



EBOOK

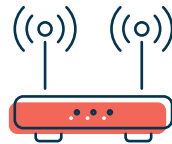
Six strategies to get the most out of Wi-Fi 6E and 6 GHz



Overview

Today's networks are limited by the available spectrum. As organizations increase their use of bandwidth-hungry video streaming, cope with increasing numbers of client and IoT devices connecting to their networks and speed up their transition to cloud, Wi-Fi congestion increases and user experience suffers.

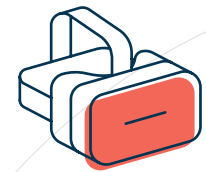
Wi-Fi 6E, an extension of the current Wi-Fi 6, helps alleviate network constraints and provides room for growth by more than doubling the available spectrum with wider channels for lower latency.



6.2B devices will connect to Wi-Fi this year¹



63% of mobile traffic is offloaded to Wi-Fi²



6x growth expected in AR/VR from 2020-2024³

1. <https://www.gartner.com/en/newsroom/press-releases/2021-04-01-gartner-forecasts-global-devices-installed-base-to-reach-6-2-billion-units-in-2021>
2. <https://www.wi-fi.org/beaton/the-beacon/wi-fi-6-shipments-to-surpass-52-billion-by-2025>
3. <https://www.idc.com/getdoc.jsp?containerId=prUS47012020>



Global adoption

Across the world, Wi-Fi 6E is becoming increasingly recognized as the next step forward in networking technologies. However, before the 6 GHz bandwidths can be used, global regulations must be approved to define the technical parameters.

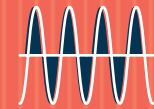
The US FCC was the first to approve the additional 1200 MHz (5925-7125 MHz) for unlicensed Wi-Fi use in the 6 GHz band and now many countries are catching on. Each country has its own approval process and may have differences with respect to the amount of spectrum assigned.

As the world prepares for Wi-Fi 6E, enterprises must look to how this new networking capacity can support their growth, as well as improve application performance and end user experience.

This guide will outline six strategies that enable you to plan your journey and future-proof your Wi-Fi investments.



Wi-Fi 6E offers:



6 GHz

More capacity in the 6 GHz band for faster performance and better user experience to help meet growing networking demands



160 MHz

Wider channels mean lower latency, ideal for high-definition video and virtual reality



Interference

No interference from legacy devices because only 6E-capable devices can use the 6 GHz band



STRATEGY 1

Maximize tri-band coverage

To maximize coverage and deliver the best possible user experience, there should be comprehensive coverage across the 2.4 GHz, 5 GHz, and 6 GHz bands. Indoor APs will primarily be tri-radio, although dual-radio with the capability to combine different radios presents another option.



Wi-Fi 6E channels*:

- ✓ 3x 20 MHz channels at 2.4 GHz often used for 2.4 GHz-only devices and IoT
- ✓ 6x 80 MHz channels at 5 GHz, including DFS channels, typically used for mainstream high-end devices
- ✓ 7x 160 MHz channels at 6 GHz reserved for the latest highest-performing devices

Wi-Fi 6E solutions will need to maximize coverage with minimal holes in the bandwidth and enable any channel combination without performance degradation. One challenge is preventing interference between the high end of the 5 GHz band and the low end of the 6 GHz band. In the US, a recent FCC decision to open indoor operation of the 5.9 GHz band has increased the risk of interference as there is only 50 MHz between the two bands.

* In countries with 1200 MHz

Approaches to resolve signal interference

If no measures are taken, co-located radios operating in the top half of the 5 GHz band simultaneously with the lower half of the 6 GHz band will interfere with each other. Transmissions from one radio will overwhelm the receiver of the adjacent radio.

APs will need hardware or software features to reduce this interference. This can be done by avoiding certain combinations of channel allocation where feasible, or by shielding and filtering between the radios. Dynamic filtering of channel allocation can better manage Wi-Fi performance with neighboring channels and may become an area of differentiation between enterprise APs.



STRATEGY 2

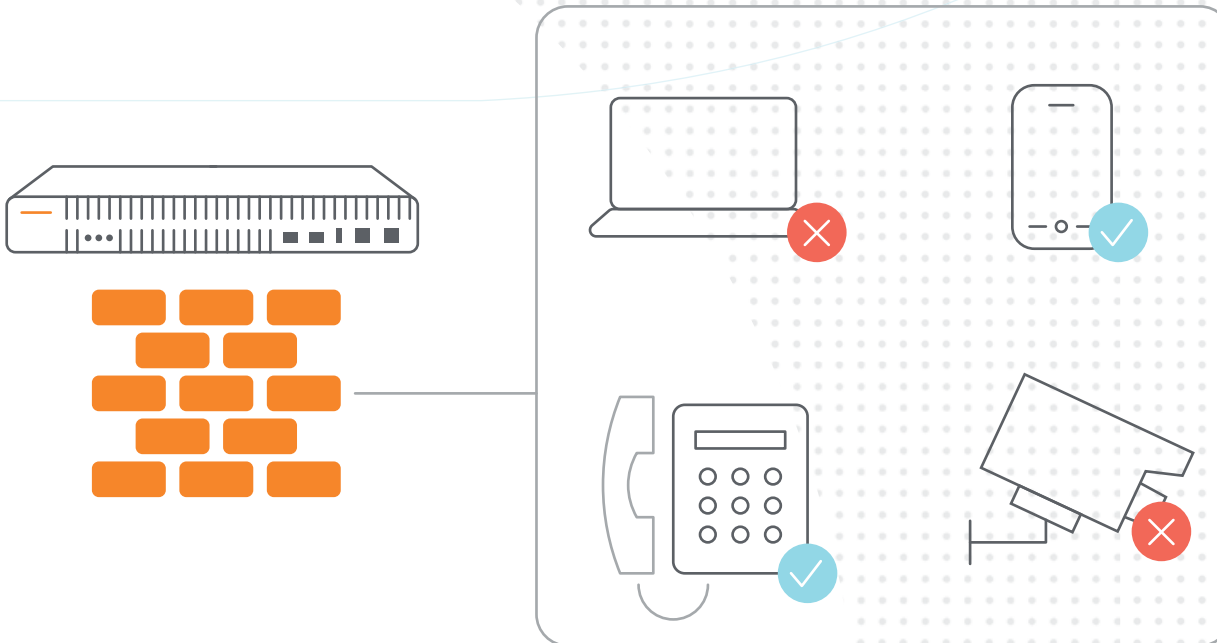
Safeguard your Wi-Fi 6E network

Hybrid workplace initiatives, IoT and edge computing are dissolving the traditional IT perimeter. Meanwhile, new security exploits crop up every day. Security should be built into Wi-Fi 6E solutions, not bolted on as an after-thought.

All certified Wi-Fi 6E solutions include WPA3 and Enhanced Open for stronger encryption and authentication to protect user passwords and data on guest networks.

Wi-Fi solutions should also include:

- ✔ Role-based policies that replace the manual configuration of static VLANs and ACLs. These policies should define proper access privileges for employees, guests, contractors, and other groups across wired and wireless networks for dynamic segmentation
- ✔ Wireless segmentation to enable secure SSID separations without needing to deploy additional access points. For example, IoT devices and guest/visitor access can be configured and managed to meet specific security requirements
- ✔ Integrated policy enforcement firewall to classify thousands of applications and provide granular, per application traffic enforcement
- ✔ Device profiling to automatically categorize all devices using deep packet inspection to track usage, understand behavior, and inform IT of the right policies





STRATEGY 3

Optimize for user experience

An average of 10 hours per week is spent by network engineers resolving Wi-Fi problems¹. To combat this, Wi-Fi 6E solutions are incorporating advanced analytics and AIOps to improve the user experience.

According to recent surveys, 30% of enterprises will adopt AI-enabled tools to augment traditional monitoring approaches by 2023, up from 2% in 2018². Why? The use of AIOps improves operator efficiency by automatically identifying network, security and performance issues using data models trained with AI and machine learning.

With AIOps, telemetry gathered from wireless networks can be used to proactively solve issues before they affect end users and business performance. AIOps can suggest solutions using a cloud-based management console.

Key Wi-Fi optimization techniques include:

- ✓ RF management automation to support growth in client density and data volumes using machine learning
- ✓ Built-in filtering to minimize the impact of interference from cellular networks, distributed antenna systems (DAS), and commercial small cell or femtocell equipment
- ✓ Client optimization to improve the experience for roaming mobile users
- ✓ Application assurance to dynamically adjust radio resources and help guarantee stringent application performance service level agreements
- ✓ Improved cellular handoffs leveraging the technical foundations of Passpoint[®] and Wi-Fi Calling to automatically and securely authenticate guests
- ✓ AI-powered automation to surface and diagnose issues using dynamic baselining, peer comparisons, and anomaly detection

1. ZK Research, Wi-Fi Troubleshooting Study, 2019

2. Gartner, "Use AIOps for a Data-Driven Approach to Improve Insights from IT Operations Monitoring Tools," May 11, 2020





STRATEGY 4

Determine if infrastructure upgrade is needed

As with any new technology, it's important to understand how it fits into your existing environment. In most cases, it will be possible to deploy Wi-Fi 6E with the existing infrastructure, allowing for upgrades at a later point.

Power requirements

Most enterprise-class Wi-Fi 6 APs will include three radios, increasing power requirements. Depending on the features, the power demands will likely be at the upper end of PoE+ (802.3at class 4). Edge switch power supplies should be sufficient for most Wi-Fi 6E APs. If necessary, even high-end Wi-Fi 6E access points should be flexible enough to operate with limited power supplies and capabilities should be configurable to enable/disable based on available power.

Backhaul requirements

Enterprise-class 6E access points are likely to include two Ethernet ports and be able to fall back to a single link for redundancy. These Ethernet ports will be capable of 802.3bz (Smart Rate) operation at 1, 2.5, and perhaps 5 Gbps. Real-world results are expected to be in the range of what existing switching infrastructure can support.

Transmit power

Propagation losses in the 6 GHz band will be greater than 5 GHz but the difference will not be significant. Propagation and transmit power levels will be very similar to 5 GHz equipment. Network designers should not need to change their guidelines from Wi-Fi 6 to Wi-Fi 6E.





STRATEGY 5

Commit to certification and standards

In order to appropriately integrate Wi-Fi 6E into current IT infrastructures, the Wi-Fi Alliance has developed a set of standards that ensure new wireless technologies are thoroughly tested and provide full support for all new capabilities. The certification process provides peace of mind that the products meet the highest standards.

Interoperability

Wi-Fi 6E's certified status means that it has been tested with numerous configurations across multiple devices to ensure interoperability. As a result, Wi-Fi 6E will be less likely to run into interoperability issues and is backward compatible. As part of the standard, the 6 GHz band is reserved for 6E capable devices only making the band more efficient.

For Wi-Fi 6E, this includes:

- ✓ 160 MHz channels to increase bandwidth, delivering greater performance with low latency
- ✓ More efficient discovery of channels in the 6 GHz band to reduce network discovery and roaming time
- ✓ Target wake time (TWT) to significantly improve battery life in Wi-Fi devices, such as IoT*
- ✓ Orthogonal frequency division multiple access (OFDMA) to effectively share channels to increase network efficiency and lower latency in high-demand environments*
- ✓ Bi-directional multi-user, multiple-input, multiple-out (MU-MIMO), to allow APs to communicate with multiple clients simultaneously*
- ✓ WPA3 and Enhanced Open to improve security for passwords and data*



STRATEGY 6

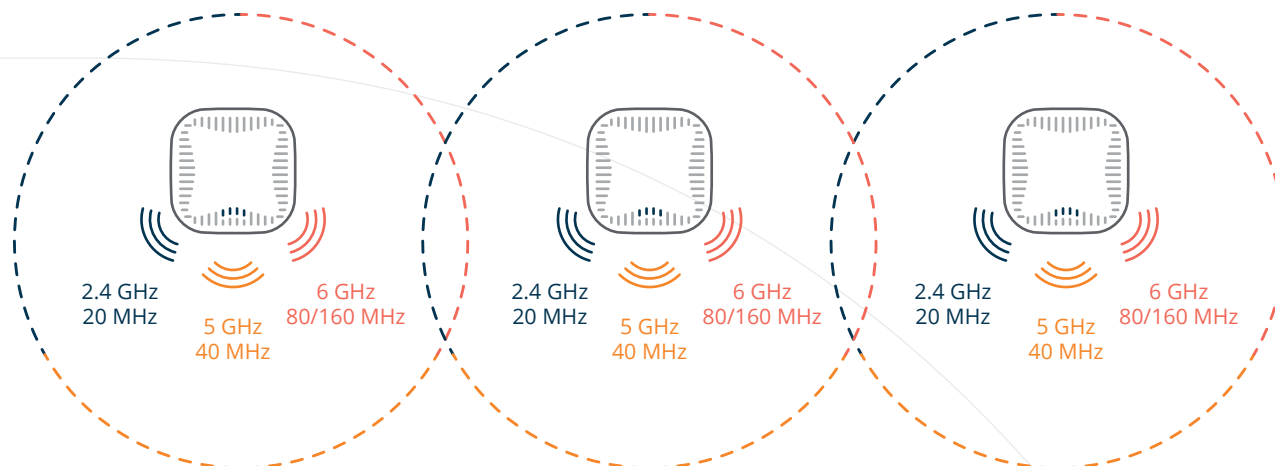
Plan to Pilot

As with any migration to a new standard, you should start with a pilot in your environment.

Typical pilot projects start with three to five APs to better understand the infrastructure requirements and expected performance gains with Wi-Fi 6E. You can use this opportunity to see how your roaming performance improves between the cluster of APs, as well as within the rest of the network.

If it is for a new building, you should consider the ideal AP spacing and what your future growth may look like. If it is for an upgrade to an existing building, it's important to map your current infrastructure to your future requirements.

With a pilot, you can proactively identify issues that prevent optimal performance and better prepare for the increased adoption of Wi-Fi 6E capable devices. This, in turn, leads to a more successful rollout with the highest-possible performance and greater user satisfaction.



Use your pilot to investigate the following areas:

- ✓ How does the cluster of Wi-Fi 6E APs perform compared to the rest of my network?
- ✓ How will the Wi-Fi 6E APs function within the broader network?
- ✓ What are the power considerations in my environment?
- ✓ What are the backhaul considerations?
- ✓ How can I ensure business continuity and failover for power and data?
- ✓ Where are the most optimal locations for my Wi-Fi 6E APs?
- ✓ How should I best plan my rollout given the learnings from the pilot?





Fast, resilient, and secure Wi-Fi 6E connectivity with Aruba

Aruba's Wi-Fi 6E solution allows you to benefit from the recent allocation of unlicensed spectrum in the 6 GHz band to deliver much greater Wi-Fi capacity at higher speeds than ever before.

Our APs deliver comprehensive tri-band coverage across 2.4 GHz, 5 GHz, and 6 GHz bands for more than double the capacity. This means greater performance, lower latency, and faster data rates to better meet the needs of more client and IoT devices, high-bandwidth applications, and new use cases like high-definition video and augmented reality/virtual reality.

Our Wi-Fi 6E solution builds upon our two decades of WLAN leadership to deliver all the benefits of Wi-Fi 6E including more capacity and wider channels.

In addition, Aruba's Wi-Fi 6E solution offers:

- ✓ Ultra tri-band filtering to minimize channel interference and coverage gaps between the 5 GHz and 6 GHz bands
- ✓ Built-in security and role-based policy enforcement to protect a wider range of devices including IoT
- ✓ Wi-Fi optimizations to prevent sticky clients, improve load steering, automate RF management, ensure application performance levels, and facilitate cellular handoffs
- ✓ AIOps to improve operator efficiencies with closed-loop recommendations and peer comparisons to better surface anomalies
- ✓ Business continuity and resiliency with dual Ethernet HPE Smart Rate ports for hitless failover of data and power





Aruba is committed to delivering a full suite of certified Wi-Fi 6E capable APs so enterprises can take advantage of the new superhighway of 6E – enabling less congested airwaves, broader channels, and higher-speed connections to support greater innovation.

Learn more about Aruba Wi-Fi 6E APs

www.arubanetworks.com/wifi6e