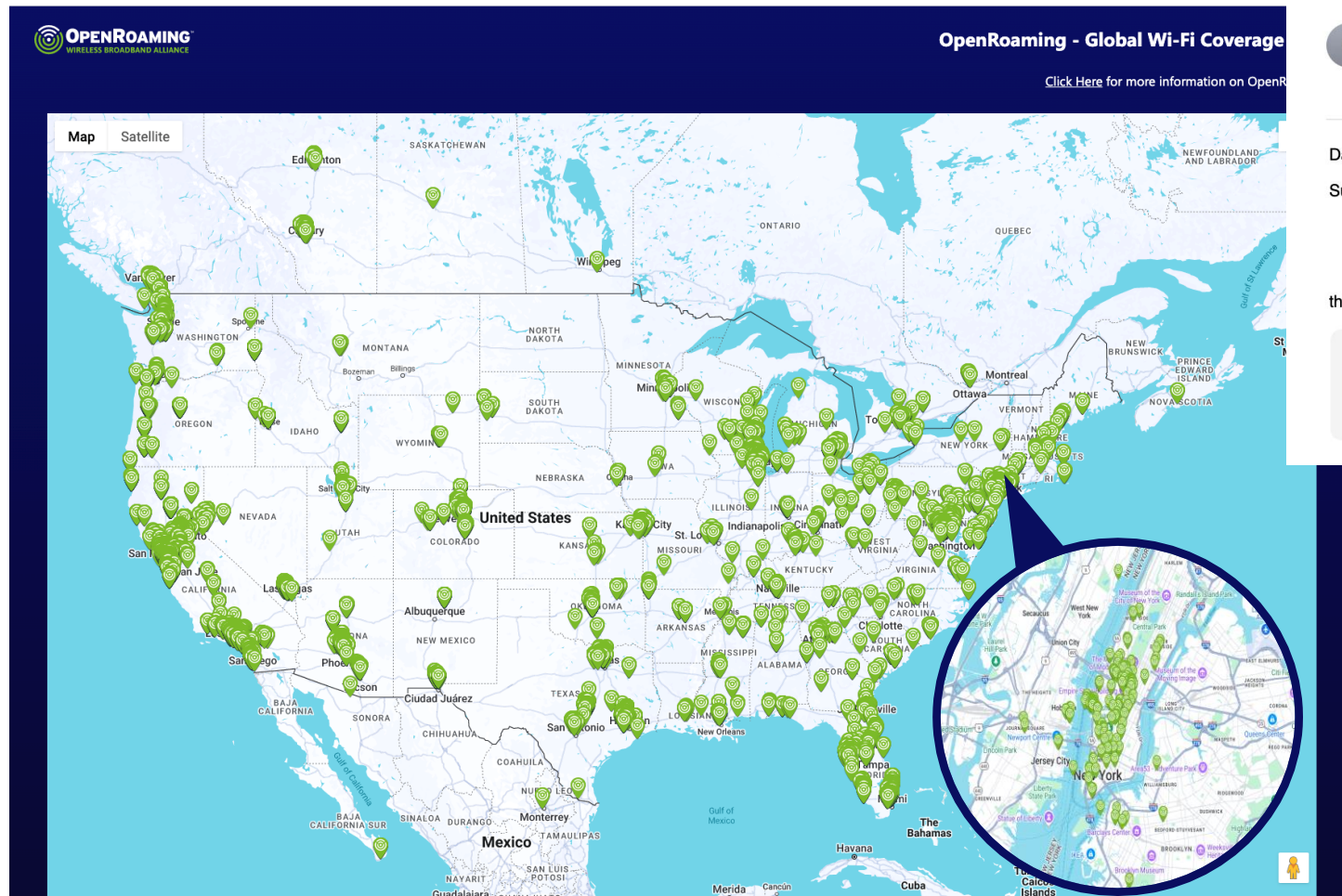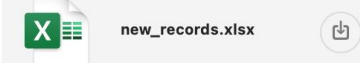
Transitioning from 10's of networks deployed per year with bilateral agreements, to over 300 new federated networks discovered in a single 24-hour period

12 months experience of one Healthcare Business that opted for OpenRoaming ANP

1.05 PetaBytes of Traffic

3.1 Million Connections

Reduced coverage complaints
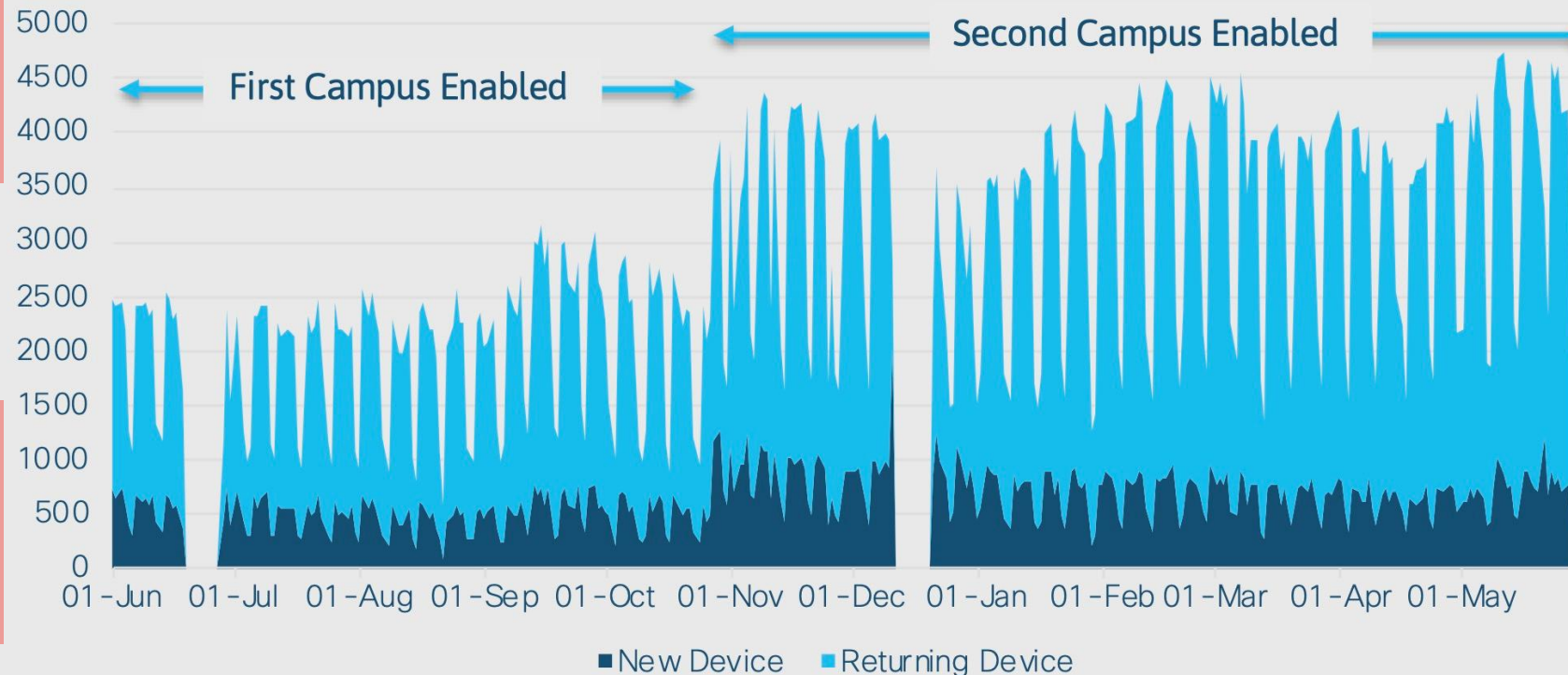
Clinical staff no longer spending time getting people connected

First Campus Enabled

Second Campus Enabled

Lower support burden on IT staff

Users don't notice Wi-Fi, just great data/voice service

■ New Device ■ Returning Device

234,283 Unique devices

146 mins average duration

Happy visitors and patients

Fast and cost-effective indoor coverage

Experience of retailer that has adopted OpenRoaming IDP-as-a-Service

Location Information

- The app reports current location to DNA Spaces. Can be used for use cases like wayfinding or targeted engagements.

Acting on insights and extend business outcomes

Enable Push Notifications

- Allows for DNA Spaces backend to send notifications to user devices

130% increase in engagement with OpenRoaming triggered targeted push

Key Take-Aways

- A renewed industry focus on indoors, but with a diversity of approaches for serving the enterprise opportunity.

- Listening to mobile carriers by delivering the best multi-vendor instrumentation of Wi-Fi experiences.

- In-building needs a different paradigm to scale beyond 2% of buildings that are over 100,000 sq.ft in area. Distributed nature of OpenRoaming fundamental for delivering scale.

- Ready for scale – Cisco Spaces already activated on over 8 million access points, with OpenRoaming ANP capability now included with every Access Point license.

- OpenRoaming is ready to deliver fast and affordable indoor coverage for carriers, while enabling enterprises to act on insights and extend business outcomes.

Wireless Global Congress Americas

WGC AMERICAS

MAY 19 – MAY 22

Wi-Fi Innovation: Connecting Our Digital World

WESTIN IRVING CONVENTION CENTER, DALLAS

#WGCAmericas | #wifirevolution | #lovewifi

IEEE 802.11 Standards Update (with a focus on Wi-Fi 8)

Robert Stacey

IEEE 802.11 Working Group Chair

◆IEEE

Overview

- A brief history of the 802.11 standard

- A review of current activity

- A review of some 802.11bn features

- What to expect in Wi-Fi 8

IEEE

802.11 revision history

802.11 standards pipeline

WNG

AUTO TIG

PQC SG

802.11br
ELC

802.11bn
UHR

802.11bp
AMP

802.11bq
IMMW

REVmf

802.11bi
EDP

802.11bk
320 MHz Pos

802.11bf
SENS

802.11bh
RCM

802.11be
EHT

802.11
-2024

MAC

MAC & PHY

Discussion
Topics

TIG/Study
groups

TG without
Approved draft

WG
Letter Ballot

SA
Ballot

Published
Amendment

Published
Standard
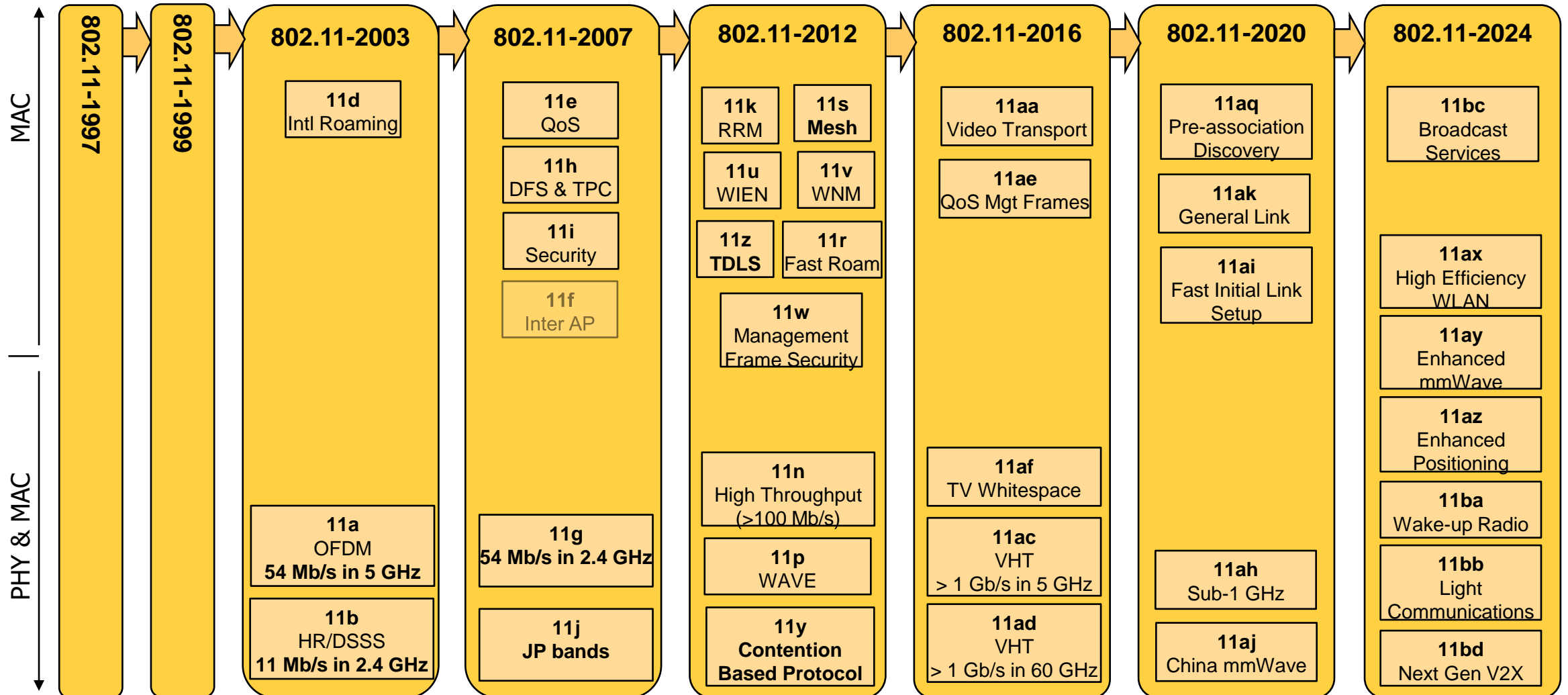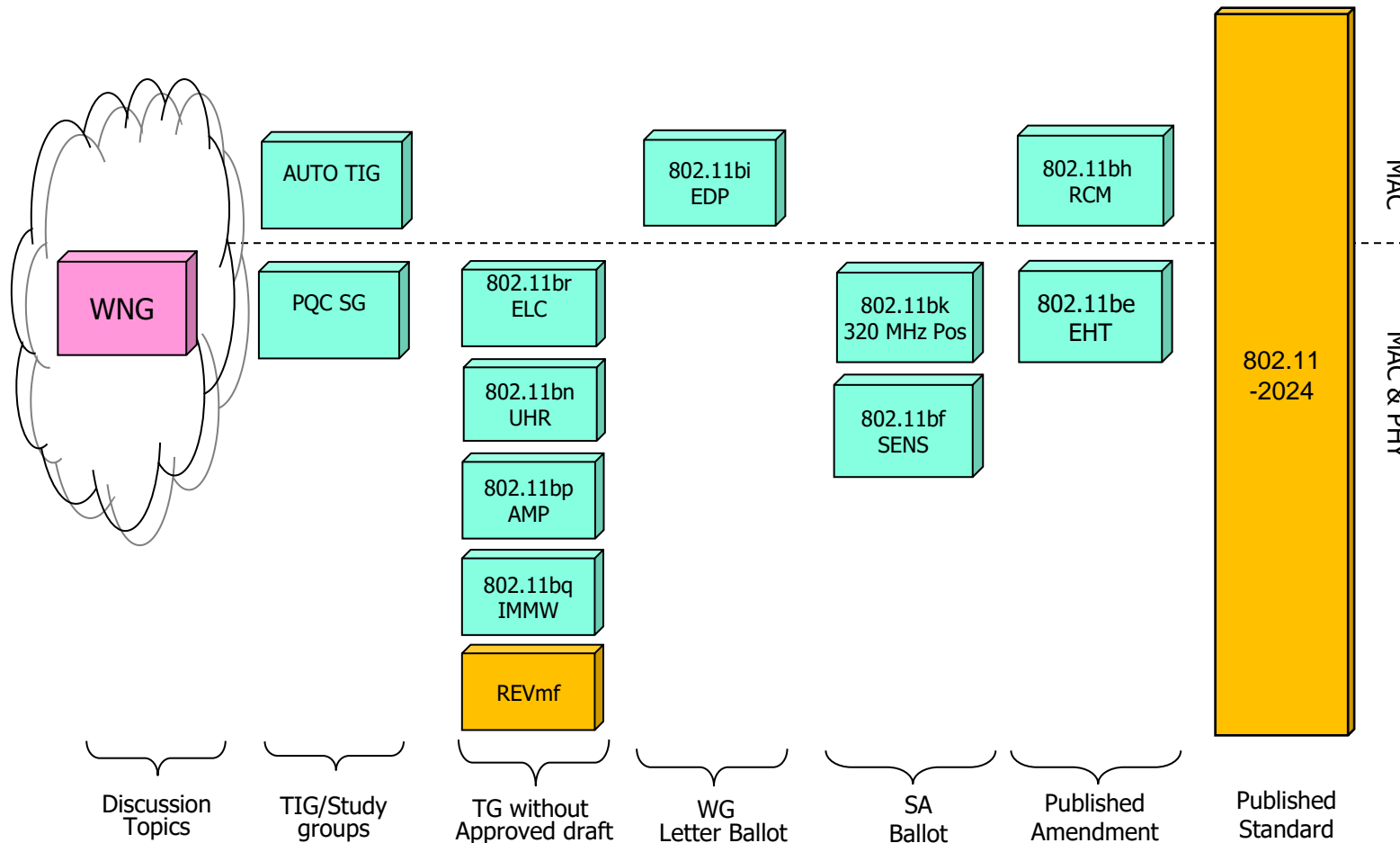
Shows the current subgroups and degree of maturity

New ideas are presented in the Wireless Next Generation (WNG) standing committee

With working group approval, these become either a study group (SG) or topic interest group (TIG)

- A SG develops a project authorization request (PAR)

- A TIG develops a report

With PAR approval, a task group (TG) is created

A TG develops a draft standard

Once the TG has an initial draft standard it is balloted in the working group (WG)

There are usually multiple rounds of balloting as comments are addressed and the is draft revised

After approval by the WG, the draft standard is balloted at the standards association (SA) level

Again, there are usually multiple rounds as comments are addressed and the draft is revised

After approval by the SA standards board (SASB) the standard is published

◆IEEE

802.11 standards pipeline
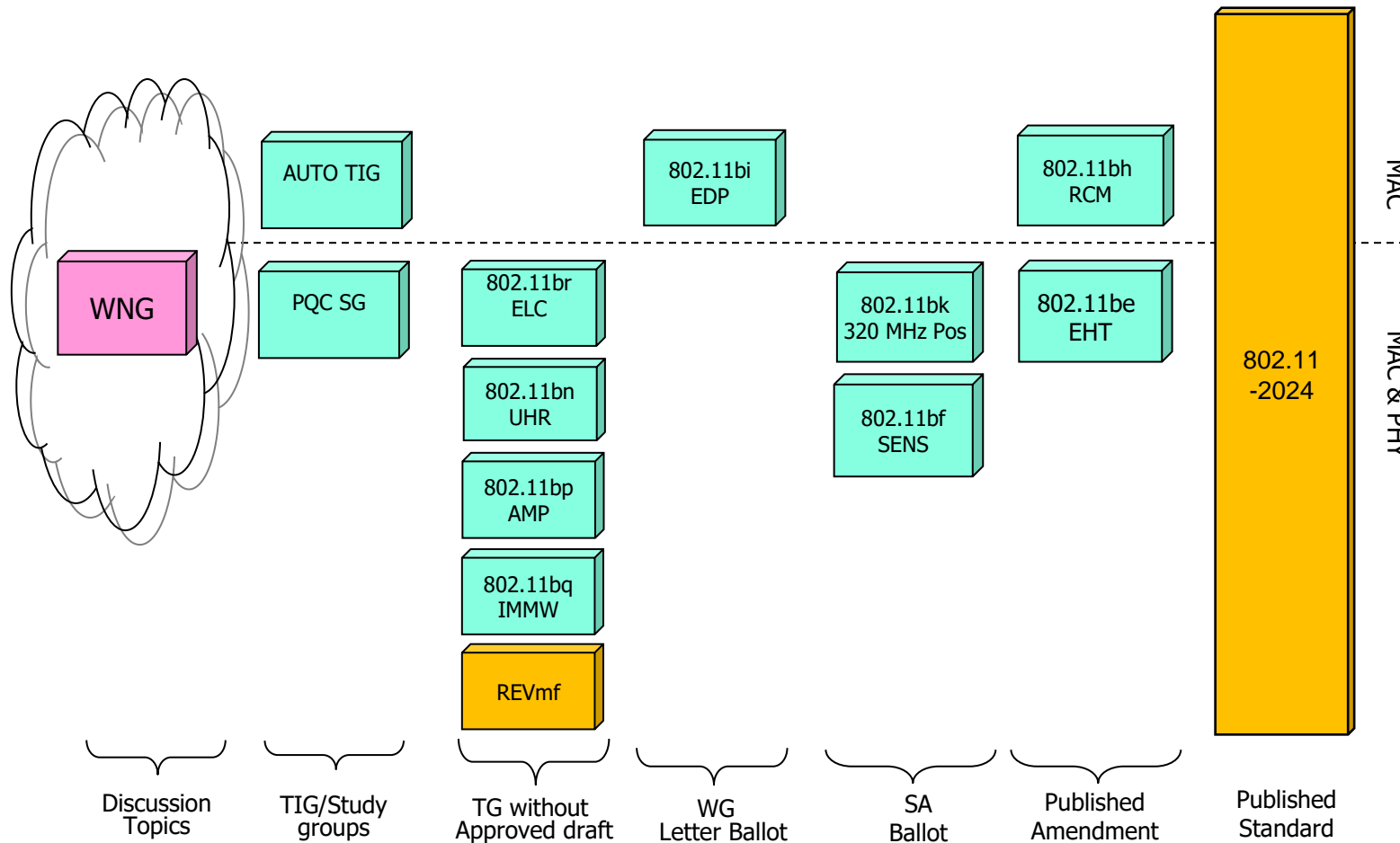
Active topic interest group (TIG)
- Automotive (AUTO) TIG – developing a report on automotive use of Wi-Fi

Active study group (SG)
- Post Quantum Cryptography (PQC)

Active task groups
- TGmf – The next revision of the 802.11 standard (REVmf)
- TGbq – Integrated mmWave (IMMW)
- TGbp – Ambient Power Communications (AMP)
- TGbn – Ultra-High Reliability (UHR)
- TGbr – Enhanced Light Communications (ELC)
- TGbi – Enhanced Data Privacy (EDP)
- TGbk – 320 MHz positioning
- TGbf – WLAN sensing (SENS)

Mainstream 802.11 evolution

Project	Industry Name	Defining features
802.11n High Throughput	Wi-Fi 4	Spatial multiplexing, 40 MHz channels, beamforming, A-MPDU
802.11ac Very High Throughput	Wi-Fi 5	80 MHz & 160 MHz channels, 256 QAM, beamforming that works Enabled broad support for 5 GHz band operation
802.11ax High Efficiency	Wi-Fi 6 and 6E	Multi-user operation, 4x OFDM symbol, 1024 QAM, 6 GHz band operation
802.11be Extremely High Throughput	Wi-Fi 7	Multi-link operation (simultaneous use of multiple channels), 320 MHz channels, 4K QAM
802.11bn Ultra-High Reliability	Wi-Fi 8*	Lower latency, longer range, faster handover

Completed — 802.11n through 802.11be

New — 802.11bn

*Expected name; will be decided outside of IEEE 802.11

◆IEEE

802.11be – EHT, aka Wi-Fi 7

- Approved and already shipping!
- Main feature is multi-link operation (MLO):
  - Higher throughput: engages the combined capacity of multiple channels across different bands
  - Reduced latency: user data is transmitted on the first channel that goes idle
  - Better reliability and robustness: one channel might experience congestion, but that is less likely across multiple channels
- Other features include:
  - Multiple resource unit (MRU) – more efficient frequency tiling
  - 4K-QAM
  - 320 MHz channels
- 2x2/4K QAM/320 MHz = 5 Gb/s

IEEE

802.11be – MLO flavors

- Single radio
  - Moves between channels using power save notification (enter power save mode on one channel; active on the other)
  - Benefit is reduced latency; better reliability

- Enhanced single radio
  - Listen on two (or more) channels
  - Transmit or receive on one channel

- Multi-radio Non-STR
  - Coordinated transmit and receive to minimize receiver saturation

- Multi-radio STR
  - Simultaneous transmit and receive (STR) on two or more channels

Increasing performance

Today, most client implementations are here

APs are already here; The future of clients is here

◆IEEE

802.11bn – Ultra-High Reliability (UHR)

Expected to be the basis for Wi-Fi 8

Preparing their initial draft; current version is D0.2

Expect to start working group ballot with D1.0 coming out of the July 2025 session

Expected improvements:
- Reduce tail latency (prioritized EDCA, P-EDCA)
- Reduce roaming latency by taking advantage of multi-link operation (seamless roaming)
- Allow access on secondary channel while primary channel is busy (non-primary channel access, NPCA)
- AP power save
- Better in-device coexistence (dynamic/periodic unavailability operation, DUO & PUO)
- Extend range by reducing sensitivity gap between client and AP (UHR ELR PPDU)
- Security enhancements, e.g., Control frame protection (moved to REVmf)
- Multi-AP coordination

◆IEEE

802.11bn – Reduced tail latency (P-EDCA)

Repeat Ch. acces time, UL STAs: 30

- The idea is to bound the max latency experienced by high priority traffic, the so-called tail latency
  - A difficult problem to solve in a legacy compatible manner
- A STA that has AC_VO traffic buffered for longer than some threshold can send a DS CTS using PIFS access
- The DS CTS reserves the medium for a "priority" contention period
- Following the DS CTS, only STAs with AC_VO traffic compete for access
- The winner sends its AC_VO traffic
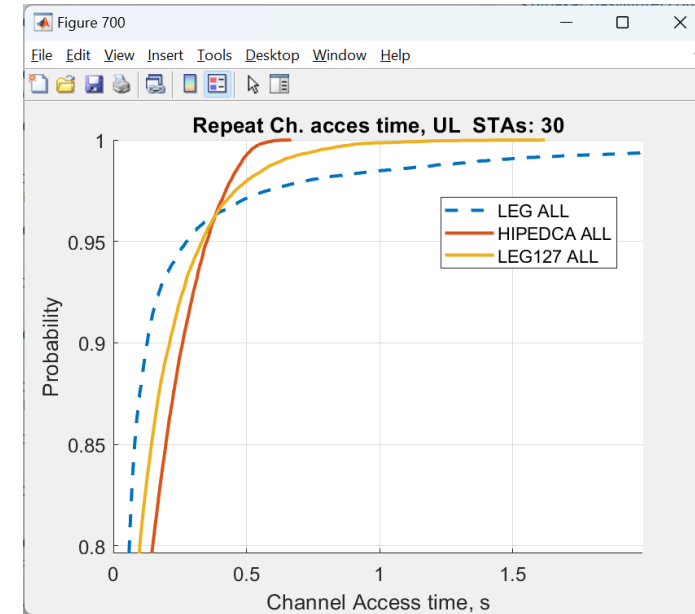
802.11bn – Reduced roaming latency (seamless roaming)

- Roam from one AP to another without reassociation

- Operates within a "seamless mobility domain", which may be a subset of the APs in an ESS

- Define a switchover point and transfer MLD context from one AP to another

  - MLD context includes security association, PN, acknowledgement SN, etc.

- At switchover point, traffic moves from one AP to the other (both UL and DL)
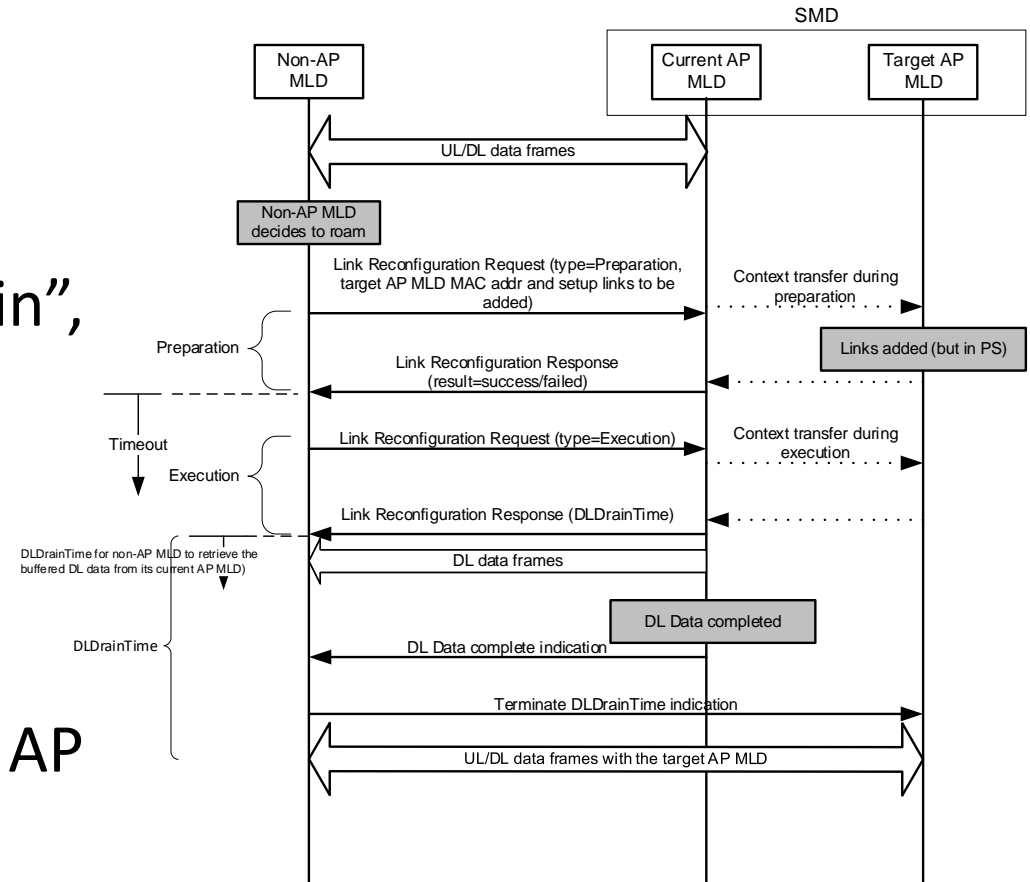
802.11bn – Non-primary channel access (NPCA)

- Allow narrow channel width operation on a secondary channel while primary channel is busy

- The BSS of interest detects the OBSS RTS/CTS sequence, identifies the OBSS TXOP length, and determines if they can trigger NPCA
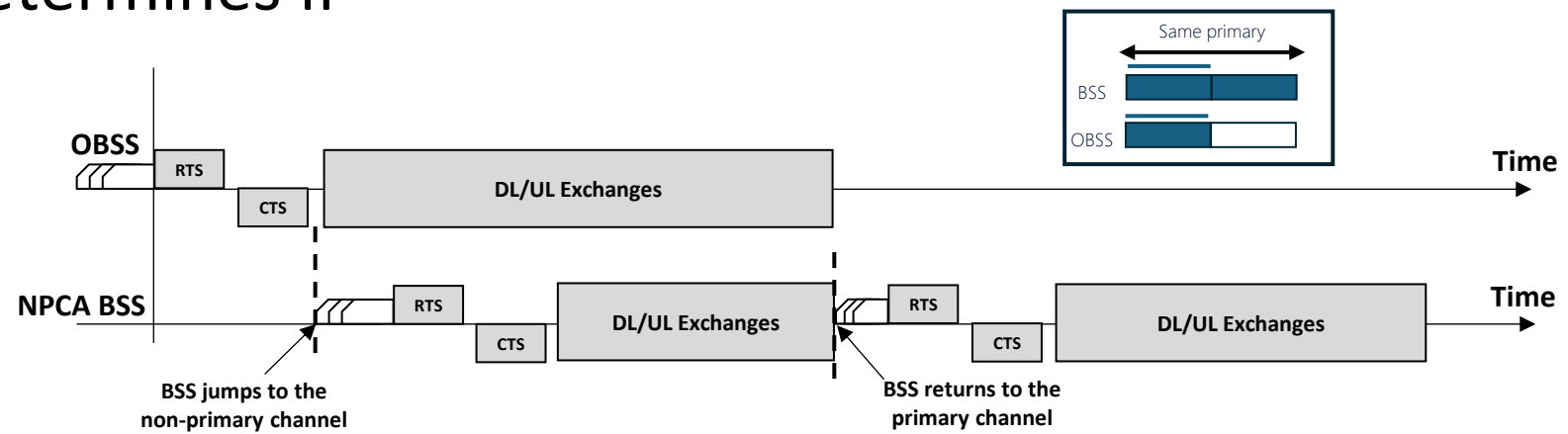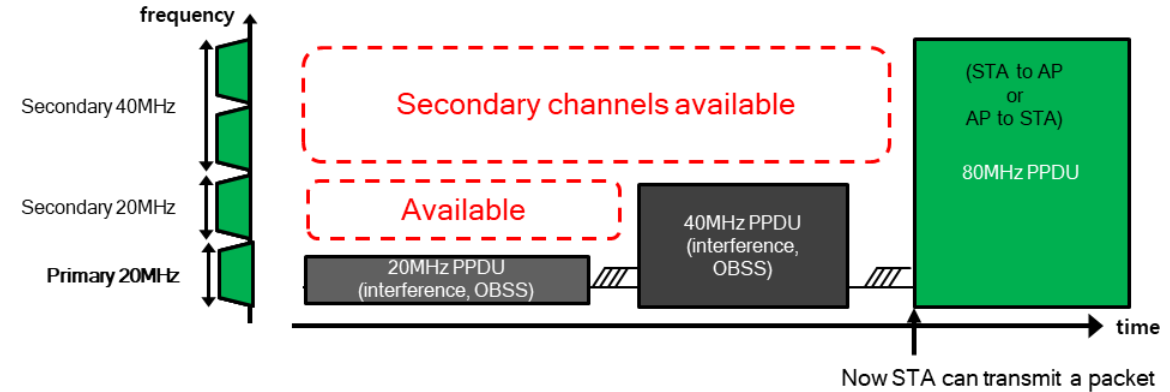
802.11bn – Extended range
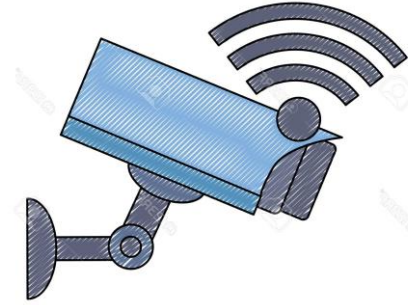
- Access point has multiple antennas and higher transmit power
- Client often has only a single antenna and lower transmit power
- The UHR ELR PPDU provides about 6 dB of processing gain to close the link

◆ IEEE

802.11bi – Enhanced privacy

A longer-term project that will enhance privacy

For example, preventing

- Device fingerprinting:
  - Identifying a device by the unique information exchanged openly prior to association
- Spoofing attacks:
  - E.g., an AP pretends to be a person's home AP in the hopes that the person's phone will try to associate when the person is in the area, thus giving up the person's location
- Presence monitoring:
  - Identifying the continued presence of an individual even if the individual cannot be identified

Completed initial working group ballot on draft D1.0 in March

Working on comment resolution

◆IEEE

802.11bp – Ambient power communications

- A new project looking into battery-free and very low power operation for:
  - Smart home, smart grid and smart manufacturing
  - Logistics
  - Fresh food supply chain
- Defines ambient power communications in the sub-1 GHz and 2.4 GHz bands
- Coexists with legacy 802.11 devices
- Expect to have an early draft D0.1 in July 2025
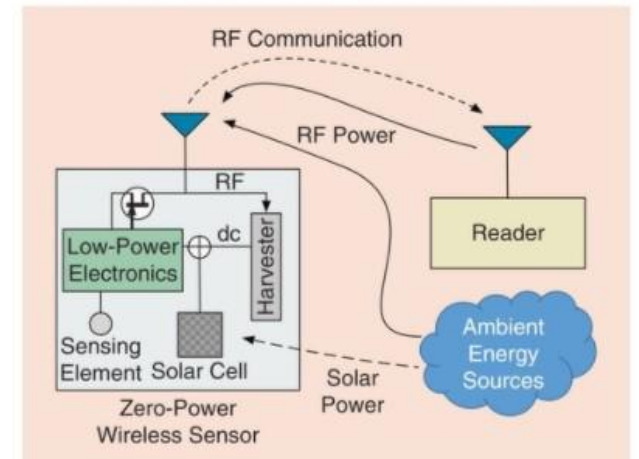
802.11bq – Integrated mmWave
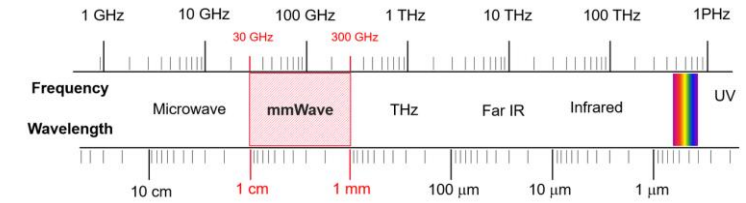
- Simplify 42-71 GHz band operation to reduce implementation cost

- Previous generations (802.11ad/ay/aj) assumed stand-alone operation
  - Re-design with multi-band support in mind (hence "integrated")

- Improvements expected:
  - Architectural reuse of low band PHY
  - Eliminate control PHY by taking advantage of multi-link; e.g., sector sweep beamforming directed through low band channel

- This project is particularly relevant to China where 6 GHz band operation is not available

IEEE

P802.11br – Enhanced light communications

- IEEE Std 802.11bb-2023 added light communications (LC) to 802.11

- P802.11br is a project that will enhance this work

- For example,
  - Add multi-link support
  - Support for underwater operation

- The group held their first meetings at the May 2025 session

IEEE

Automotive (AUTO) TIG

- The AUTO TIG is developing a report on the automotive use of Wi-Fi

- The automotive industry wants to use Wi-Fi opportunistically to
  - Update software, maps, etc.
  - Get updates on traffic conditions
  - Serve internet connectivity to occupants using Wi-Fi
  - Connect to mobile devices

- The report will provide
  - Use cases and requirements
  - Key performance indicators
  - Technical approaches and 802.11 standard gaps in the areas such as protocols in association & authentication, seamless AP handover, optimized roaming algorithm, etc.
  - Alternative solutions
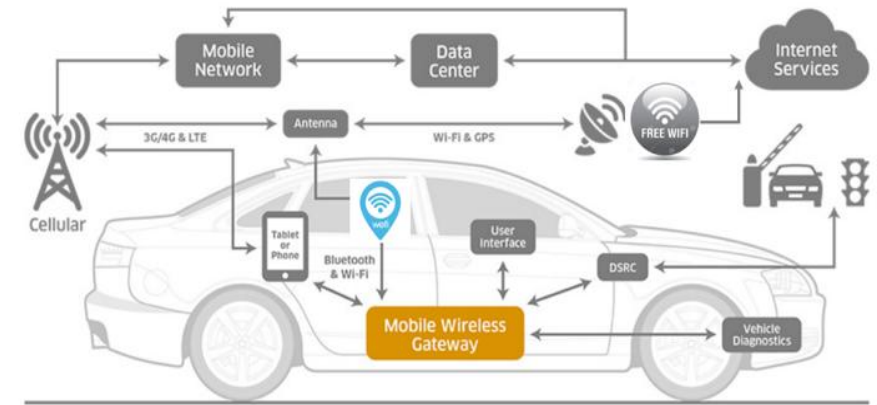
Post Quantum Cryptography SG

- Cryptographically relevant computers are anticipated in the near future
- We need to move our security framework to support quantum resistant technologies
  - US National Security Agency (NSA) recently advanced its timeline to 2027
  - UK National Cyber Security Centre has set 2035 as a milestone for completing migration
- The PQC study group is developing a project authorization request (PAR) for this work
- At the May session (last week) the WG approved the P802.11bt PAR for review and approval by the 802 LMSC in July

IEEE

Summary

- Wi-Fi 8 is expected to be primarily based on P802.11bn, but *might* include work from other projects, e.g.,
  - Control frame protection from REVmf
  - Quantum-resistant security from P802.11bt
- From 11bn we can expect small efficiency and reliability gains in
  - Channel access latencies
  - Roaming latencies
  - Coexistence
  - Power saving
  - Longer range
- Expect to see further performance gains from MLO as implementations catch up with what is already defined in 11be
- We will see additional gains as AI/ML is adopted for
  - Improving beamforming (reducing sounding overhead)
  - Link adaptation
  - Traffic shaping and scheduling

◈ IEEE

Discussion & Questions

Backup slides

REVmc, 11az, 11bk - Positioning

Ranging in the form of Fine Timing Measurement (FTM) was introduced in IEEE Std 802.11-2016

    Derived from an existing "Timing Measurement" frame exchange that supported clock sync

    Historically referred to a "REVmc FTM" from the revision project that created it

Since then, it has been enhanced with IEEE Std 802.11az-2022:

    Support for wider bandwidths ➜ enhanced accuracy

    Secure LTF ➜ prevent position spoofing

Further enhanced with 802.11bk: adds 320 MHz channel support

FTM is widely supported in both APs and clients

Supports numerous use cases, including

    Geofencing (e.g., limiting access to devices within a building)

    Indoor navigation

    Aid regulatory requirements (e.g., 6 GHz band AFC)

And might help with security/privacy, roaming, link adaptation and similar problems

Overlaps with and compliments similar solutions in BT and UWB

t_1 FTM t_2

Ack t_3

t_4
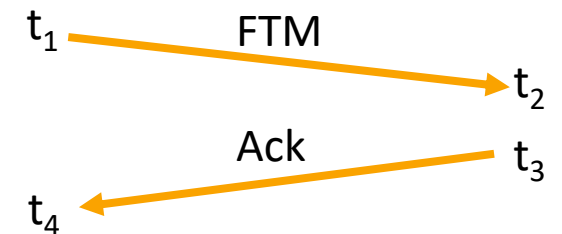
$trip\_time = (t_2 - t_1 + t_4 - t_3)/2$

$distance = trip\_time \times c$

triangulate to get position

802.11bf - Sensing

Users can turn on, off or snooze motion notifications while also having visibility to hourly, daily and weekly motion activity.

802.11bf developed a protocol for environmental sensing

Measurements that can be used to monitor environmental conditions and changes

– Range, velocity, motion, presence, proximity, gesture

– Human, animal, number of people

– Room, car, enterprise

Built on the sounding waveforms

– The sounding waveforms are used to measure the channel state so that the per-antenna subcarrier amplitude and phase can be optimized for a subsequent transmit (beamforming)

Does not define use of the measurements; just defines the sounding exchange and protocol for transferring of channel state information (CSI) between devices

◆IEEE

802.11bh – Random and changing MAC addresses

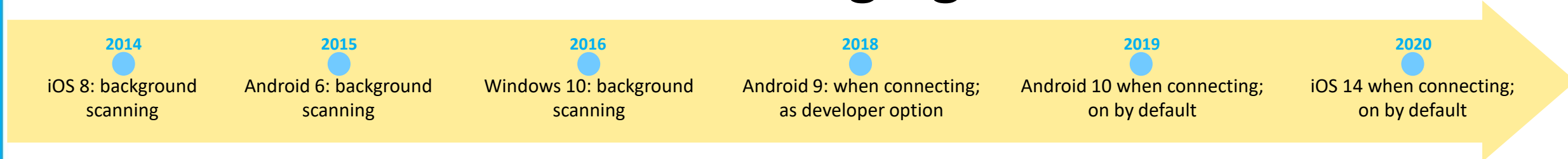| 2014	2015	2016	2018	2019	2020
iOS 8: background scanning	Android 6: background scanning	Windows 10: background scanning	Android 9: when connecting; as developer option	Android 10 when connecting; on by default	iOS 14 when connecting; on by default

- A short-term project that addressed the device identification problem arising from the use of random and changing MAC addresses
  - e.g., caching of security credentials, billing, troubleshooting
- Defines two **secure** methods for device identification:
  - IRM: Client tells the AP what MAC address it will use the next time it engages with the AP
  - Device ID: AP gives the client an identifier to be used the next time the two engage
- Both mechanisms are based on sharing information securely (post association) that can be used when the devices next encounter each other

◆ IEEE

Innovation Forum
May 22, WGC Dallas

Powered by WBA CTO Group

Gathering industry's leading wireless Chief Technologists in championing the next big thing in wireless

1 **Strategic Alignment:** Set the future direction of the forum and industry roadmap for the next decade to drive state-of-the-art networks and services

2 **Global Diversity:** Unique gathering of players across the wireless ecosystem and industry verticals, operators, hubs, infrastructure, chipset and device vendors

3 **Execution Capacity:** Best-in-class program management supported by a team with vast experience in industry collaboration

4 **Impactful deliverables:** WBA members and industry verticals unique representation jointly collaboration on unique content and roadmaps

https://wballiance.com/innovation-forum

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Innovation Forum:
6G & Wi-Fi 8 – Path to ubiquitous connectivity

WGC, Dallas, May 2025

dean@disruptive6G.com   @disruptivedean

Image credits: Pixabay.com / Midjourney AI / Dean Bubley / Companies as stated

Enterprises use Wi-Fi / cellular networks at multiple scales

Wi-Fi Private 4G / 5G / 6G

Public Networks

Application / Testbed

Building

Plant / HQ

City / National / infrastructure

Global / Supply Chain

Disruptive Analysis
Don't Assume
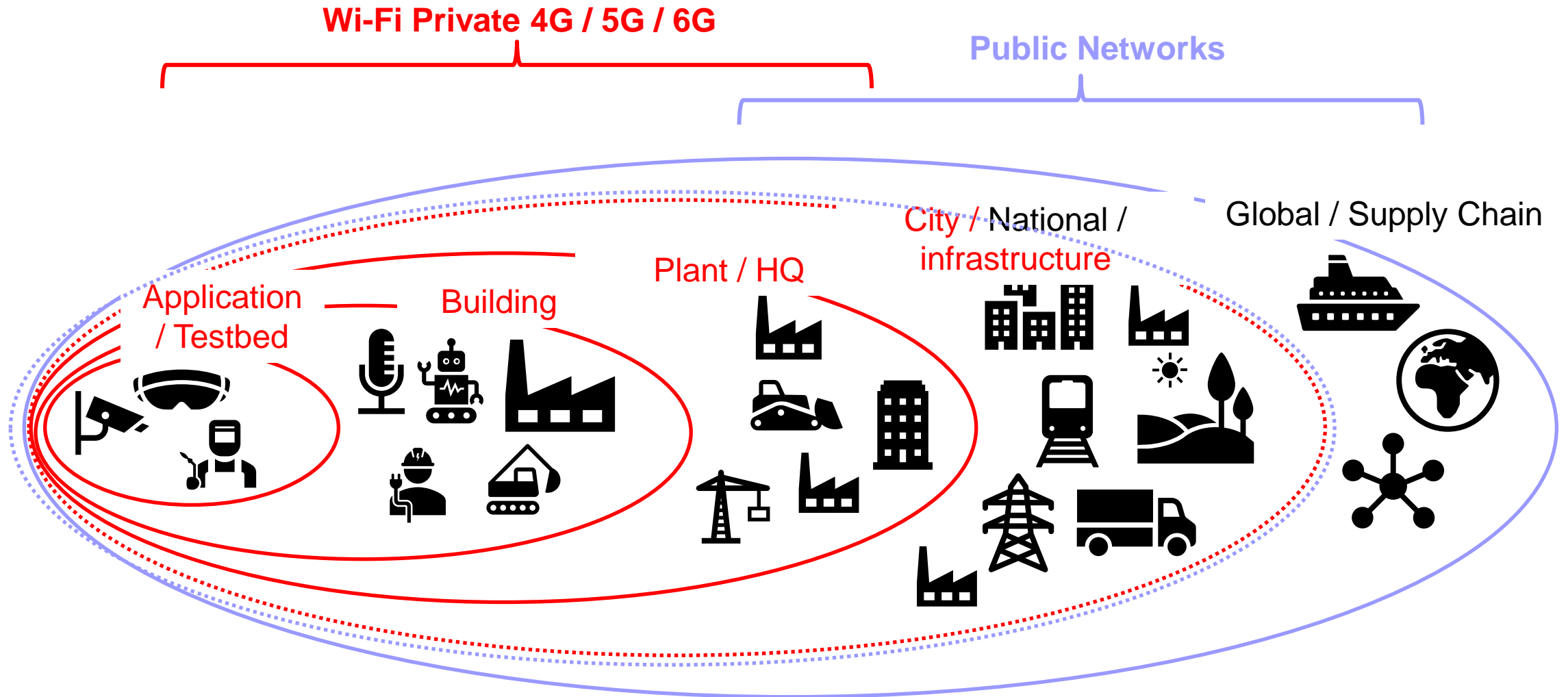
Resetting the ITU's wheel diagram for the real world
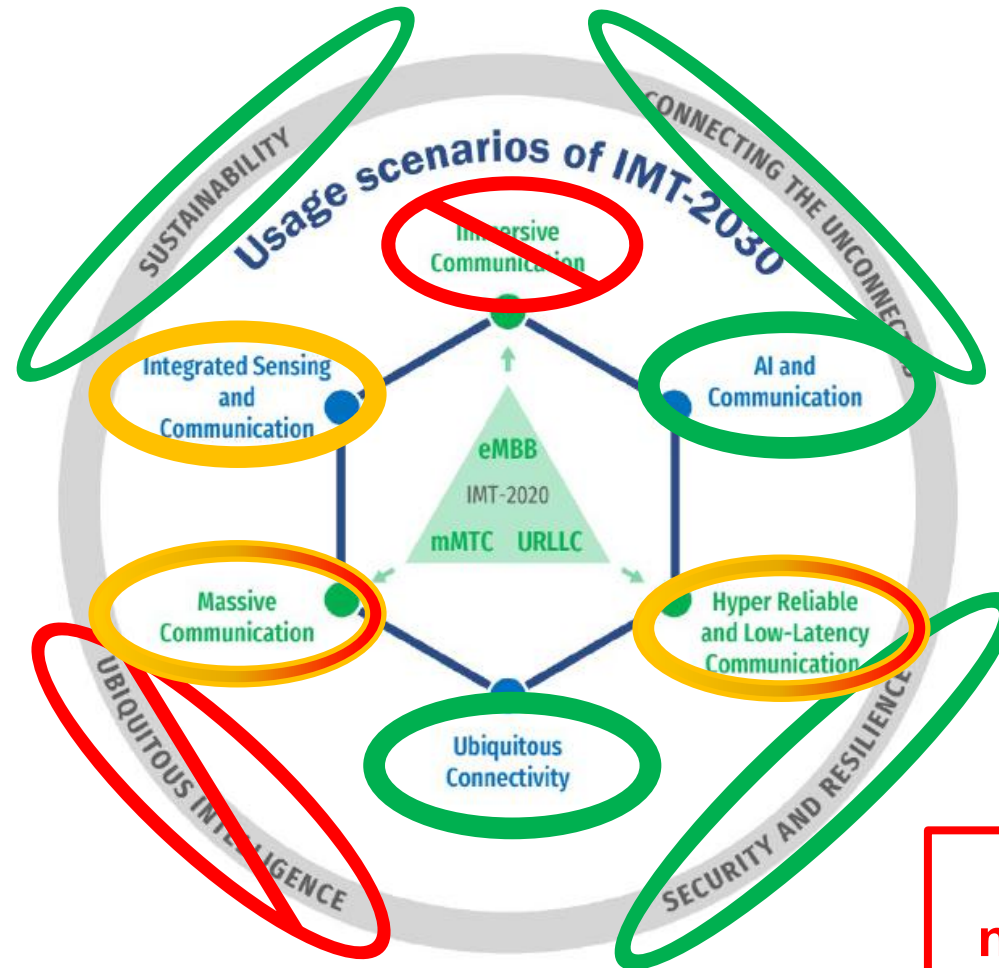
6G needs "business model neutrality" with enterprise private networks as 1st class citizens

6G must be based on the world in 2030 when it launches

Disruptive Analysis
Don't Assume

AI for everything anywhere

New telco industry structure & investors

Network diversity eg satellite & HAPS

Macro-economic & regulatory shifts

Security & geopolitics challenges

Vertical-isation & local-isation

Robots, digital twins exist

Fibre transition completed

Virtualised hybrid & disaggreg networks

Edge is not mobile centric

AR / VR not an anchor use-case

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c80% of mobile use is indoors. This is "ubiquity" for 6G

Indoor
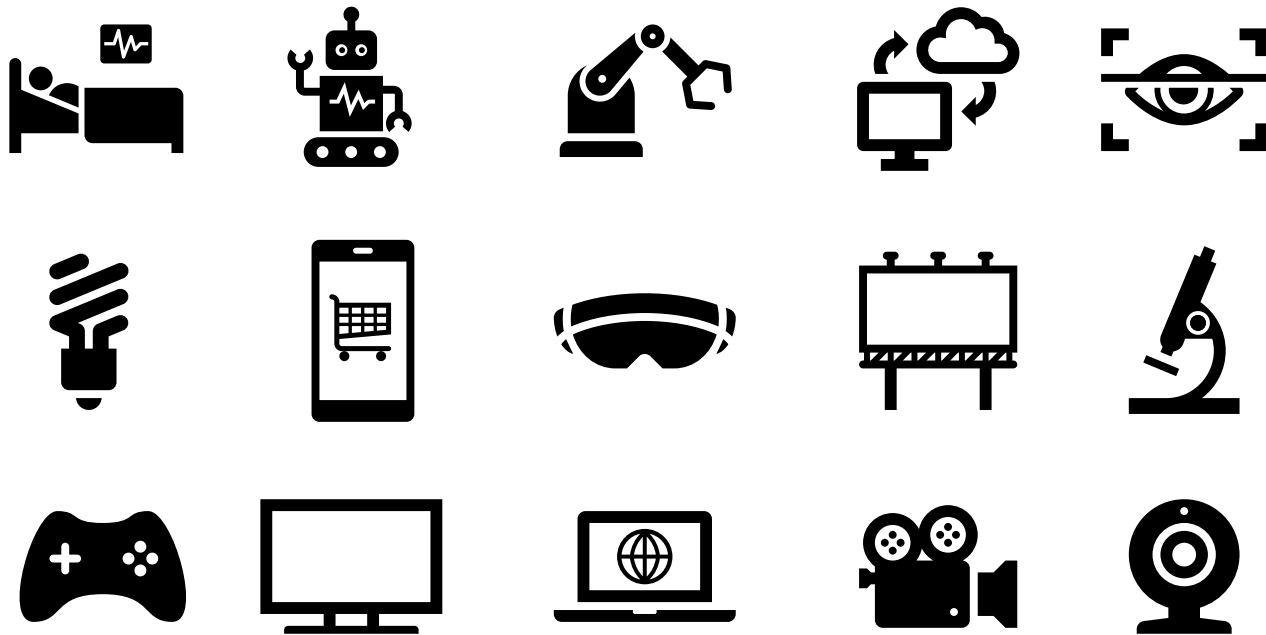
Outdoor

"Up to 80% of mobile traffic is generated indoors"
"Indoor coverage becomes more important but also more challenging with 5G" – Ericsson
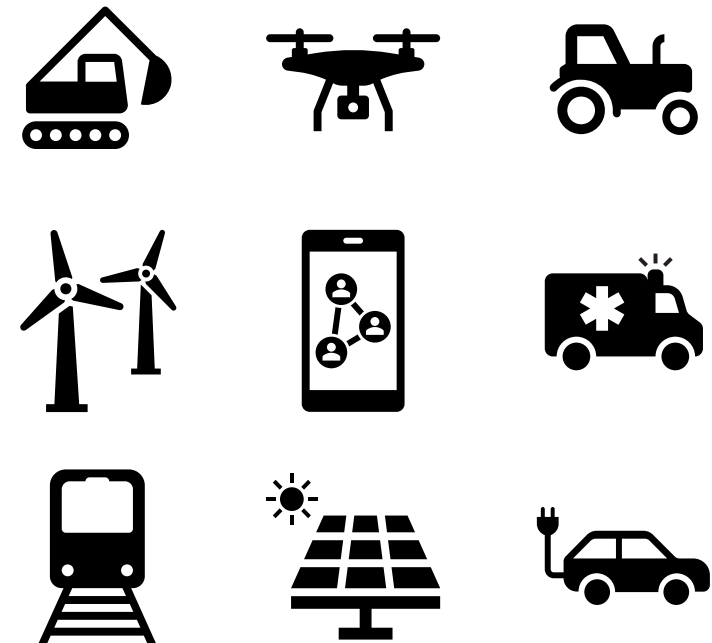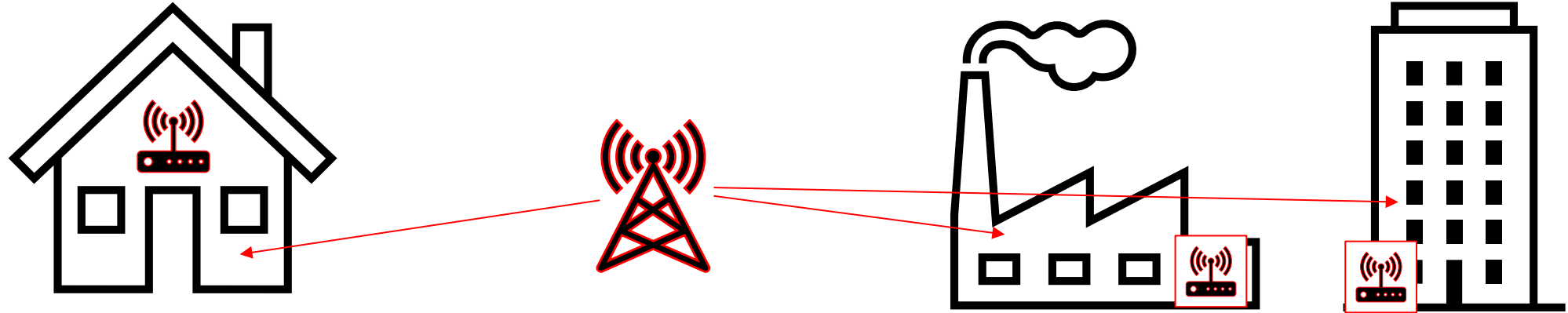
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Indoor wireless: Mix of outdoor-to-indoor & "indoor-native"

Indoor-native

Consumer Wi-Fi
Femtocells / repeaters
Smart home eg Bluetooth,
Zigbee, Thread
Legacy/niche eg DECT

Outdoor-to-indoor

2G - 6G MNO cellular
Non-MNO 6G networks
Broadcast TV & radio
Wide area IoT (eg LoRa)
Satellite & GPS
Public safety

Indoor-native

Enterprise / MDU Wi-Fi
Indoor MNO 5G / 6G coverage
[DAS, DRS, small cell, repeater, RIS]
Private 4G / 5G / 6G
Public safety coverage
Audio-visual wireless
Smart building / IoT / industrial
Indoor positioning

# Wi-Fi integration with cellular needs greater focus

- It's not "offload" (except for MVNOs)
- It's about coverage & performance
- … and support of Wi-Fi calling & SMS
- Onboarding must be frictionless
- Passpoint & OpenRoaming are elements
- MNOs may need convincing
- Security & visibility need to be addressed
- Mix of venue-pays & MNO-pays models
- Don't forget private 5G / 6G as well as public

There are multiple dimensions for spectrum sharing
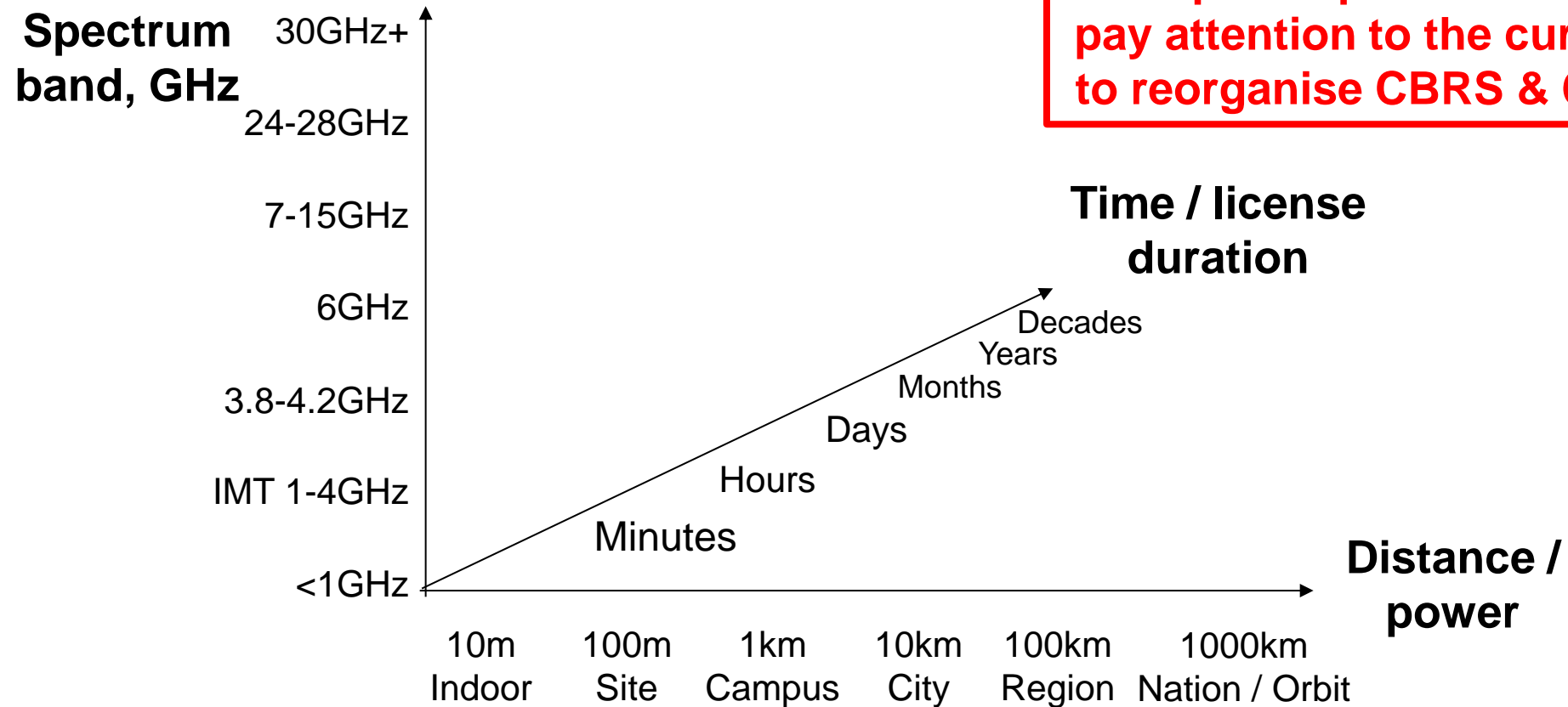
Enterprise spectrum users need to pay attention to the current threats to reorganise CBRS & 6GHz bands

Spectrum band, GHz

- 30GHz+
- 24-28GHz
- 7-15GHz
- 6GHz
- 3.8-4.2GHz
- IMT 1-4GHz
- <1GHz

Time / license duration

- Decades
- Years
- Months
- Days
- Hours
- Minutes

Distance / power

10m	100m	1km	10km	100km	1000km
Indoor	Site	Campus	City	Region	Nation / Orbit

Temporal dimension for 6G-era spectrum sharing scenarios

< 1 sec	Seconds	Minutes	Hours	Days	Months	Years	Decades

Dynamic demand response
Failovers / resilience
Interference mgmt
Opportunistic

Busy hour
Off-peak
Public safety
App-specific

Major events
PMSE
Govt events
Holidays
Disasters

Seasonality
Construction

Enterprise
Wholesale
Neutral Host

MNO RAN
Utilities / energy
Defence
Underground
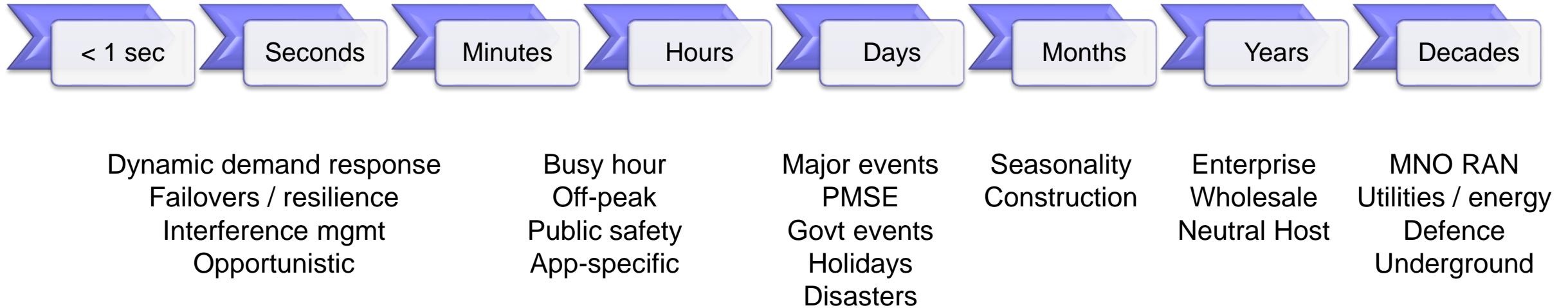
Indoor spectrum options: new approaches, new challenges

- Should there be a central "controller"? Or distributed?

- Extending the unlicensed / Wi-Fi model
  - New bands – 6GHz, 60GHz, <1GHz HaLow, others?
  - AFC / light-licensed
  - Should Wi-Fi 9 include XTS, or be submitted for IMT2030?

- Opportunistic sharing indoors (eg 7-8GHz)
  - Maybe opportunistic spectrum pooling / roaming?

- Indoor spectrum-sensing

- Indoor location & positioning issues

- Not just cellular & Wi-Fi: Audio, Bluetooth, UWB, IoT etc

- How much do regulators / policymakers know or care?

- Reliable spectrum database access? Circular problem?

CTO Innovation Forum Assets

Booklet Profile Page
Promotional deck with Chief Technologists information

Roadmap & Key Trends
Funneled through an open innovation cycle

Invitation-only Forum
Unique forum for information exchange and repository

Welcome Article on Newsletter
Dynamic engagement with industry creating momentum

Strategic Meetings & Initiatives
Periodic meetings, remote or F2F Leading Wireless CTO Award

Unique Industry Event
Global F2F gathering for all Forum members

Powered by WBA CTO Group

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Working Items: Roadmap & Key Trends

The group will be developing a technology roadmap aligned with industry key trends (CTO Survey)

WBA Program Development

WBA Members

Plan and execute project ToR's

Global call for projects and initial priorities

Deliver

CTO IF Survey

Results Evaluation / Key inputs to alignment

WBA Roadmap Execution

Internal roadmap and priorities alignment

PUSH

PULL

Feed priorities

Industry Developments

Key forums / Industry priorities

Drive companies research on verticals
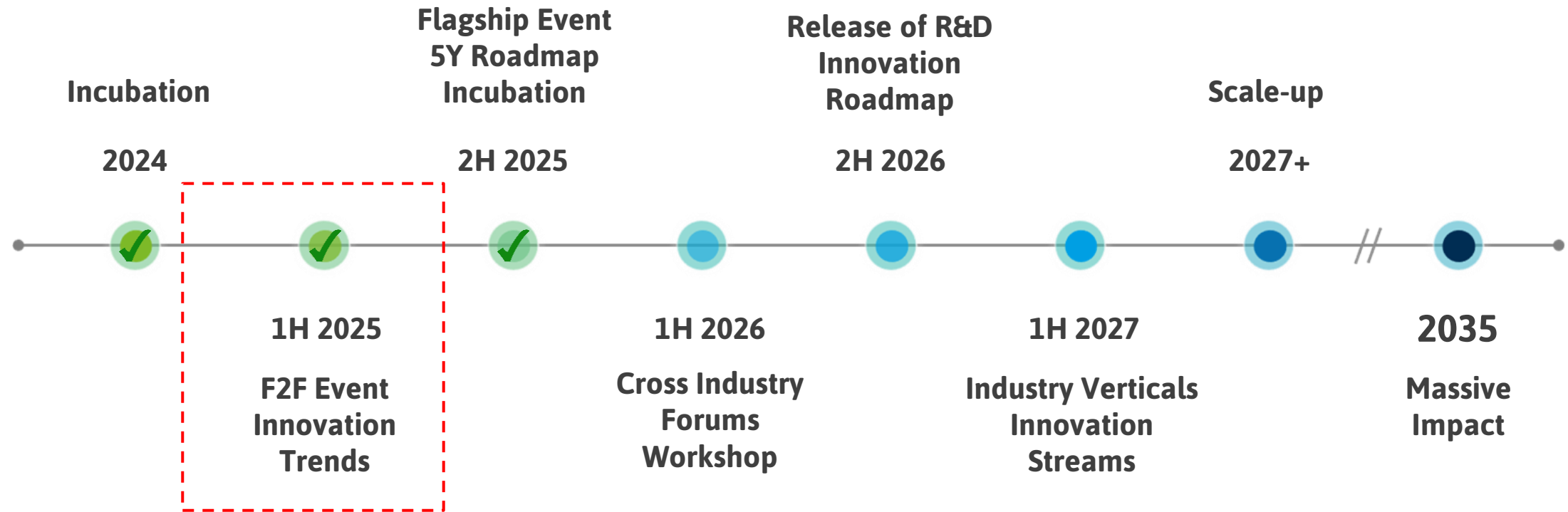
Add vertical industries (invitation-only)

Start with technology and market trends based on group assessment > summary / roadmap

Forum email: wba-ctog@connectedcommunity.org

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Evolution Timeline / Next Steps

Incubation — 2024

Flagship Event
5Y Roadmap
Incubation — 2H 2025

Release of R&D Innovation Roadmap — 2H 2026

Scale-up — 2027+

1H 2025 — F2F Event Innovation Trends

1H 2026 — Cross Industry Forums Workshop

1H 2027 — Industry Verticals Innovation Streams

2035 — Massive Impact

CTO Group @ pmo@wballiance.com

Next Steps - WBA will help you get on board the CTO Innovation Forum:
1) Participate on the technology roadmap effort – drive the industry forward
2) Attend the flagship Innovation Forum meeting planned activities for 2025-2026

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Thank You

contact: pmo@wballiance.com

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