SMB Guide to WiFi 6E

White Paper

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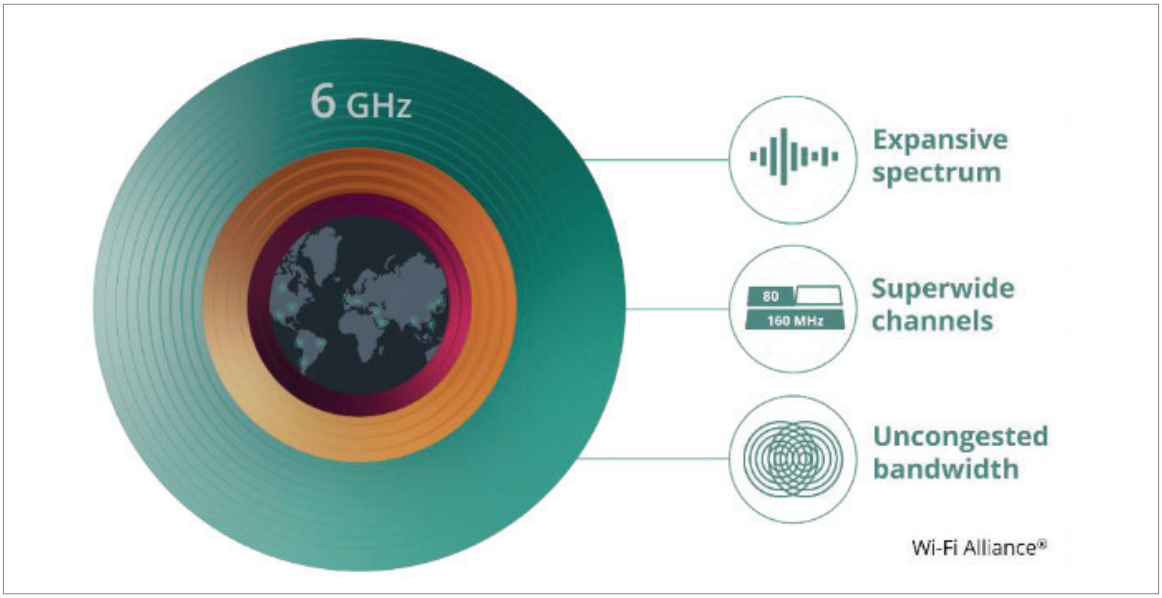
Abstract

WiFi 5 and older generations of WiFi have grown the wireless market to leaps and bounds for about 20 years. Many small and large businesses have benefited from expanded capacities, performance, and wireless reliability. The latest creation of WiFi 6 or 801.11ax benefited businesses and industries to another level – by providing a huge leap in wireless capacity, speed, and efficiency within the 2.4GHz and 5GHz frequency band. As the older and current generations of WiFi share one common building block, it operates on the 2.4GHz and 5GHz frequency band – creating instability, loss of bandwidth issues, and other wireless connection issues. In April of 2020, the FCC provided a huge innovation leap to the wireless industry by providing the 1200MHz of the spectrum in the 6GHz frequency band available for unlicensed use.

Introducing WiFi 6E, the enhanced version of the WiFi 6, is the first technology to support the new unlicensed frequency. WiFi 6E delivers expanded speeds, connections, and capacity thanks to a completely new and wider 6GHz frequency band with more WiFi channels.

What is WiFi 6E?

WiFi 6E is not a new wireless standard, it is the first technology to adopt the newly unlocked and unlicensed 6GHz wireless band. Just as the impact of WiFi 6 in the wireless industry, WiFi 6E brings innovation to whole new level. WiFi 6E uses the new and wider 6GHz band and delivers more wireless channels. The new WiFi 6E brings higher performance, lower latency, and faster data rates due to the uncongested 6GHz wireless band.



Key Highlights of WiFi 6E	
New 6GHz WiFi Band	Exclusive access for only devices supporting the new 6GHz band means less congestion and faster speed
More Spectrum	Up to 200% more spectrum than dual band (2.4GHz & 5GHz) WiFi to WiFi 6E devices
More High-Bandwidth WiFi Channels	Up to 3.5X more high-bandwidth 160MHz WiFi channels for applications such as your 8K video streaming
Ultra-Low Latency	Less traffic on the 6GHz band gives you lower latency for your AR/VR gaming and other WiFi-intense applications
Cutting-Edge WPA3 Security	The latest WiFi security protocol to keep your family and network safe

What is the technical difference between WiFi 6 and WiFi 6E?

WiFi 6E builds on the existing WiFi 6 (802.11ax) standard. WiFi 6E offers all of the new cutting-edge features of WiFi 6 and allows access to a new 6GHz wireless band.

Main features in WiFi 6:

- **Orthogonal Frequency-Division Multiple Access (OFDMA)**. This feature enables your router and devices to use your bandwidth more efficiently by reducing the time between data transmissions. As a result, more bandwidth is available for other devices. For example, the WAX630 supports several client devices per WiFi band with downlink and uplink OFDMA technology.
- **High-bandwidth traffic efficiency with eight-stream Multi-User-Multiple-Input Multiple-Output (MU-MIMO)**. This technology enables your router to communicate with many devices simultaneously. Wi-Fi 6 also allows 8x8 APs to use all eight streams to transmit information.
- **Improvements through higher order modulation (1024-QAM)**. Higher order modulation increases the efficiency and speed of data transmission on your network. This technology can give up to 25 percent improvements in speed.
- **Extended battery for mobile and smart home devices with Target Wake Time (TWT)**. TWT makes communication between your devices and your router's Wi-Fi channels more efficient. Devices that support TWT enter a sleep state until their scheduled wake time. TWT reduces energy consumption and bandwidth use.

WiFi 6E builds on these features by adding access to a new 6GHz wireless band. Some of the features of this new band include:

- **Additional spectrum.** The 6GHz band supports up to 14 80MHz channels or seven 1690MHz channels. More available WiFi channels means more available WiFi spectrum and less overlap between networks in crowded areas like apartments complexes or offices.
- **More high-bandwidth channels.** The 6GHz band supports almost twice as many high-bandwidth (80GHz, 160MHz) channels as 5GHz. More available high-bandwidth channels mean more capacity for applications like 4K and 8K streaming, virtual reality gaming, and high-definition video conferencing.
- **No DFS scanning required**. Unlike 160MHz channels in the 5GHz wireless band, devices operating in 6GHz don't share the spectrum with radar devices or TV stations. As a result, people who cannot take advantage of 160MHz channels because they live near places like airports or TV stations can benefit from vacant 160MHz channels.
- **No legacy (WiFi 3/4/5/6) devices on 6GHz**. The 6GHz band is exclusive to WiFi 6E devices. 6GHz networks don't have to slow down to accommodate older devices. This means that WiFi 6E devices can take full advantage of the bandwidth, spectrum, and speed improvements of 6GHz without competing with any non-6E devices.
- **Mandatory Wi-Fi Protected Access (WPA) 3**. WPA 3 is mandatory for all WiFi 6 Certified devices operating in 6GHz. WPA3 is the latest Wi-Fi Alliance security certification. WPA3 provides the latest in security and authentication protocols. As a result, 6GHz WiFi traffic is more secure than ever and 6GHz networks are more difficult to hack.

The table below highlights the technical difference between WiFi 6 and WiFi 6E.

WiFi 6	WiFi 6E
2.4 and 5 GHz Radios	6 GHz Radio
DFS[1] in 5 GHz	AFC* 6 GHz
WPA2, WPA3 and other Security Protocols	WPA3 and OWE (Opportunistic Wireless Encryption)
80 and 500 MHz channel widths	1200 MHz channel widths
(2) 160 MHz and (6) 80 MHz	(7) 160 MHz and (14) 80 MHz channels
AP Discovery on all channels	AP Discovery on 2.4/5 GHz scanning or 6 GHz PSC's (Preferred Scanning Channels)

[1] Dynamic Frequency Selection (DFS) is a channel allocation scheme specified for wireless LAN, commonly known as Wi-Fi. It is designed to prevent electromagnetic interference with other usages of the C band frequency band that had predated Wi-Fi, such as military radar, satellite communication, and weather radar.

* AFC (Automated Frequency Control) – Protects outdoor or higher power 6 GHz operations from RF interference.

What are the benefits of WiFi 6E?

Most of the benefits of WiFi 6E have to do with the fact that the 6GHz wireless band WiFi 6E is a new and much larger than existing 2.4GHz and 5GHz bands. The 6GHz band is also exclusive to WiFi 6E devices. An empty band with a very large spectrum capacity means WiFi 6E devices can take full advantage of the available bandwidth, and don't have to compete with traffic from other slower wireless devices or networks.

Additionally, WPA3 is mandatory for all Wi-Fi 6 Certified devices operating in 6GHz. WPA3 is the latest Wi-Fi Alliance security certification. WPA3 provides the latest in security and authentication protocols. As a result, 6GHz WiFi traffic is more secure than ever and 6GHz networks are harder to hack.

Which NETGEAR SMB products support WiFi 6E?

In March of 2022, NETGEAR released the WAX630E, first SMB grade WiFi 6E access point. The WAX630E access point provides tri-band connectivity (2.4GHz, 5GHz, and 6GHz) with an optional Insight Cloud Management capability.

The WAX630E Insight Managed Smart Cloud Tri-band 2x4x2e (AXE7800) Wireless Access Point with maximum WiFi performance and coverage. This new Tri-band Wireless Access Point from NETGEAR Business is the state-of-the-art of WiFi 6 and 6E Wireless performance and management. 3 separate radios (2.4GHz, 5GHZ and 6GHz) bring a total of 7.8Gbps throughput and full flexibility in device WiFi support and coverage.

Conclusion

As stated early, WiFi 6E is not a new wireless standard. It is a new innovation that builds on top of the current WiFi 6 standard and creates access to the new unused 6GHz frequency band. As WiFi 6E becomes widely used, 6GHz's short range and greater number of channels will provide an advantage in challenging environments like public institutions, corporate campuses, and educational institutions. For the next generation of consumers, WiFi 6E will be huge for higher bandwidth for 8K and 4K video streaming or video calls, lower latency for VR/AR environments over WiFi, and WiFi congestion relief in public environments. To that point, we can confidently say the future of SMB WiFi is here with the WAX630E access point and NETGEAR is truly excited to be at the forefront as we've always been.

For More Information on NETGEAR WAX630E:
Visit https://www.netgear.com/business/wifi/access-points/

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