

Wi-Fi 6E and Future-Proofing Wireless Infrastructure



Wi-Fi 6E builds on the technology improvements in Wi-Fi 6 of increased capacity, efficiency and security while operating in the 6 GHz band.

Introduction

The future of wireless networking needs will continue to grow. Location based services, sensors, and IoT devices will continue to be added to wireless networks. Expanding and new uses of Wi-Fi that require high performing connections like AR/VR, AI/ML, and new technologies we don't even know about yet will compete for wireless network resources. Finally, all the standard uses we currently associate with Wi-Fi like video and voice calls, streaming services and cloud hosted applications will continue to bring more devices to wireless networks with increasing traffic demands.

New technologies continue to be developed to meet the growing demand on wireless networks. As these new technologies are adopted, especially by end users, higher quality of service will be expected from the network. Higher bandwidth, lower latency, and higher capacity are some of the benefits of utilizing the newest Wi-Fi standard, Wi-Fi 6E.



What is Wi-Fi 6E

Wi-Fi 6E is the latest standard of Wi-Fi introduced by the Wi-Fi Alliance in 2021. Wi-Fi 6E devices meet Wi-Fi 6 standards, but are capable of operating in the 6 GHz frequency band.¹ Wi-Fi 6E builds on the technology improvements in Wi-Fi 6 of increased capacity, efficiency and security while operating in the 6 GHz band. Wi-Fi 6E devices are quickly becoming available following regulatory approvals in several countries.

Network administrators that are looking to take advantage of this new frequency band, will likely still want to support the current 2.4 GHz and 5 GHz bands (as opposed to replacing them) in order to provide wireless connectivity for a wide range of devices. Many wireless devices, like IoT devices for example, will continue to rely on the 2.4 GHz and 5 GHz bands for wireless connectivity for the foreseeable future. Wi-Fi 6E technology is still very new, however more and more connecting devices and infrastructure components that support Wi-Fi 6E are being shipped every year.

Benefits of Wi-Fi 6E

Users on Wi-Fi 6E networks will experience faster speeds, lower latency and higher reliability even when there are hundreds of other users accessing network resources in the same space at the same time. Providers of Wi-Fi networks will experience increased user satisfaction and the ability to support higher data rates on the wireless network as the number of wireless devices continues to grow.

The primary benefits of Wi-Fi 6E over previous generations of Wi-Fi standards include:

Faster throughput speeds and ultra low latency

More channels as well as wider channels are available in the 6 GHz band. This allows devices to spread out across more channels and therefore can provide users higher data rates and lower latency. This reduction in interference, compared to the 2.4 GHz and 5 GHz ranges, allows users to experience superior network performance.

Ability to support higher density of users

Wi-Fi 6E can support higher user density due to advanced technological features that can manage wireless spectrum efficiently. The 6GHz band offers a large number of channels that can boost network capacity.

More Secure

Wi-Fi 6E requires the latest wireless security protocol, WPA3. The WPA3 standard has stronger encryption and better user authentication than its predecessor, WPA2. It is more resistant to brute force attacks, such as dictionary attacks and mitigates other vulnerabilities by using an improved 4-way handshake mechanism when authenticating to a network.

Considerations for Wi-Fi 6E

Wi-Fi 6E is a new Wi-Fi standard, and the adoption of this technology will increase over time. There are several considerations that network administrators should keep in mind when looking to expand their Wi-Fi network to include Wi-Fi 6E technology.

Device Compatibility

Wi-Fi 6E can only be utilized by devices that have hardware support for Wi-Fi 6E built in, and it cannot be added through software updates. This means that very few devices manufactured before 2023 will have the ability to use Wi-Fi 6E. The good news is that major manufacturers of devices like computers, tablets and phones are starting to release new products that support Wi-Fi 6E.

Range

The range of a radio band decreases as frequency increases. Signals of lower bands like 2.4 GHz can travel considerable distances with little impact to the end user's experience, however the bandwidth is lower and latency is higher in this band. In the 5 and 6 GHz band, the speeds can be very high and the latency can be very low, but the connecting device needs to be within relatively close proximity to an AP to experience these benefits. Any signal attenuating material such as walls can affect this range as well as the density of connecting devices. To get the significant performance benefits of the faster speeds and lower latency of Wi-Fi 6E, APs need to be relatively close to the devices connecting to them.

Channel Availability

Wi-Fi channels that are available to the public domain to use vary by country. Global regulations determine what channels in the wireless spectrum can be utilized by Wi-Fi networks. While many countries are opening up the 6 GHz band entirely to the public domain, others are opening up portions of the 6 GHz band. Additionally there can be restrictions on where Wi-Fi 6E can be used regarding indoor and outdoor as well as how much power an antenna can transmit as the 6 GHz band is already in use by incumbent technologies such as point-to-point microwave links, satellite communications, and television broadcasting.

The global regulations can be found on the [Wi-Fi Alliance website](#).



Future-Proofing Wireless Infrastructure

What can administrators do today to prepare for the increasing demand on wireless networks? As existing wireless networks are refreshed, and new sites are being built, Wi-Fi 6E APs can be incorporated in order to provide the future benefit of Wi-Fi 6E. Some networks may not have enough Wi-Fi 6E capable devices connected to make the change worthwhile today. However, planning for the future needs of the network doesn't mean there aren't advantages to incorporating Wi-Fi 6E capable APs today.



When considering new Wi-Fi 6E capable APs for your network, ensure they meet the following criteria:

Multi-band Radios

Include APs with at least 3 radios. At least one of the radios needs to support multiple bands, but allow flexibility for how the radios are used today. For example, a multi-band radio can broadcast on 6 GHz, but can also broadcast on 5 GHz. Network administrators can serve today's devices by tuning two of the three radios to 5 GHz while reserving the opportunity to switch one radio to the 6 GHz band to provide optimal performance for devices in the future.

Software Defined Capabilities

Ensure that APs can easily switch to the 6 GHz frequency to allow the network to adapt to future needs with software configurations, not by replacing existing hardware. Optimizing APs to meet the needs of the users and organization will change over time. Multi-band radios that allow for changes to the operating frequencies will allow for these adjustments. Where there are few Wi-Fi 6E end user devices connecting to the network, the APs can use one radio for the 2.4 GHz band, one radio for the lower half of the 5 GHz band, and a third radio for the upper half of the 5 GHz band. As the density of Wi-Fi 6E compatible end user devices increases, administrators can adjust one radio to use the full 5 GHz band and one to use the new 6 GHz band. Cloud based centralized management makes configuration changes to optimize the wireless network to be made efficiently and without going on site.

Controllerless Access Points

Inevitably as networks grow over time, more APs are needed to ensure adequate coverage and performance. Controllerless APs provide scalability, ease of administration, lower capital expenses and fewer appliances to maintain. With a controllerless system, centralized management is handled completely in the cloud. The APs are not physically connected to an onsite concentrator or physical controller. Centralized cloud-based management can seamlessly scale over time as a network grows, and also provides for a more reliable network as there is no single point of failure. Even if an AP loses connectivity to the cloud manager, it continues to provide secure network access.

How Arista Can Help

Arista Cognitive Wi-Fi is an industry leading wireless networking solution that provides reliable connectivity, automatically optimizes connections as network conditions change and delivers actionable intelligence to network administrators.



The Arista enterprise class access points include multi-radio offerings for ensuring the best floor coverage and capacity, intrusion protection, zero touch deployment, auto RF tuning, cloud manageability, and integrated wired/wireless cloud based centralized management. This product line is based on a controlless architecture, where management data is managed centrally, yet the data and control planes are local, ensuring no single points of failure.

- Enterprise class Wi-Fi 6E and Wi-Fi 6 technologies
- Optimized performance to scale from 1 to hundreds of users per AP
- Multi-gigabit uplink choices based on bandwidth needs
- Open, published APIs for integration with ITSM and monitoring tools

References

1. Wi-Fi Alliance - 6 GHz Wi-Fi - Connecting to the future
https://www.wi-fi.org/downloads-registered-guest/Wi-Fi_6E_paper_202112.pdf/37285

Santa Clara—Corporate Headquarters

5453 Great America Parkway,
Santa Clara, CA 95054

Phone: +1-408-547-5500

Fax: +1-408-538-8920

Email: info@arista.com

Ireland—International Headquarters

3130 Atlantic Avenue
Westpark Business Campus
Shannon, Co. Clare
Ireland

Vancouver—R&D Office

9200 Glenlyon Pkwy, Unit 300
Burnaby, British Columbia
Canada V5J 5J8

India—R&D Office

Global Tech Park, Tower A, 11th Floor
Marathahalli Outer Ring Road
Devarabeesanahalli Village, Varthur Hobli
Bangalore, India 560103

Singapore—APAC Administrative Office

9 Temasek Boulevard
#29-01, Suntec Tower Two
Singapore 038989

Copyright © 2023 Arista Networks, Inc. All rights reserved. CloudVision, and EOS are registered trademarks and Arista Networks is a trademark of Arista Networks, Inc. All other company names are trademarks of their respective holders. Information in this document is subject to change without notice. Certain features may not yet be available. Arista Networks, Inc. assumes no responsibility for any errors that may appear in this document. June 9, 2023