The Ultimate Wi-Fi Upgrade Guide

ekahau

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EXECUTIVE SUMMARY

IT teams across industries face a common challenge: how to deliver fast, reliable, and secure networks in response to the constantly increasing demands placed on wireless networks. Wi-Fi 7 addresses this challenge by delivering a significant leap in wireless connectivity, offering enhanced speeds and capabilities that lay the foundation for both high-throughput and low latency applications as well as more reliable everyday operations.

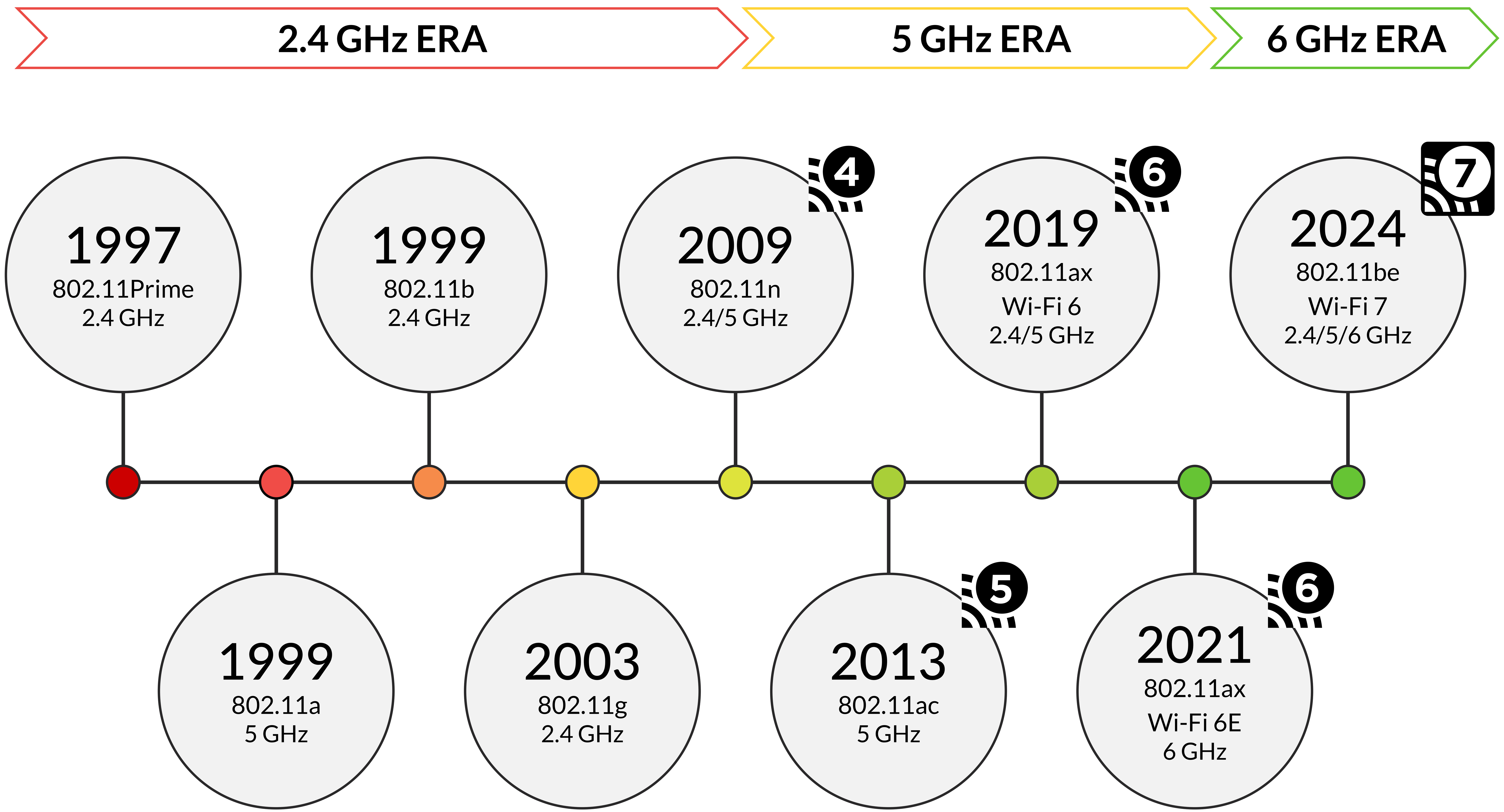
This guide provides network engineers and business leaders with a comprehensive roadmap for navigating a successful Wi-Fi 7 migration. By understanding how Wi-Fi 7 transforms connectivity, organizations can achieve a significant competitive advantage, avoiding the risks of falling behind in a rapidly evolving digital landscape. Drawing on real-world implementations and industry best practices, the following guide offers expert insights for assessing current network readiness, planning upgrades effectively, and implementing proven strategies to optimize Wi-Fi 7 deployments.

We'll start by explaining Wi-Fi 7's key technological advances in clear, accessible language. Each technical section will then demonstrate how these capabilities strengthen and enhance your network. By the end of this guide, readers will have the tools and knowledge to confidently assess their network's readiness, plan a migration strategy, and position their organization to thrive in the era of Wi-Fi 7. By taking a proactive, strategic approach to Wi-Fi 7 adoption, organizations can fully leverage the transformative potential of this new wireless standard.

What is Wi-Fi 7?

Wi-Fi 7 (IEEE 802.11be) is the next evolutionary leap in wireless networking technology, designed to meet the exponentially growing demands of modern digital enterprises. This new standard builds upon its predecessors by introducing fundamental improvements to speed, reliability, and network efficiency.

Wi-Fi 7 is also the second Wi-Fi standard that includes the availability of 6 GHz spectrum, following Wi-Fi 6E's initial introduction of this band. However, Wi-Fi 7 leverages this spectrum more effectively through advanced features, enabling organizations to achieve unprecedented wireless performance and reliability.



Wi-Fi 7's Core Benefits

Wi-Fi 7 delivers fundamental improvements across every key network metric: faster speeds, lower latency, better reliability, and enhanced security.

In these next sections, we'll review the technical advances that enable these improvements. You'll learn how 4K QAM can drive unprecedented speeds, how Multi-Link Operation (MLO) improves reliability, how spectrum puncturing maintains performance through interference, and how mandatory WPA3 strengthens security.

Together, these advances create Wi-Fi networks that can reliably deliver speeds over 1 Gbps, support more concurrent devices, and maintain performance even in challenging environments. Whether you're running an enterprise office, managing a busy venue, or operating mission-critical industrial systems, Wi-Fi 7 provides the foundation for your next-generation wireless network.

> *Speed continues to be the most critical measure of Internet quality for enterprise applications and essential services – this will only intensify with the adoption and use of AI-based services and applications. Wi-Fi 7 is an important foundation for meeting these exponentially growing demands.*

Stephen Bye
President, Ookla

Wi-Fi 7 Theoretical Maximum and Real-World Speeds

Revolutionary speeds don't just enable existing technologies—they spark entirely new possibilities and enable emerging technologies. When your Wi-Fi can support hundreds of AI-powered cameras analyzing production quality, or teams collaborating in virtual environments without lag, or factory floors running automated systems with millisecond precision—that's when network speed translates into a competitive advantage.

Wi-Fi 7 delivers unprecedented speeds, with theoretical maximums reaching 46 Gbps. With 80 MHz wide channels and two spatial streams, wireless clients can exceed speeds of 1.4 Gbps. Here is a look at the real-world maximum data rates you can expect for the latest technologies at both 20 and 80 MHz wide channels:

Wi-Fi Standard	MCS	Spatial Streams	Channel Width	Maximum Data Rate
Wi-Fi 7 802.11be (EHT)	MCS 13 (4096-QAM)	2	20 MHz	344 Mbps
Wi-Fi 7 802.11be (EHT)	MCS 13 (4096-QAM)	2	80 MHz	1,441 Mbps
Wi-Fi 6 802.11ax (HE)	MCS 11 (1024-QAM)	2	20 MHz	286 Mbps
Wi-Fi 6 802.11ax (HE)	MCS 11 (1024-QAM)	2	80 MHz	1,201 Mbps

New Spectrum in the 6 GHz Band

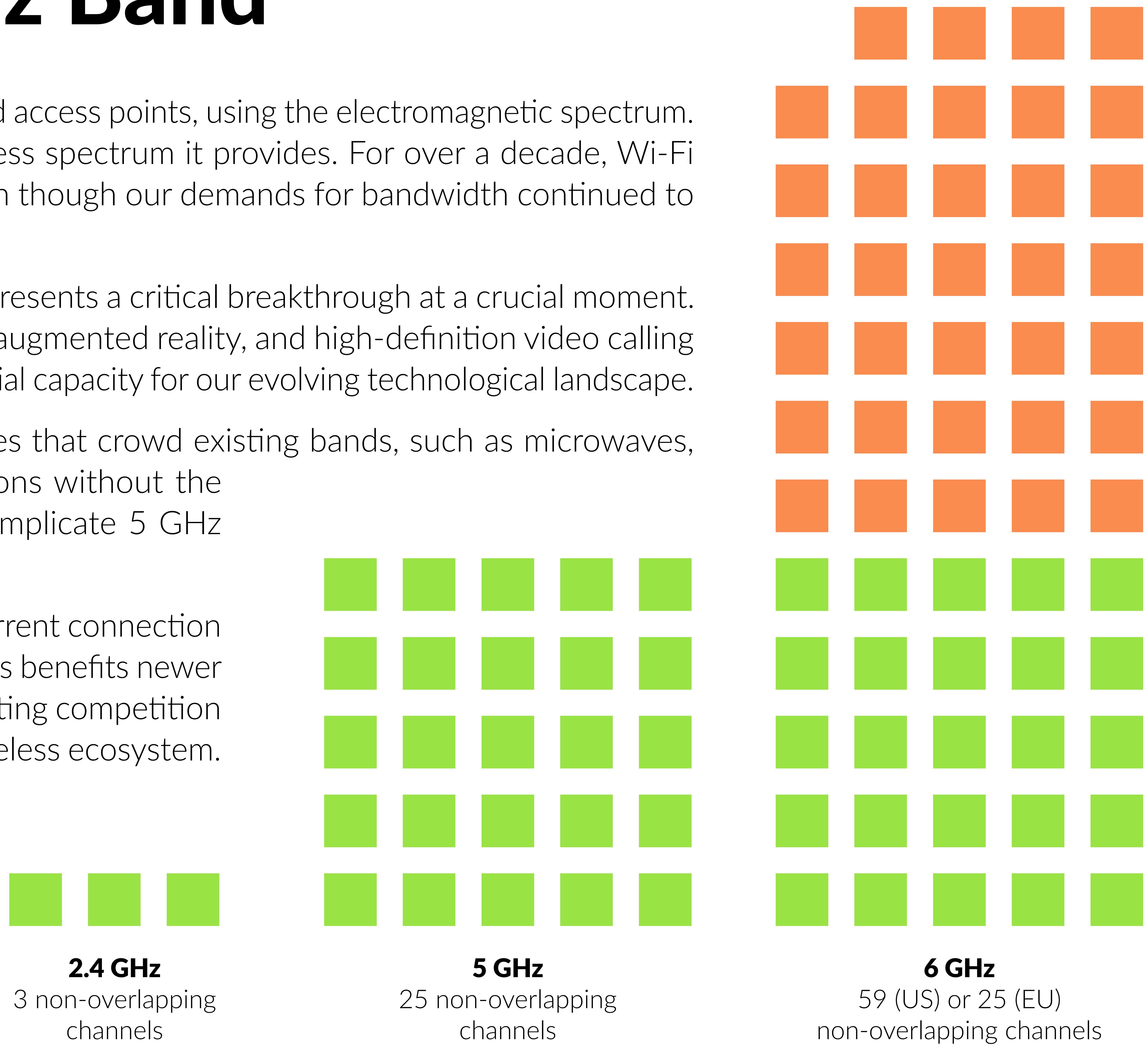
Wi-Fi uses higher-frequency radio waves to transmit data between devices and access points, using the electromagnetic spectrum. The most significant advantage of 6 GHz is the sheer amount of new wireless spectrum it provides. For over a decade, Wi-Fi operated within strict constraints - just the 2.4 GHz and 5 GHz bands – even though our demands for bandwidth continued to expand exponentially.

Starting in Wi-Fi 6E and now Wi-Fi 7, the introduction of the 6 GHz band represents a critical breakthrough at a crucial moment. As applications become increasingly demanding – with artificial intelligence, augmented reality, and high-definition video calling requiring unprecedented levels of throughput – this expansion provides essential capacity for our evolving technological landscape.

The new spectrum significantly reduces interference from non-Wi-Fi devices that crowd existing bands, such as microwaves, Bluetooth devices, and motion sensors. This added spectrum also functions without the Dynamic Frequency Selection (DFS) radar detection requirements that complicate 5 GHz deployments.

More non-overlapping channels enhance network performance, boost concurrent connection capacity, reduce congestion in dense areas, and improve wireless reliability. This benefits newer 6 GHz devices directly and indirectly aids legacy 2.4/5 GHz devices by alleviating competition on older bands, ultimately contributing to a more efficient and responsive wireless ecosystem.

Wi-Fi 7 builds upon these advancements, offering enhanced capabilities and performance optimization across the 6 GHz spectrum, marking a significant step forward in wireless technology adoption and implementation.

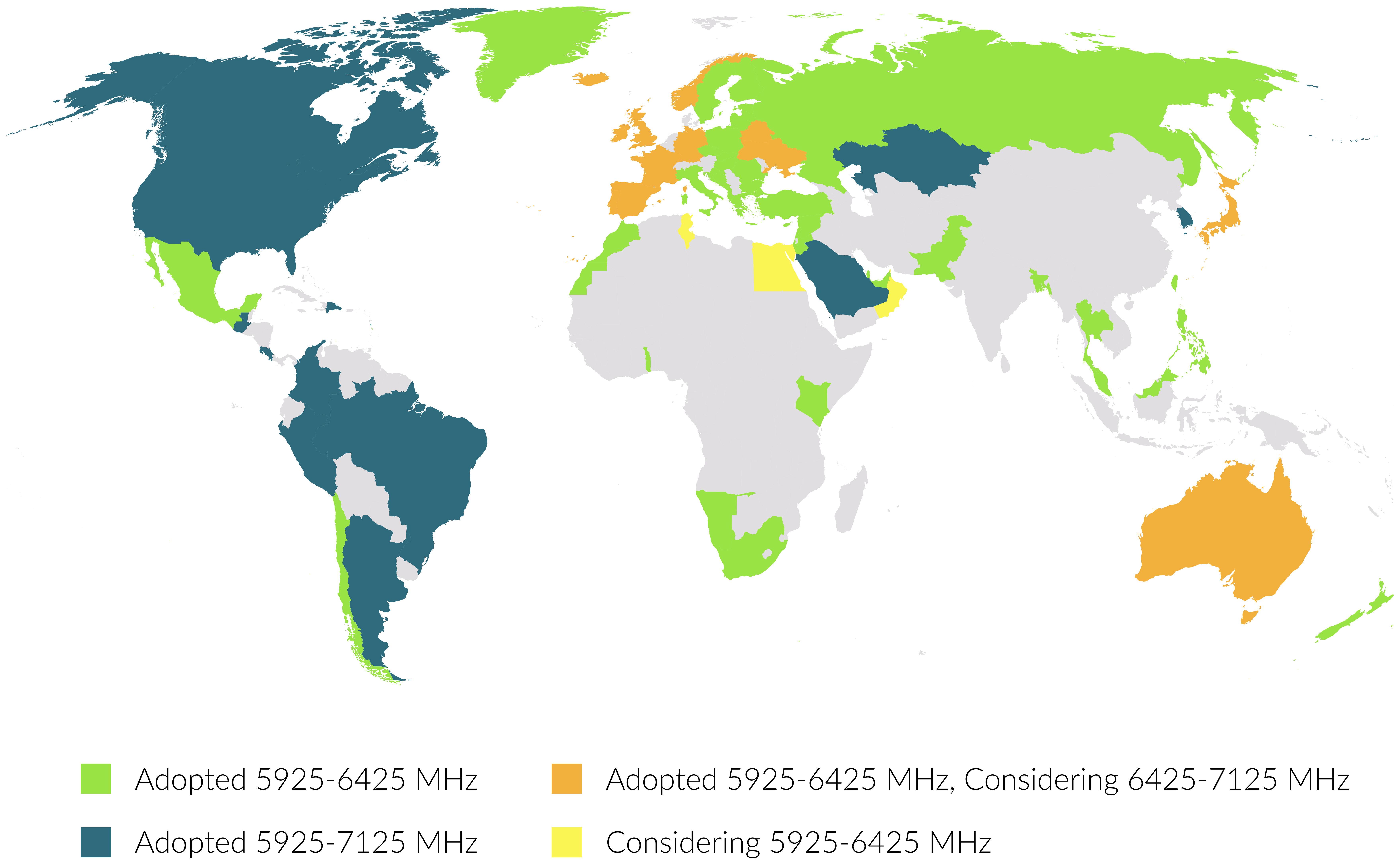


Spectrum Availability by Region

National regulators control spectrum, reserving bands for military and government use, licensing portions to private companies like mobile operators, and designating unlicensed bands. Wi-Fi operates in an unlicensed spectrum, where anyone can transmit following established rules.

As the Wi-Fi industry has advocated for 6 GHz adoption, progress has varied by region. For example, much of the Americas have made the full 1.2 GHz of spectrum available for Wi-Fi use, while many European countries have allocated 500 MHz of spectrum. This means there are now an additional 59 or 25 non-overlapping 20 MHz-wide channels for many organizations across the world.

For regions where the 6 GHz spectrum is not yet available, Wi-Fi 7 still delivers significant performance improvements through advanced features like Multi-Link Operation, 4K QAM, and enhanced channel utilization. These technological advancements enable faster speeds, lower latency, and improved network efficiency across existing 2.4 GHz and 5 GHz bands.



Spectrum Interference in Wi-Fi

Wi-Fi signals face constant challenges from an invisible enemy: spectrum interference, which comes from a surprising array of common household and office sources. Interference can severely impact network performance, making it difficult to send and receive data wirelessly.

Interference comes in two major flavors:
Wi-Fi interference and Non-Wi-Fi interference.

Wi-Fi Interference: When APs operate on the same or adjacent frequencies, you can get what is called Co-Channel Interference/Contention, Adjacent Channel Interference, or Primary/Secondary overlapping basic service set (OBSS). All three reduce or disable your ability to send and receive data wirelessly.

External non-Wi-Fi Interference: These are the interference effects from unrelated radio networks operating on the unlicensed band, such as microwave ovens, baby monitors, Bluetooth devices, etc. Fortunately, Wi-Fi 7's 6 GHz band is currently relatively free from non-Wi-Fi interference. Most current interferers like microwaves and Bluetooth operate in lower bands, making 6 GHz an ideal environment for high-performance Wi-Fi 7 networks.

When it comes to Wi-Fi interference, choosing the right Wi-Fi tools is critical. To combat Wi-Fi and non-Wi-Fi interference across all three Wi-Fi bands effectively, the Sidekick 2's high-resolution spectrum analyzer, combined with the Ekahau Analyzer app, transforms your mobile device into a specialized "Wi-Fi-vision." This powerful tool enables you to visualize the invisible spectrum, pinpoint sources of interference, and resolve issues impacting your network.

Whether you're deploying a new network or troubleshooting existing ones, the Sidekick 2's spectrum analysis capabilities provide invaluable insights across all Wi-Fi bands, ensuring reliable, high-performance connectivity in even the most challenging environments.

Legacy Devices: Compatibility, Congestion, and Performance

Are you worried if your legacy devices will still work with a Wi-Fi 7 network? Don't fret, Wi-Fi 7 is backward compatible, meaning a newer generation of Wi-Fi access points can still connect and function with older Wi-Fi devices, even if they use a different standard.

When organizations deploy Wi-Fi 7 infrastructure, devices using previous Wi-Fi standards automatically connect using their supported protocols and frequencies. This seamless integration ensures business continuity during network and device upgrades.

The 2.4 GHz band remains particularly crucial for legacy support, as many essential devices are limited to this frequency. Common examples include IoT devices like thermostats, door locks, and various sensors. Additionally, medical and industrial equipment like warehouse scanners often remain on 2.4 GHz due to lengthy upgrade cycles and certification requirements. To address these limitations, network administrators frequently create dedicated 2.4 GHz SSIDs and must continue to factor 2.4 GHz coverage into their wireless network designs.

While legacy devices cannot access Wi-Fi 7's new 6 GHz band, they still benefit indirectly. As newer devices shift to 6 GHz, network congestion decreases in the 2.4 and 5 GHz bands. It's like opening a brand-new expressway: the latest devices take the faster, less crowded route, leaving more room on the older lanes for legacy devices to operate, ultimately creating a win-win situation for all clients.

Channel Widths

Wi-Fi standards define channels within the 2.4, 5, and 6 GHz frequency bands, standardized at 20 MHz wide. These channels can be bonded together to create wider channels. For example, two adjacent 20 MHz channels can combine to form a 40 MHz channel, and so forth.

Channel width selection remains crucial for network design, whether using static channel plans or dynamic assignment algorithms. Wider channels offer higher throughput but require careful planning to avoid interference and ensure optimal performance.

Wi-Fi 7 supports channel bonding up to 320 MHz – combining sixteen 20 MHz channels! This unprecedented channel width enables the standard's remarkable speed capabilities, supporting theoretical maximum data rate of up to 46 Gbps.

While these ultra-wide channels showcase Wi-Fi 7's capabilities, practical deployments require different approaches. The 6 GHz band offers varying amounts of non-overlapping 320 MHz channels across regions – three in the U.S. and just one in the EU. Given these constraints, network admins should typically opt for 80 MHz channels where throughput demands are high, and 20 MHz widths in high-density environments to balance performance with capacity needs and minimize channel contention.

Channel Availability in the 2.4 GHz Wi-Fi Band
3 non-overlapping 20 MHz channels

Maximum Channel Width in Wi-Fi 7
320 MHz bonded channels

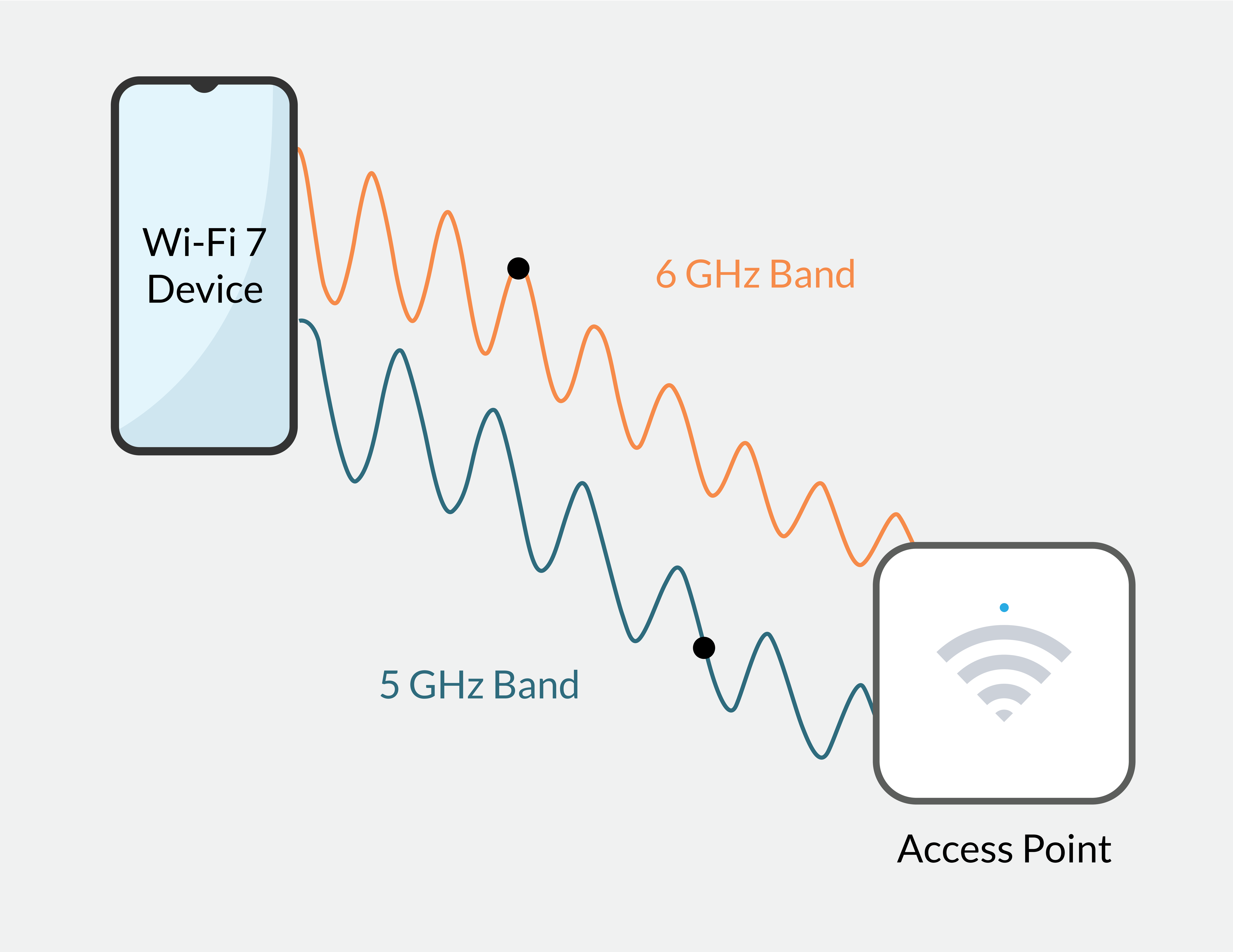
Multi-Link Operation

Multi-Link Operation (MLO) is a key innovation in Wi-Fi 7 that allows devices to maintain simultaneous connections across multiple frequency bands. Instead of being restricted to a single channel at a time, a Wi-Fi 7 device can actively communicate across multiple links – for example, using both 5 GHz and 6 GHz bands concurrently and dynamically switching between them based on network conditions.

This allows for faster and more efficient data transmission, especially in dense Wi-Fi environments where traditional single-channel operation may cause congestion.

In enterprise environments, MLO provides several benefits:

- Higher aggregate throughput by using multiple frequency bands simultaneously
- Better reliability through link redundancy
- Reduced latency by choosing the cleanest available channel for each transmission
- Improved performance in dense deployments where single-band operation often faces congestion



4K QAM Modulation

Before Wi-Fi signals can travel through the air as radio waves, the data must be converted into a suitable format for transmission. That's where modulation comes in—by combining changes in signal strength (amplitude) and timing (phase), modulation determines how efficiently data can be packed into each radio wave transmission, using methods ranging from basic to highly sophisticated.

Wi-Fi 7 introduces 4K QAM (Quadrature Amplitude Modulation), a significant advancement in encoding efficiency. By precisely controlling both amplitude and phase, 4K QAM packs 12 bits into each symbol (a single unit of digital communication), compared to Wi-Fi 6's 1024-QAM at 10 bits. This 20% improvement in data density enables unprecedented network speeds.

Think of this technology like you're packing a suitcase. Modulation has evolved from tossing in a couple of crumpled sweaters (basic encoding) to neatly folded clothing (better encoding) to vacuum-sealed compression bags (4K QAM). Same suitcase, but WAY more stuff!

Spectrum Puncturing

Imagine your Wi-Fi network operates on an 80 MHz wide channel, providing high-speed connectivity to all users. Suddenly, a neighboring device begins transmitting on a 20 MHz segment within your channel, causing interference. In traditional setups, your network's response would depend on its management system.

With a static channel plan, this interference would lead to persistent performance issues—high packet loss, increased latency, and reduced throughput—until manual intervention occurs to change the channel or adjust the channel width.

In a setup with a wireless LAN controller utilizing dynamic channel management, the system would detect the interference over several scan cycles. Depending on the controller's configuration, this detection could take from several seconds to a few minutes. Once identified, the controller might decide to reduce the channel width or switch to a different channel entirely. This change, while mitigating interference, would cause a brief service interruption as clients reconnect. For someone on a video call, this interruption could result in dropped audio or frozen video, disrupting the communication experience.

Enter spectrum puncturing in Wi-Fi 7. When interference is detected within the 80 MHz channel, a Wi-Fi 7 access point can 'puncture' the affected 20 MHz segment, effectively excluding it from use. The AP and Wi-Fi 7-compatible clients continue communication over the remaining 60 MHz of clean spectrum without any service interruption. This seamless adaptation ensures that high-priority applications, like video calls, proceed without a hitch.

However, it's crucial to note that for spectrum puncturing to be effective, both the AP and the client device must support Wi-Fi 7. Legacy clients, such as those using Wi-Fi 5, do not support this feature. In mixed environments where Wi-Fi 7 APs serve older clients, the AP may need to revert to narrower channels to maintain compatibility, potentially reducing performance for those devices.

Security - WPA3 Explained

WPA3 adds significant security improvements through enhanced encryption and authentication methods. While WPA3 is mandatory for 6 GHz operation, this requirement won't impact legacy devices—the backwards-compatible nature of Wi-Fi 7 ensures older devices will continue working on traditional bands with WPA2 security.

The required security level depends on the frequency band and device capabilities. Starting with Wi-Fi 6E, 6 GHz frequency operation mandates WPA3, the latest security protocol that strengthens encryption and authentication. The Wi-Fi Alliance requires all Wi-Fi 7 certified devices to support WPA3.

For personal networks, WPA3-Personal employs Simultaneous Authentication of Equals (SAE), implementing Diffie-Hellman based key exchange for stronger encryption. This prevents offline password guessing attacks and represents a significant advance over WPA2's security model.

6 GHz Wi-Fi: Enhanced Security

Open	WEP	WPA	WPA2	Enhanced Open	WPA3
Authentication: No layer 2 authentication	**Authentication:** Shared key	**Authentication:** Personal: PSK Enterprise: 802.1X	**Authentication:** Personal: PSK Enterprise: 802.1X	**Authentication:** No layer 2 authentication	**Authentication:** Personal: SAE Enterprise: 802.1X
Encryption: No layer 2 encryption	**Encryption:** RC4	**Encryption:** TKIP/RC4	**Encryption:** CCMP/AES (default) TKIP/RC4 (optional)	**Encryption:** Opportunistic Wireless Encryption (OWE)	**Encryption:** CCMP/AES GCMP/AES
Commonly used to provide guest access in conjunction with a captive portal.		TKIP was designed as a temporary fix for WEP Only 802.11 a/b/g data rates supported (max data rate 54 Mbps)	Always use CCMP/AES if you can as it fixes vulnerabilities and shortcomings of TKIP/RC4	Used to create encrypted Guest networks	Protected Management Frames mandatory
	Broken **Do Not Use**	**Superseded** **Do Not Use**		**Mandatory in 6 GHz**	**Mandatory in 6 GHz**

Deployments benefit from WPA3-Enterprise, which mandates Management Frame Protection and offers optional 192-bit military-grade encryption. This builds upon WPA2-Enterprise's foundation while adding critical security enhancements required for modern corporate networks. Management Frame Protection (MFP), also known as Protected Management Frames (PMF), is a Wi-Fi security feature designed to safeguard management frames from being forged or tampered with.

Automated Frequency Coordination for Standard Power Access Points

While the 6 GHz frequency band is newly unlicensed for Wi-Fi, it’s still being used by previously licensed services, like fixed satellite systems. To ensure existing licensed users can safely share the airwaves with new Wi-Fi 6E deployments, the Federal Communications Commission (FCC) introduced Automated Frequency Coordination (AFC) as a radiofrequency traffic control system that prevents interference.

Standard Power (SP) devices, which operate at higher power up to 36 dBm and are used in outdoor or large indoor spaces, rely on AFC to avoid interference. Standard Power APs must determine their exact location (via GPS or similar methods) and send their 3D position (including antenna height) to an AFC system. The AFC then checks its database of incumbent users and assigns clean, interference-free channels for the Standard Power AP to use. Without AFC approval, Standard Power devices cannot transmit, ensuring the incumbents remain protected.

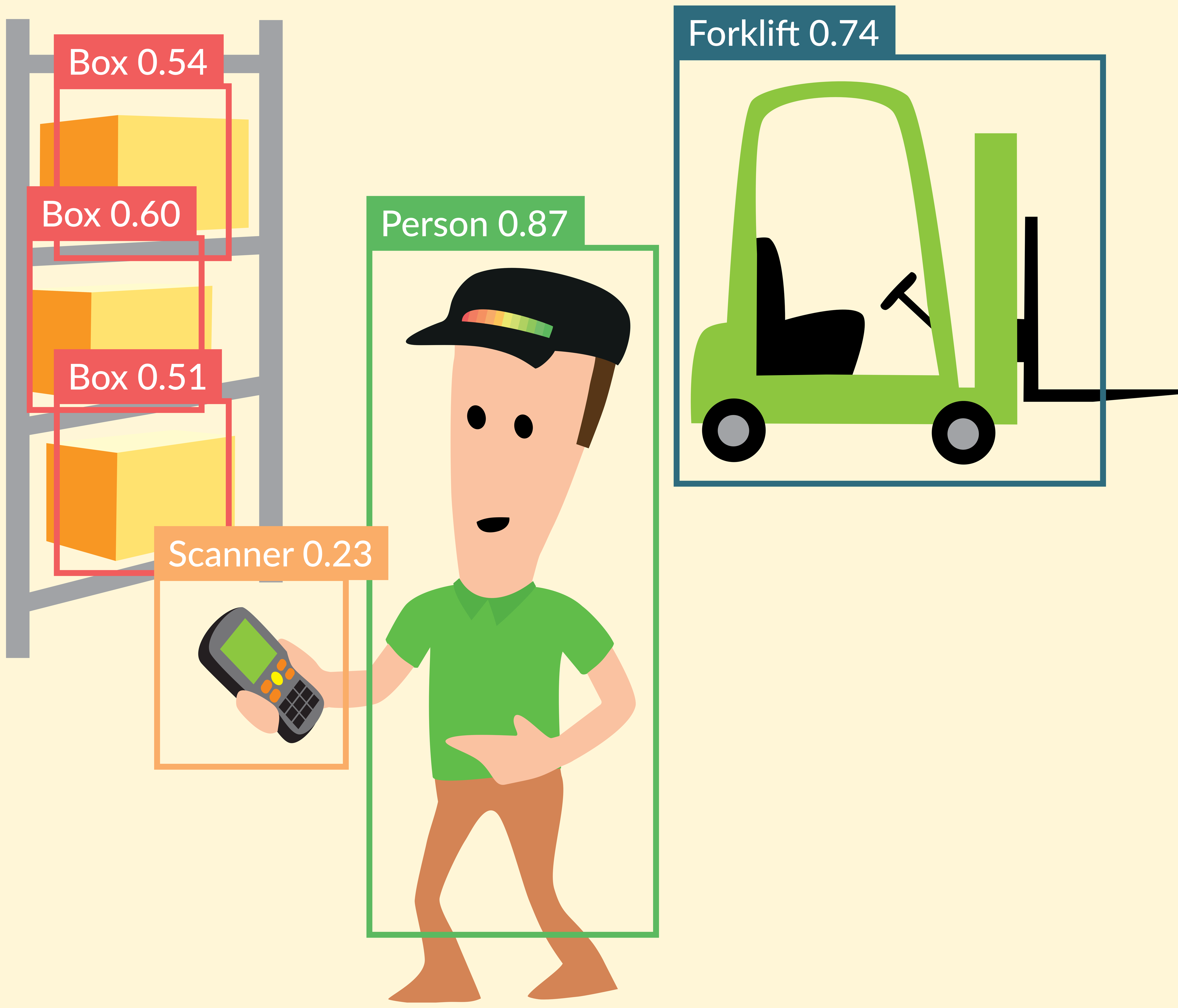
In contrast, Low Power Indoor (LPI) and Very Low Power (VLP) devices do not require AFC. LPI devices are restricted to indoor use at lower power levels, minimizing interference by design. They can access all 6 GHz channels but must stay in fixed locations and avoid mobile deployments like vehicles or boats. Meanwhile, VLP devices operate at the quietest power levels, ideal for short-range IoT and mobile applications. These devices are flexible, requiring neither fixed locations nor AFC approval, making them versatile for specialized, low-impact tasks.

Use-Case: AI

AI is a rapidly growing field with increasingly complex computational demands, particularly for tasks involving large datasets, real-time processing, and machine learning. Wi-Fi 7's ultra-fast speeds, extremely low latency, and high reliability make it uniquely suited to support these demanding AI workloads.

Many AI applications, such as computer vision, natural language processing, and autonomous systems, require transferring large volumes of data with minimal latency. For example, computer vision systems, which allow computers to analyze and understand visual information, often need to process hundreds of high-resolution images per second. A single manufacturing line using AI-powered quality control cameras might generate hundreds of gigabytes of visual data daily, all of which need to be analyzed in real time to catch defects.

Equally demanding on network resources is Natural Language Processing (NLP), which enables computers to understand, interpret, and generate human language. Applications include voice assistants, chatbots, sentiment analysis, text summarization, and language translation. Wi-Fi 7's high-speed, low-latency connectivity is crucial for wireless NLP tasks that require processing large language datasets, real-time speech recognition, and interactive conversational AI.



Use-Case: AR/VR

Immersive technologies like augmented reality (AR) or virtual reality (VR) require exceptional network performance to deliver seamless and responsive experiences. Wi-Fi 7's advanced features are well-suited to meet the demands of AR and VR applications, offering high bandwidth for high-resolution visuals and ultra-low latency for interactivity and better responsiveness.

While the consumer AR and VR markets are still maturing, businesses across various industries have already begun aggressively adopting these technologies for practical applications. In employee training, VR is used to simulate complex tasks and environments, allowing workers to learn safely and efficiently. Industries like healthcare use VR for surgical simulations while manufacturing leverages VR for equipment training and process simulations.

Augmented reality is transforming on-site maintenance and repair work by overlaying real-time data on equipment, enabling technicians to diagnose and fix problems faster and more accurately. In the automotive and aerospace industries, AR assists workers on assembly lines by providing step-by-step visual instructions, improving precision, and reducing errors. These applications require continuous, high-speed data transmission, making Wi-Fi 7 an ideal connectivity solution.

As these technologies continue to evolve, Wi-Fi 7's scalability and advanced features ensure that industries can meet the growing demand for high-performance, immersive experiences. From training simulations to real-time collaboration, Wi-Fi 7 will provide a robust foundation for the next generation of AR and VR applications, enabling businesses to deploy these solutions with confidence and efficiency.

Use-Case: Robotics and Automation

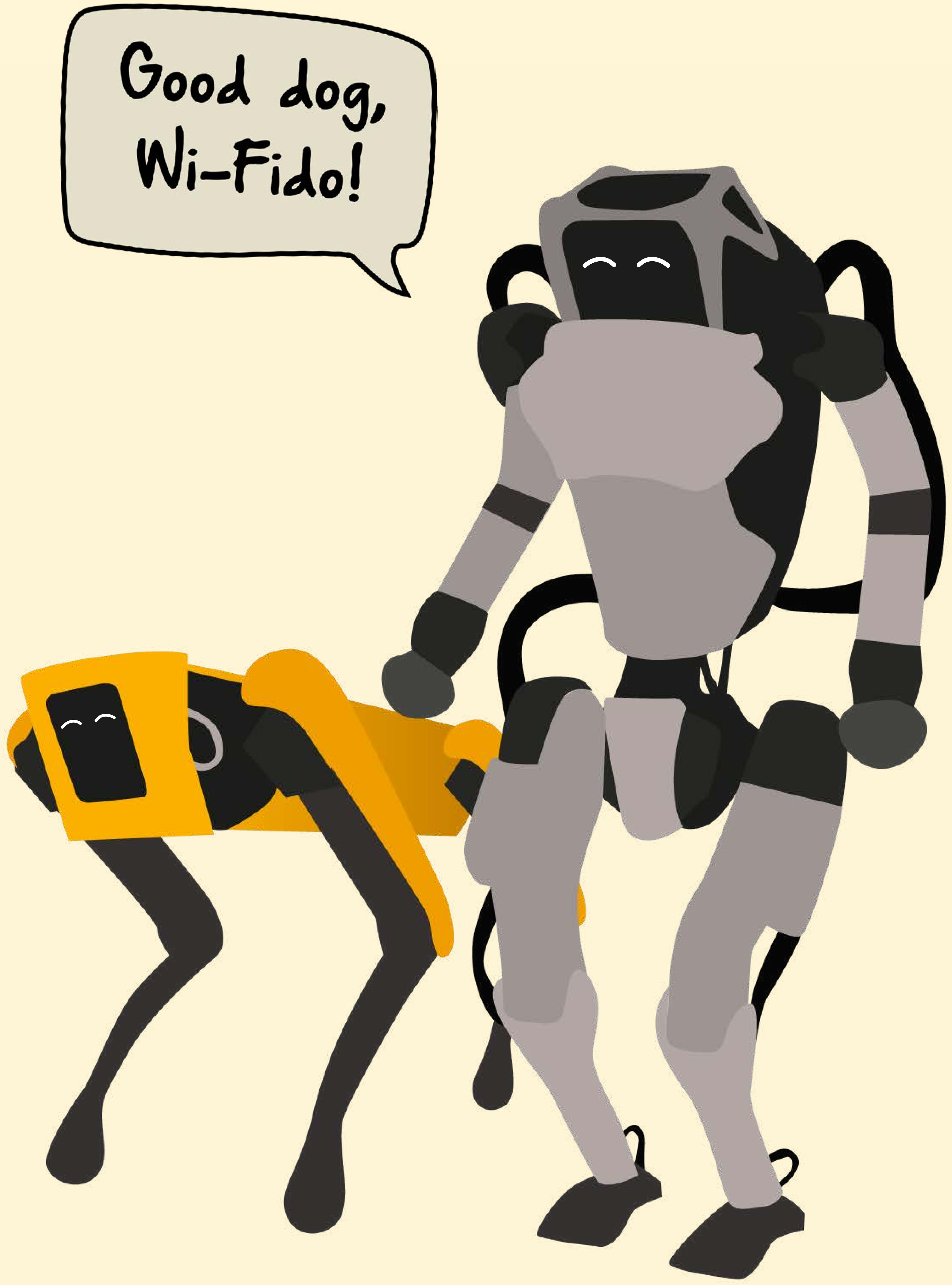
Robotics and automation are transforming industries, with wireless connectivity serving as the backbone for control, coordination, and real-time data exchange. While previous generations of Wi-Fi struggled to meet the demanding requirements of industrial robotics and automation, Wi-Fi 7 offers a breakthrough solution that delivers the ultra-low latency, high reliability, and flexibility needed for these complex environments. This enables real-time control, coordination, and data exchange across automated systems.

Wi-Fi 7 enhances throughput and quality of service (QoS) through its wide channel availability, multi-link operation, 4096-QAM modulation, and spectrum puncturing. These features are particularly valuable for industrial robotics, enabling reliable communication in dynamic settings.

In industrial environments, Wi-Fi 7 facilitates real-time sharing of sensor data, video feeds, and 3D maps. It also enhances coordination for applications like collaborative robotic arms and autonomous mobile robots (AMRs). Its low-latency and high-throughput capabilities are critical for seamless operation.

Wi-Fi 7 supports the massive data flow needed for autonomous robots to navigate safely and identify issues in real time: High-resolution camera feeds and LIDAR sensor data can be transmitted efficiently, ensuring AMRs can operate reliably in dynamic environments.

By integrating wired connections for fixed components with Wi-Fi 7 for mobile elements, industrial robotics achieve a balance of speed, mobility, and reliability. Wi-Fi 7 provides a scalable, future-proof connectivity foundation, empowering organizations to confidently deploy next-generation robotic systems.



Evaluating your Current Network Infrastructure

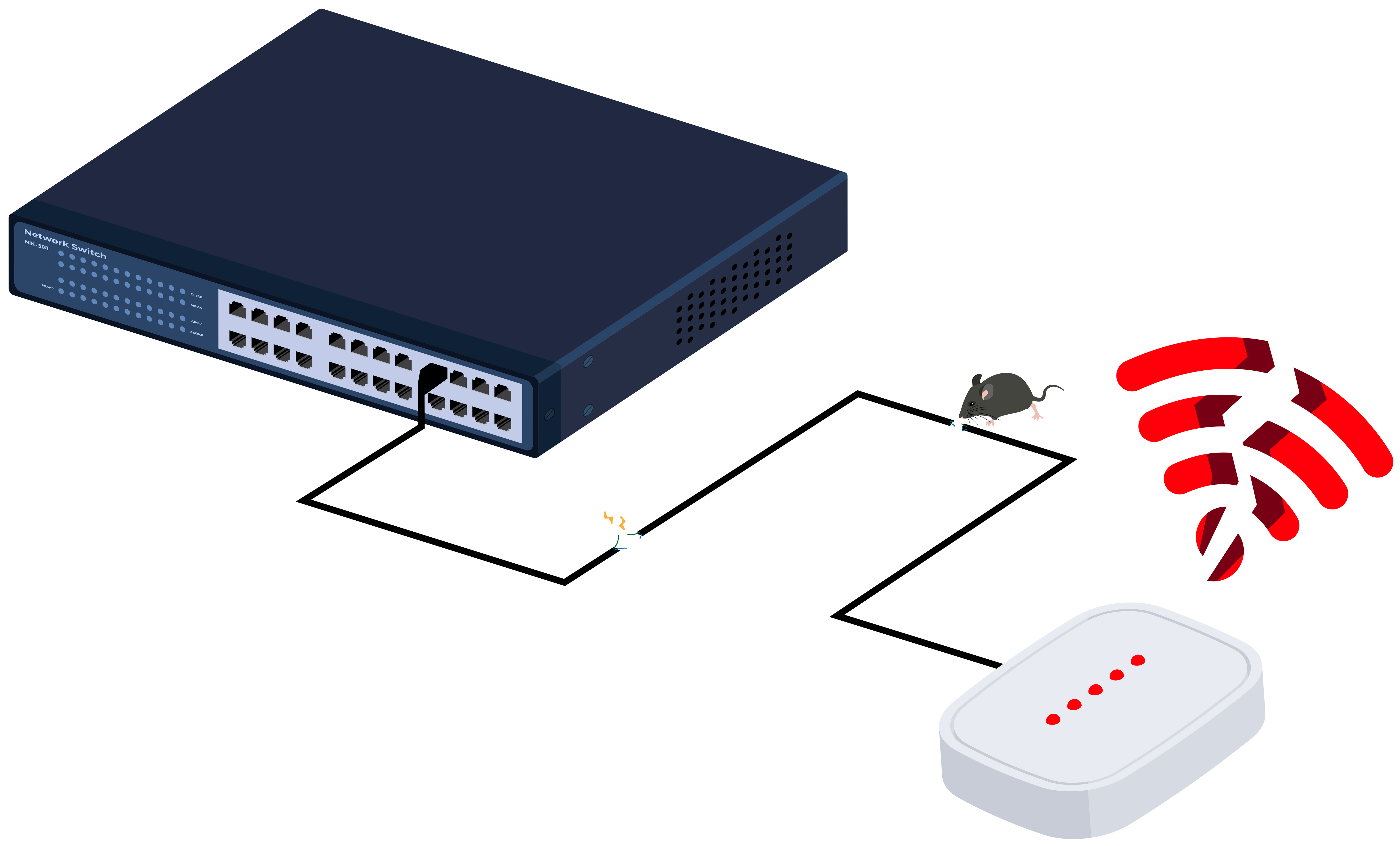
Upgrading to Wi-Fi 7 isn't just about replacing access points—it requires a strategic assessment of your entire network infrastructure to ensure optimal performance. Every component, from your ISP connection to your access points, plays a critical role in delivering the seamless, high-performance connectivity that Wi-Fi 7 promises. In this next section, we'll walk through the components of your network infrastructure and make sure they're Wi-Fi 7 ready.

Bottleneck Prevention

Before upgrading to Wi-Fi 7, it's crucial to evaluate your entire network infrastructure. While Wi-Fi 7 introduces transformative capabilities, those benefits can only be realized if your entire network path supports the increased throughput and lower latency demands. A single bottleneck—whether at your ISP, cabling, or hardware—can undermine the performance gains of this cutting-edge technology.

Start with a comprehensive audit of your network. Trace the path of data from your internet service provider (ISP) to your access points, identifying potential weak links along the way. Common bottlenecks include:

- **ISP Bandwidth:** Ensure your enterprise's internet plan can handle the increased data rates that Wi-Fi 7 enables. If your throughput requirements exceed your ISP's capacity, upgrading to a higher-speed service is critical.
- **Routers and Firewalls:** Many legacy devices lack the processing power or port speed to handle the high data rates Wi-Fi 7 enables. Evaluate their specifications to ensure they're optimized for multigigabit performance.
- **Switches:** For wired backbone connections, verify if your switches are multigigabit-capable. Standard Gigabit Ethernet switches may not meet the increased demands of modern workloads.
- **Cabling:** The physical cables connecting your devices are often overlooked. Older Cat5e cables, for example, may cap out at 1 Gbps. Upgrading to Cat6a or higher ensures you're ready for multigigabit speeds.



Wi-Fi 7 Cabling Requirements

Wi-Fi may free us from the clutter of cables at the user level, but behind every seamless wireless experience lies an intricate web of Ethernet cables and switches making it all possible.

When planning for next-generation technologies like Wi-Fi 7, it's tempting to only focus on installing cutting-edge access points. But at the heart of any network lies a critical, often-overlooked component: the Ethernet cable. These cables carry both data and—through Power over Ethernet (PoE)—electricity to devices like wireless access points, cameras, and IoT systems.

While upgrading your access points to Wi-Fi 7 is an essential step, it's important to understand their increased infrastructure requirements. Wi-Fi 7 access points are significantly more powerful than previous generations, with multiple radios, advanced signal processing, and IoT or edge computing capabilities. These improvements increase both power and bandwidth demands, making PoE++ (802.3bt) essential. Older cabling like Cat 5 or Cat 6 does not support these higher power needs, necessitating an upgrade to Cat 6a or higher, which can increase network upgrade costs.

Wi-Fi 7 access points often require up to 51 watts of power, particularly when USB ports or additional radios are in use.

Cable Category	Link Class International	Max Speed	Max Distance (at Max Speed)	Power Capability	Release Year
Cat 5	Class D	100 Mbps	100 meters	PoE	1995
Cat 5e	Class D	1 Gbps	100 meters	PoE	1998
Cat 6	Class E	1 Gbps (10 Gbps*)	100 meters (55 meters*)	PoE/PoE+	1999
Cat 6a	Class E	10 Gbps	100 meters	PoE/PoE++	2001
Cat 7	Class F	10 Gbps	100 meters	PoE/PoE+/PoE++	2002
Cat 8	Cat 8.1 Class 1 Cat 8.2 Class 2	25-40 Gbps	30 meters	PoE/PoE+/PoE++	2015

While some vendors' devices may operate with lower power (e.g., 30W, achievable with PoE+), this involves disabling features like USB ports or reducing radio capabilities. For full functionality, PoE++ is required.

Understanding these power requirements is crucial for planning your deployment—underestimating them could force you to either compromise on Wi-Fi 7's advanced features or undertake costly power infrastructure upgrades after installation.

Planning Your Wi-Fi 7 Upgrade

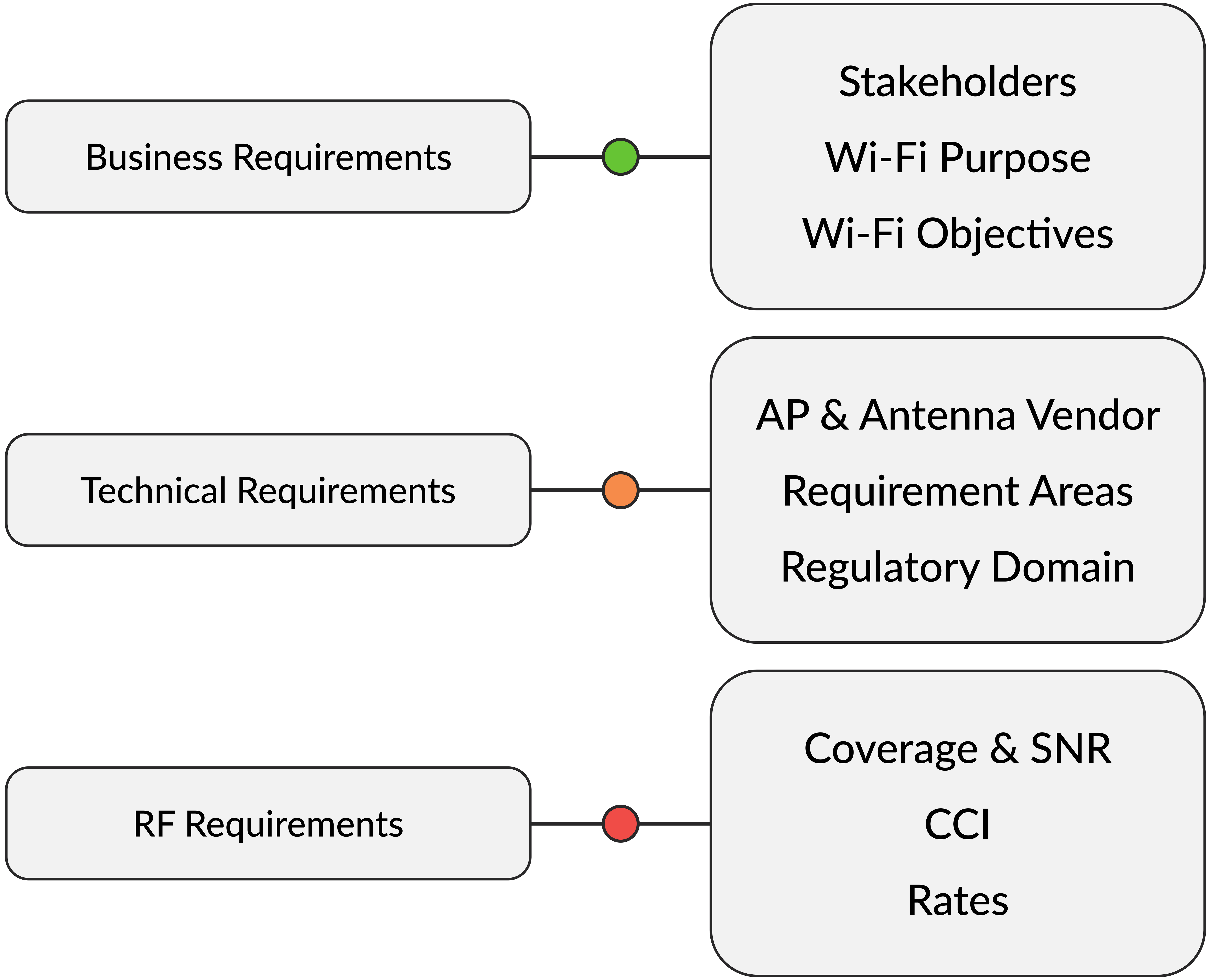
We'll walk you through planning a seamless Wi-Fi 7 upgrade. You'll learn how to assess network requirements, survey existing networks, analyze the RF environment, design an optimal new network, and determine if a rip-and-replace will suffice or if you'll need a complete redesign. We'll share best practices for deployment and discuss how to validate and optimize performance post-rollout.

Defining Network Requirements

The first step to achieving high-performing Wi-Fi is accurately defining your network requirements. Wi-Fi design is the process of taking your business's requirements for Wi-Fi connectivity and turning them into a plan for a high-performing and reliable network. It's the translation of your business needs—how many devices need Wi-Fi (capacity) and where they need it (coverage)—into a deployment plan detailing how many access points you'll need, where they need to be installed, and how they should be configured in order to satisfy the demands of your users.

Network design choices can vary significantly based on the applications and number/types of devices the Wi-Fi needs to serve, as well as the unique architecture of buildings.

By accurately defining your network requirements first, you can create a Wi-Fi 7 network that maximizes the latest technologies while ensuring reliable coverage and capacity. Using Ekahau's Wi-Fi planning tools, you can then translate these requirements into detailed network designs, using either industry-standard presets or custom configurations that ensure your deployment will meet your organization's specific needs.



Importance of Visualization Tools

Wi-Fi's invisible nature makes visualization tools incredibly important to understanding your network performance. These tools use Wi-Fi heatmaps, a visual representation of your wireless signal coverage and strength. Wi-Fi heatmaps are generally overlaid on top of a building or facility floor plan to help give network owners a clear idea of either their proposed network design or collected survey data.

By visualizing performance metrics like primary and secondary signal strength (measured in dBm), channel overlap between Access Points, and Signal-to-Noise Ratio (SNR), IT pros can quickly identify coverage gaps, interference zones, and other network issues without having to manually analyze raw network data. When based on actual survey data, these heatmaps show real-world performance across the environment; when used in predictive modeling, they illustrate expected coverage patterns and potential problem areas.

Existing Network? Start with a Wi-Fi Survey

Before investing in Wi-Fi 7 hardware, it's essential to understand how wireless signals behave in your space. Start with a Wi-Fi survey - this critical first step will help you map out coverage patterns, identify interference sources, and locate dead zones. When you have a clear understanding of how Wi-Fi behaves in your specific environment, you can ensure your upgrade will produce a high-performing network.

A Wi-Fi survey with the Sidekick 2 takes thousands of measurements of your Wi-Fi network—capturing signal strength, interference patterns, and network configurations throughout your space. The Sidekick 2 listens for beacons transmitted by all enabled radios inside the access points and identifies their precise locations and characteristics so you can visualize your invisible Wi-Fi network through heatmaps.

Heatmaps aren't just about seeing your current network performance. Through our patent-pending AI propagation model in our software, the Sidekick 2's precise measurements create a digital model of your environment, allowing you to visualize and validate different upgrade scenarios before making any changes.

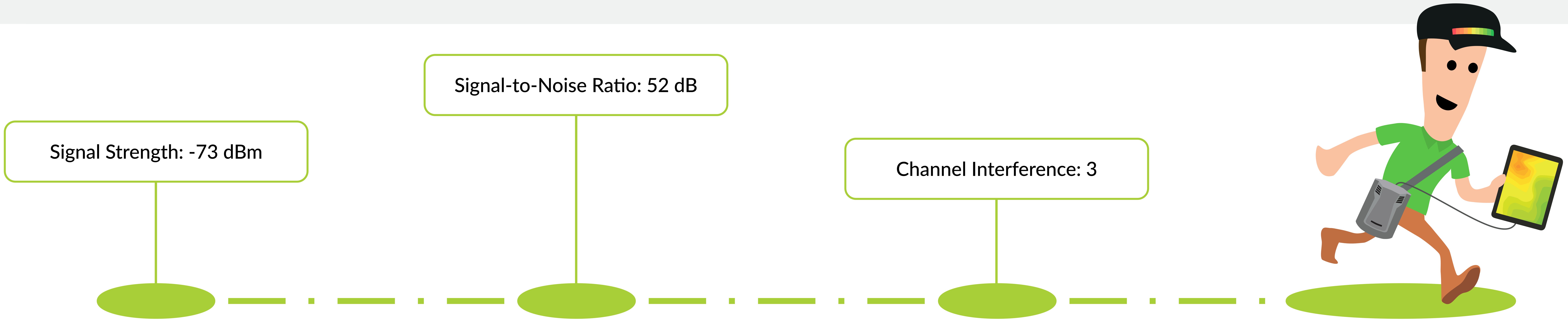
Stop & Go
Stop, collect, move, and repeat. Collects the least amount of data.

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.



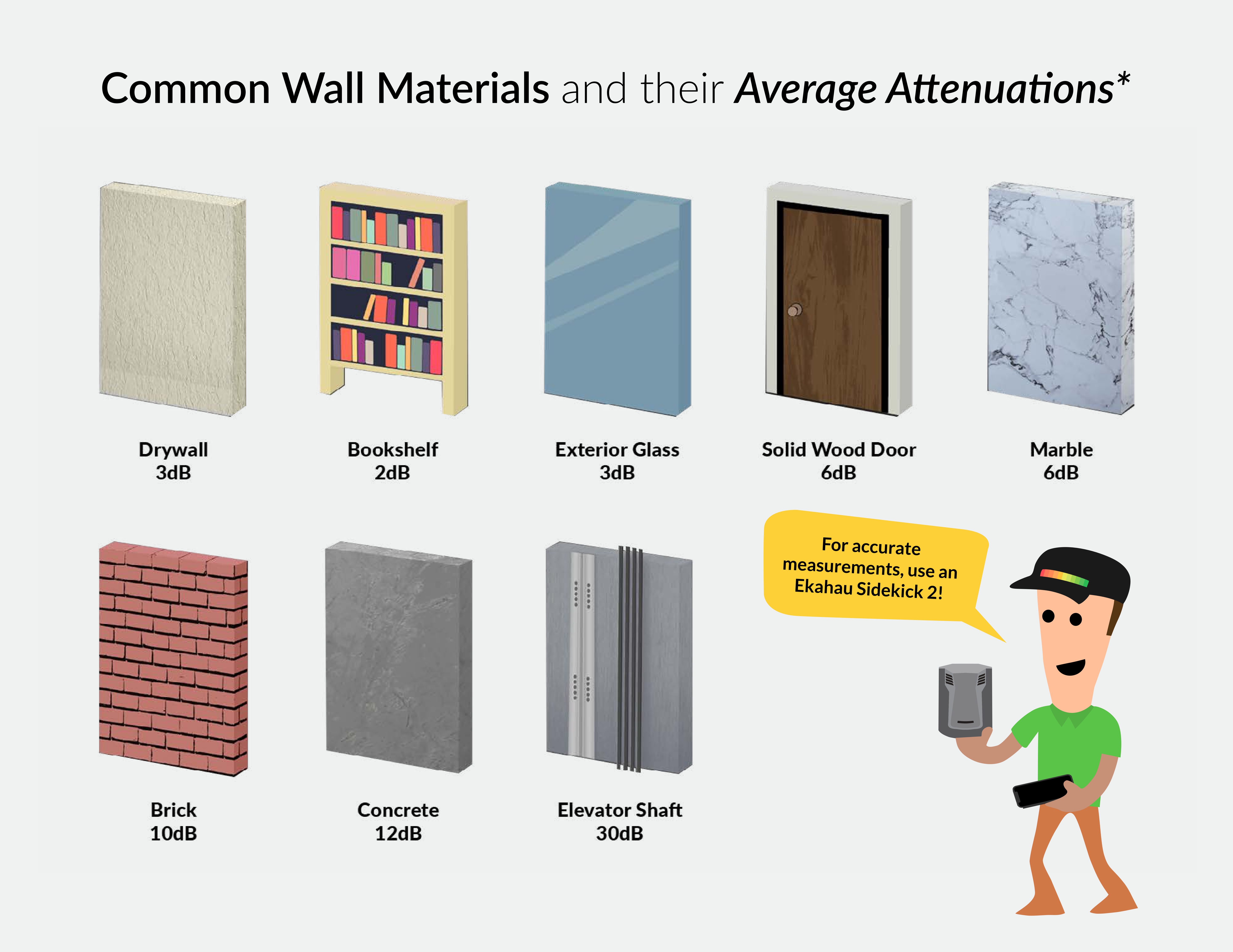
Understanding Your Network Environment

Your network environment is as unique as a fingerprint. There are two key factors that make your network environment unique: your physical space and the RF (radio frequency) conditions within it. That's why it's usually impossible to determine a rule of thumb for the number of APs needed in a given space without understanding the nuances of your environment.

First, let's talk about the physical environment. Every wall, pillar, and object attenuates (weakens) Wi-Fi signals passing through them. Drywall typically reduces signal strength by around 3dB, while large concrete pillars can stop Wi-Fi dead in its tracks! Understanding the layout and materials in your space is crucial for designing a network that delivers reliable coverage.

But it's not just about what's inside your walls. Neighboring wireless networks, radar activity, motion sensors, and even your office microwave can all create RF interference that compromises your Wi-Fi performance.

That's where the Sidekick 2 and AI Pro Online comes in. A survey with the Sidekick 2 measures the RF environment, and Ekahau AI Pro Online creates a comprehensive digital model of your space, taking into account both the physical layout and the RF characteristics. Instead of relying on one-size-fits-all assumptions, you get data-driven insights tailored to your unique environment. With this foundation in place, you can confidently plan a Wi-Fi 7 network that delivers the speed, reliability, and coverage your organization needs to thrive.

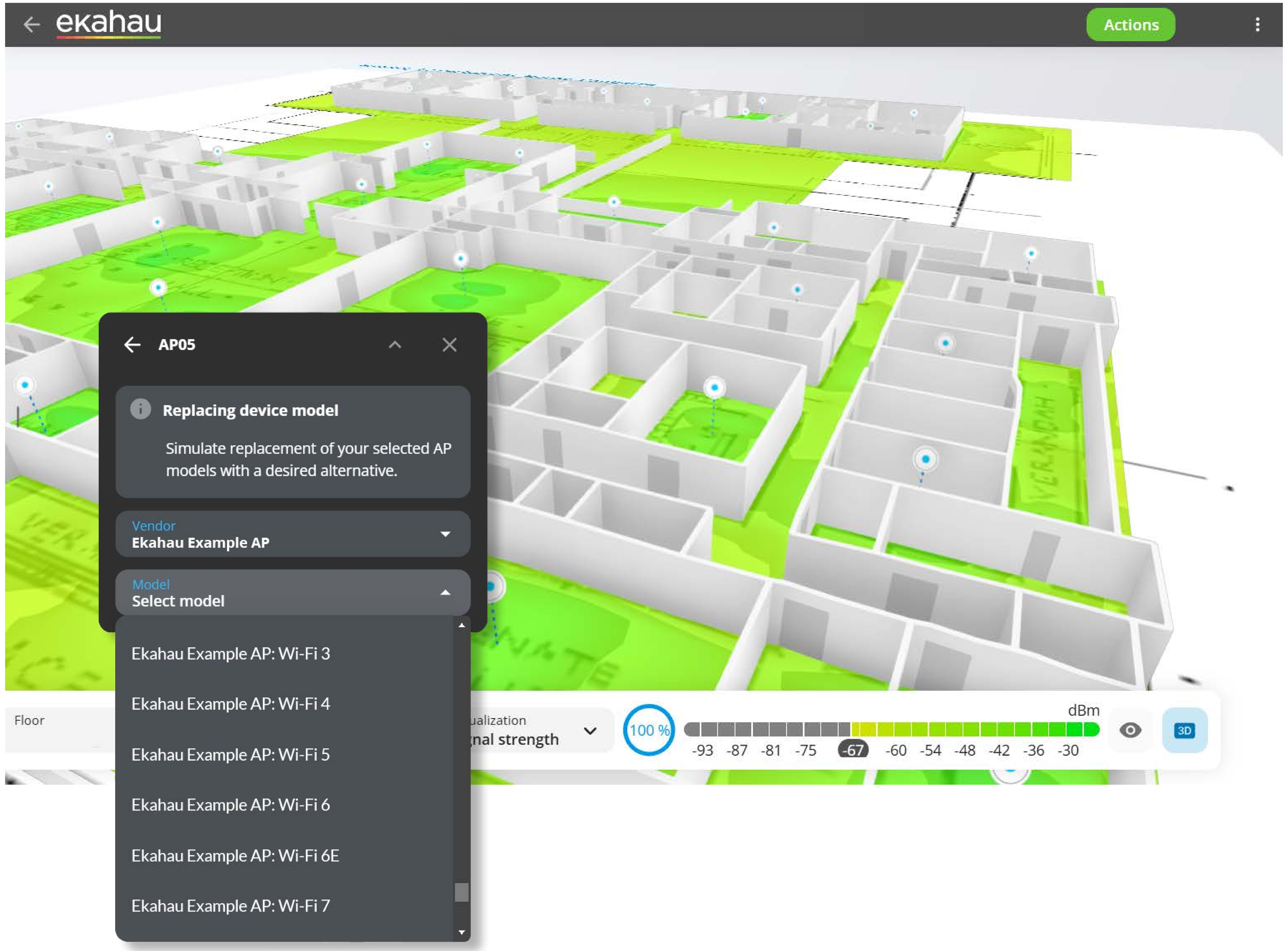


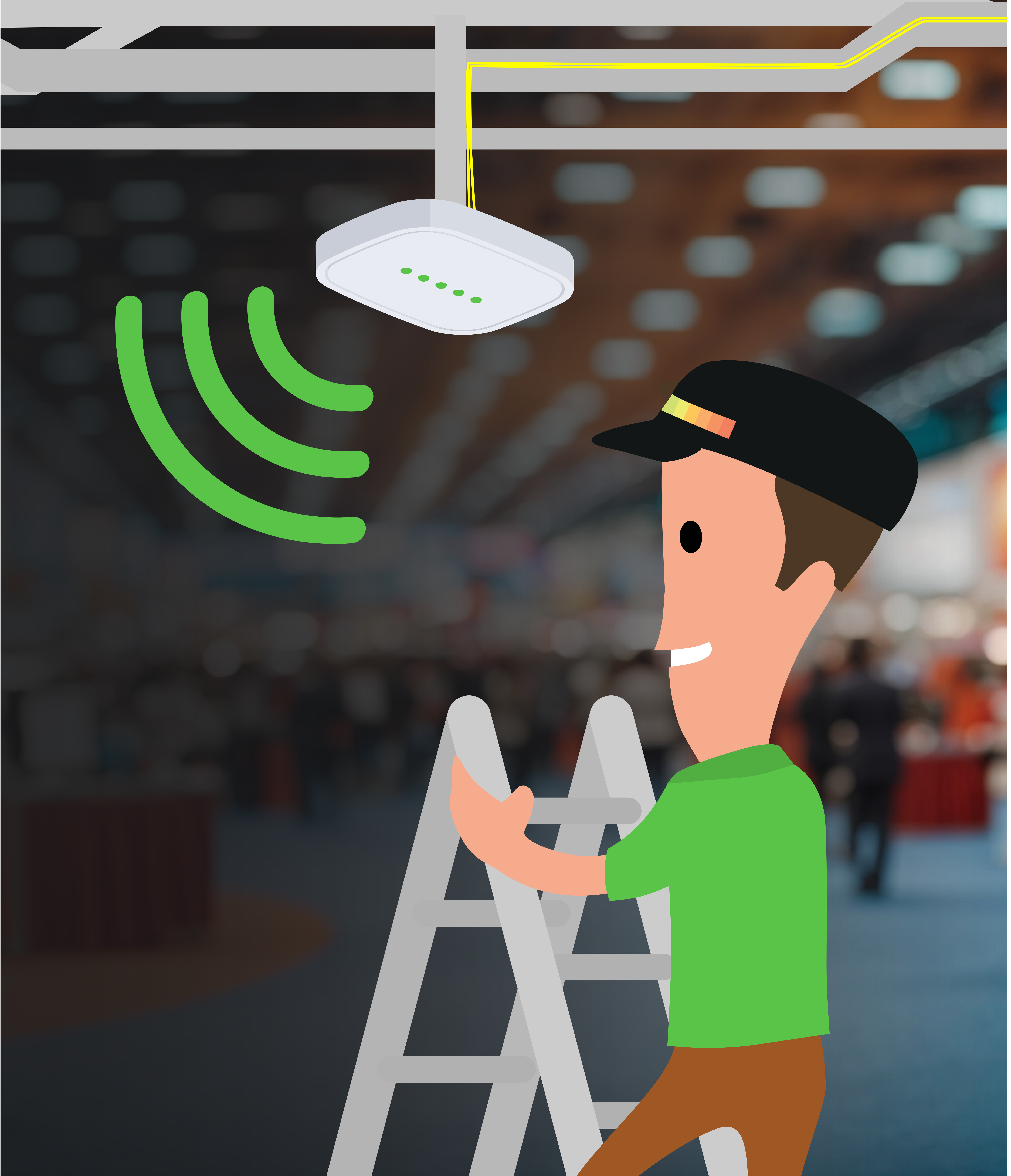
Visualize Rip-And-Replace Scenarios

Once you have a clear understanding of your network environment through a Sidekick 2 survey, it's time to explore Wi-Fi 7 upgrade options. In the world of network upgrades, a "rip-and-replace" scenario is exactly what it sounds like: removing your existing access points and replacing them with new ones in the same locations.

Ekahau AI Pro Online makes it easy to evaluate whether a simple rip-and-replace will deliver the performance you need. After uploading your survey data to AI Pro Online, select the APs discovered during the survey and replace them with your desired Wi-Fi 7 access point models to visualize the expected network performance of the new APs. You'll see detailed heatmaps and performance metrics, allowing you to assess if the rip-and-replace approach will meet your network requirements. Even if your network is only capable of 2.4 / 5 GHz, Ekahau can predict and visualize how 6 GHz and Wi-Fi 7 will perform in your environment.

Armed with these insights, you can make an informed decision about your upgrade path. If the rip-and-replace scenario looks promising, you can move forward with your network refresh with confidence. However, if the performance doesn't quite meet your expectations, it's worth exploring alternative upgrade strategies to ensure your Wi-Fi 7 network delivers the results your organization demands.





Network Redesign

While a rip-and-replace upgrade can often deliver significant performance improvements (and is much simpler to implement), there are times when a more comprehensive redesign approach is needed. If you've inherited a network with suboptimal AP placements, need to add capacity to keep up with growing demand, or simply want to maximize the ROI of your Wi-Fi 7 investment, a full network redesign with new AP placements may be the way to go.

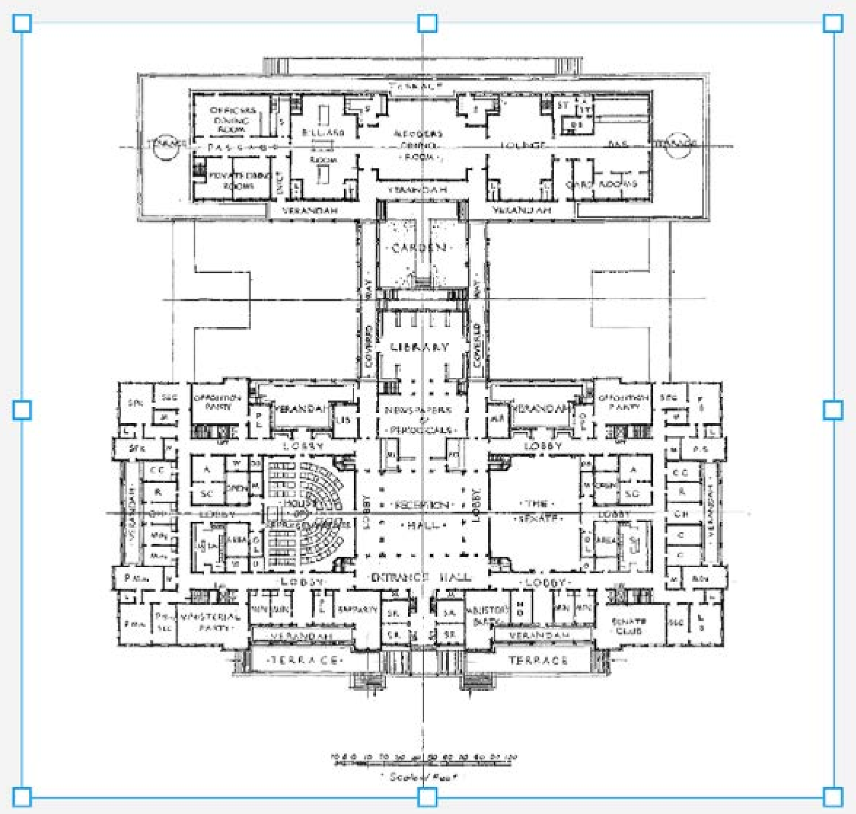
The good news is that a full redesign doesn't always mean starting from scratch. In many cases, you can combine some rip-and-replace tactics with moving a few APs or adding new ones to achieve your performance goals. It's all about finding the right balance for your unique environment and requirements.

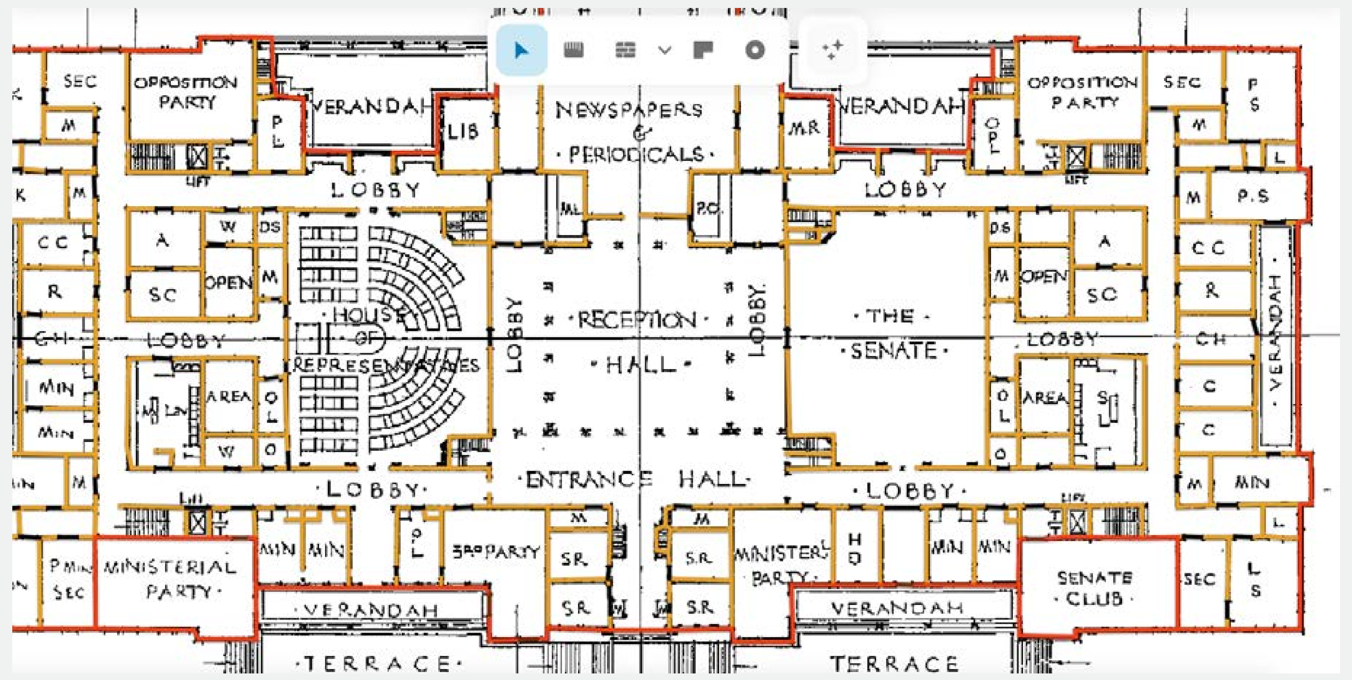
If you're already planning to re-cable your network as part of your Wi-Fi 7 upgrade, it's the perfect opportunity to critically evaluate your AP placements. After all, you're already investing time and resources into the project—why not make sure your new network is optimized for peak performance?

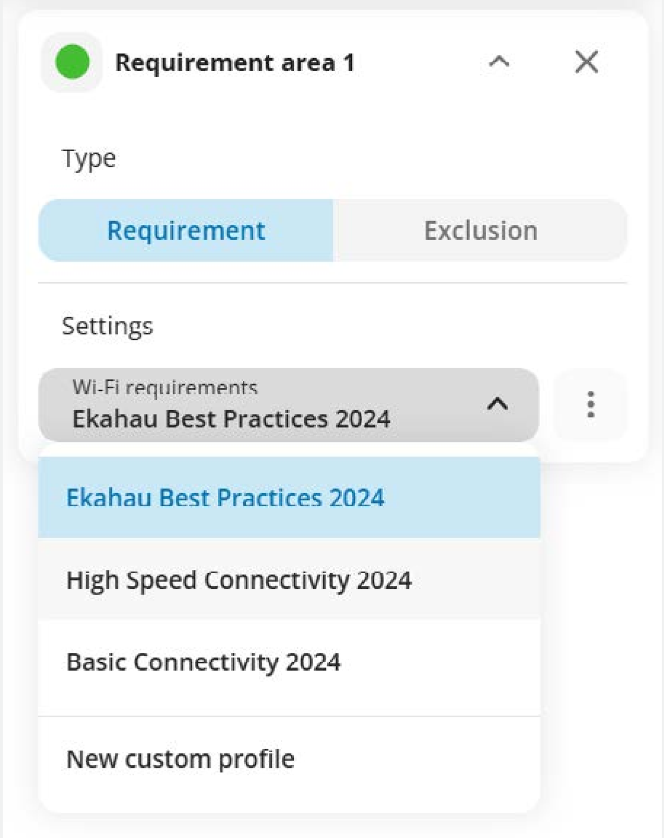
Whether you opt for a full redesign, a rip-and-replace, or a combination of both, the key is to approach your Wi-Fi 7 upgrade with a strategic mindset. By taking the time to assess your current network, define your performance goals, and explore your options, you can unlock the full potential of this game-changing technology and create a network that exceeds your expectations.

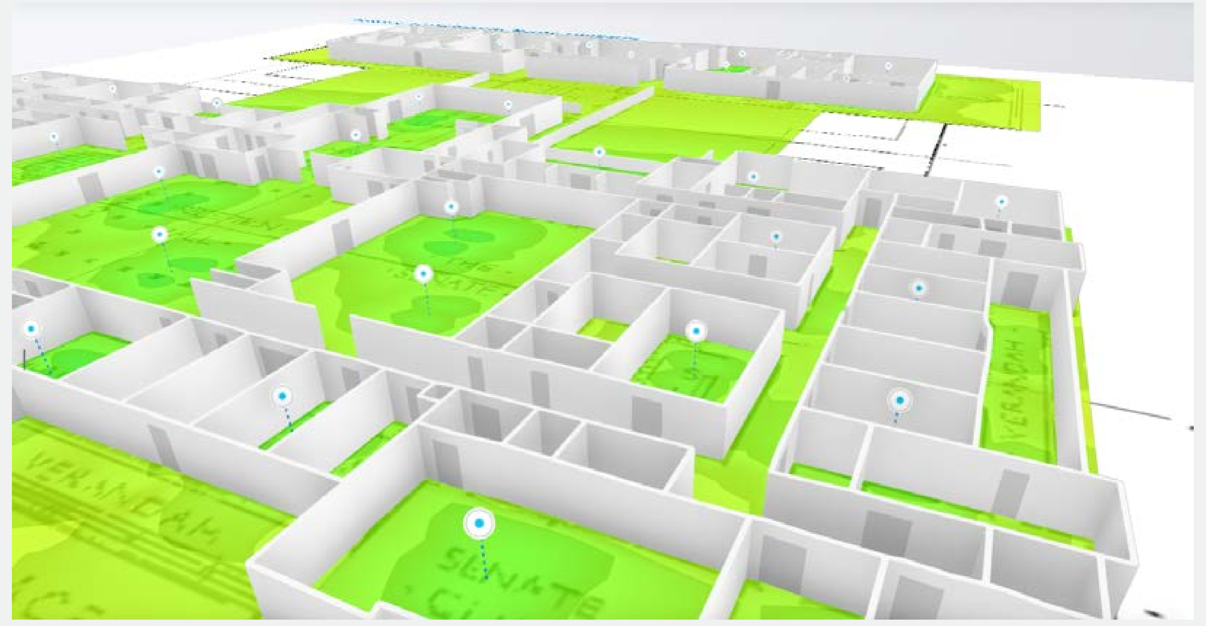
Designing a New Network Based on Floor Plans

We've covered how to evaluate and upgrade existing networks, including using the Ekahau Sidekick 2 for comprehensive site surveys. However, there are times when site surveys simply aren't feasible. Maybe you're designing a network for a new building that hasn't been constructed yet, or perhaps you don't have access to the site for a physical survey. For these scenarios, you can still design an effective Wi-Fi 7 network with Ekahau! Here's how:









1. **Upload your floor plan:** Start by importing your building's floor plans into Ekahau AI Pro Online. Whether you have CAD files, bitmap images like .pngs or .jpgs, or PDFs, the software can handle it all.

2. **Automatically draw walls:** With just a few clicks, Ekahau AI Pro Online can automatically detect and draw walls based on your floor plan. You can also manually adjust wall heights and attenuation to get as close to an accurate model of your environment as possible.

3. **Define your requirements:** Next, specify your network's performance requirements — what level of connectivity do you need in each given area? Choose from either predefined best practices within AI Pro Online or customize your connectivity requirements to meet your specific needs. Ekahau AI Pro Online will use this information to guide the design process.

4. **Place APs with Assisted Planning:** Assisted Planner, a feature of AI Pro Online, automatically suggests optimal AP locations and dynamically adjusts recommendations as you place each AP—or you can place all recommended APs instant ly with one click.

Deployment Tips

After carefully planning your Wi-Fi 7 network, the next challenge is turning that design into reality. Even the best-designed Wi-Fi 7 network can stumble during deployment if you don't follow key installation practices. Here are critical considerations to ensure your rollout goes smoothly:

Plan Your Downtime Strategically

Network upgrades inevitably require some system downtime. Work with stakeholders to identify maintenance windows that minimize disruption to business operations. Consider phasing your deployment across different areas or departments if a complete system shutdown isn't feasible. Remember: a well-planned hour of downtime is better than rushed work that leads to issues later.

Be Precise with Physical AP Placement

The physical placement of your APs can make or break network performance. Avoid installing APs under HVAC ducts, which can create significant signal interference and impact coverage patterns. However, sometimes real-world constraints force changes to your planned AP locations. When this happens, update your predictive model to ensure these adjustments won't create coverage issues or affect the overall network design. Stay flexible, but verify that any deviation from the original plan won't compromise your network's performance.

Document Your Deployment

Use the Ekahau Survey app to photograph and note each AP installation—these records prove invaluable for future maintenance, troubleshooting, or when onboarding new IT team members. This documentation not only helps with ongoing network management but also provides crucial reference points for your next critical step: network validation. Once your APs are mounted and powered up, it's time to verify and document that your carefully planned network is performing exactly as designed.

Network Validation

So your new Wi-Fi 7 APs are installed—time to go home, right? WRONG! It's time to validate that your network is working as designed. Network validation is a crucial final step in any wireless network deployment or upgrade, particularly for new technologies like Wi-Fi 7. Rather than assuming everything works perfectly after installation, a validation survey (by walking your site with the Sidekick 2) verifies that the network performs according to the original design specifications and requirements.

For upgrades specifically, validation ensures you're getting those promised performance improvements while providing concrete data to verify your return on investment. It helps catch everything from misplaced APs to configuration issues that could impact speed, capacity, and reliability. Plus, it establishes a solid performance baseline for future reference and the final step: optimization.

Network Optimization

Think of optimization as the other side of the validation coin: where validation shows you how your network is performing, optimization helps you maximize its performance through fine-tuning controller configurations.

Using Ekahau Optimizer, you can transform your validation survey data into actionable improvements. The software analyzes comprehensive measurements from the Sidekick 2 to pinpoint exactly what changes will have the biggest impact on your network's performance.

What used to require hours of manual analysis can now be identified in minutes. Whether you're a seasoned Wi-Fi pro or new to network tuning, Optimizer translates complex data into clear, actionable improvements for your network performance and security.

Our networks are constantly changing, so the work doesn't just stop after you validate and optimize your network. Whether adding new people, client devices, or applications to your network, it's critical to keep up to date with those changes to ensure the network you've designed and deployed isn't falling behind your evolving requirements. For a detailed explanation into Wi-Fi Optimization, read our comprehensive ebook, the **Wi-Fi Performance and Security Playbook**.

Performance Management

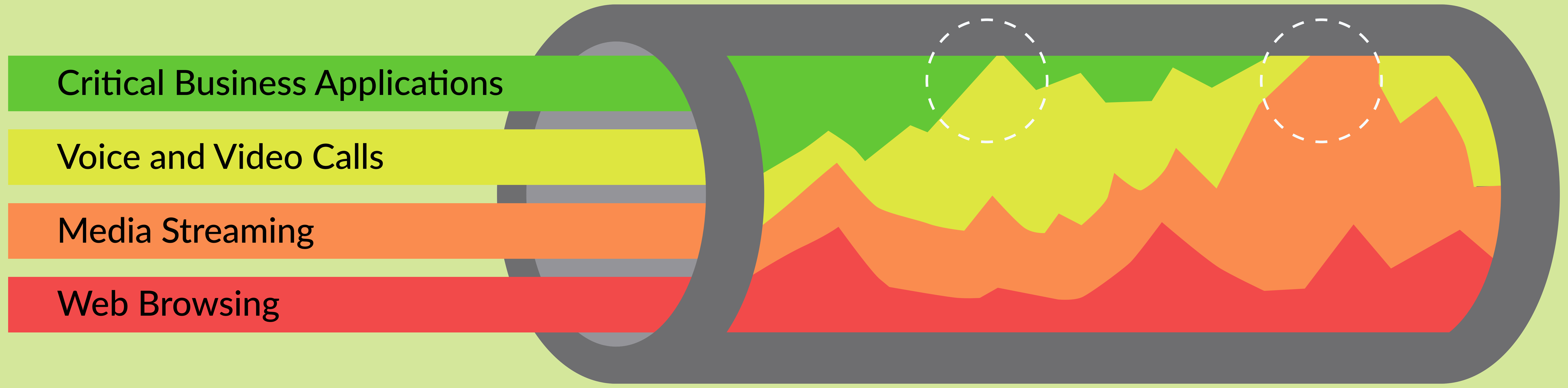
Installing your Wi-Fi 7 network is just the beginning—now you need to ensure it consistently delivers the performance your applications demand. While having a well-designed Wi-Fi 7 network is crucial, managing network traffic effectively is equally important. Quality of Service (QoS) plays a vital role in ensuring your critical applications get the bandwidth they need when they need it.

Without QoS, it's every application for itself—the bandwidth needed for your crucial business applications can become overrun by someone's streaming video. Critical services can get bogged down when network congestion hits, leading to dropped video calls or laggy application performance.

With QoS properly configured, you create dedicated lanes for different types of traffic. Critical business applications get an express lane, while voice and video calls get priority over media streaming and general web browsing. This hierarchical approach ensures that when bandwidth gets tight, your most important applications maintain their performance.

In Wi-Fi 7 networks, implementing effective QoS becomes even more crucial as higher speeds and lower latency capabilities allow more demanding applications to coexist on your network. While not bulletproof, by properly configuring QoS policies, you can better ensure your network not only delivers blazing speeds but also maintains reliable performance for all your critical services.

Bandwidth without QoS



Bandwidth with QoS

> *Without QoS, it's like giving someone the keys to a Ferrari - they can't resist going 100 miles an hour down the highway. We recently increased our network speed at remote offices, and immediately everyone maxed it out with Netflix and video streaming. Give people more bandwidth, and they'll use every bit of it. That's why having a strong QoS policy from the start is crucial. It will save you down the line.*

Kevin Nanns
Network Engineer, Hillsborough County

Conclusion

Moving to Wi-Fi 7 isn't just a network upgrade—it's a critical investment in keeping your organization from falling behind. With its unprecedented speeds, improved reliability, and enhanced security features, Wi-Fi 7 provides the foundation needed for everything from everyday operations to the most demanding next-generation applications like AI, AR/VR, and advanced automation.

However, achieving these benefits requires more than just installing new access points. Success demands a strategic approach: evaluating your infrastructure, understanding your requirements, and following proven practices for design, deployment, validation, and optimization. By taking the time to properly plan and implement your Wi-Fi 7 migration, you ensure your network not only meets today's needs but is ready for tomorrow's challenges.

Remember: a successful wireless network is never truly "finished"—it evolves alongside your organization's changing needs. Through regular monitoring, validation surveys, and optimization, you can ensure your Wi-Fi 7 network continues delivering the performance your business demands. The future of wireless is here—make sure you're ready for it.

Ready to take the next step?

Request a demo and see how Ekahau can help make your Wi-Fi 7 journey a success.

Ekahau Product Suite

Everything you need for always-great Wi-Fi

SOFTWARE

AI Pro

Powerful Wi-Fi planning and AI design for the most reliable, best performing 2.4/5/6 GHz wireless networks. Design, analyze, optimize and troubleshoot enterprise Wi-Fi networks.

One-time investment in software. Ekahau Connect Subscription required.

HARDWARE

Sidekick 2

The fastest, most precise Wi-Fi testing and measurement device, supercharged and tuned for 2.4/5/6 GHz. Walk to collect measured data to validate & optimize any wireless network.

One-time investment in hardware. Extended warranty available.

SUBSCRIPTION

Connect Subscription

- Ekahau AI Pro Online
- Optimizer Step-by-Step Configuration Guides
- Survey Mobile App Wi-Fi Health Validation
- Analyzer Mobile App Live Troubleshooting
- Insights Wi-Fi Performance Analytics
- Packet Capture
- Cloud Project Sync with Guest Sharing
- Software & Firmware Updates
- Latest AP Models & Dashboard Integrations
- Global Customer Support

Annual software maintenance and support. Sidekick 2 required to use all features.

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