WHITE PAPER

A division of Chatsworth Products

Next-Gen Networking: Exploring Wi-Fi 7 IEEE 802.11be (EHT)

By Bree Murphy, RCDD
Global Technical Training | Applications Engineer
Oberon® - A division of Chatsworth Products

Published: March 2025

oberonwireless.com

A New Generation of Connectivity

In an era when being connected is essential, the advancement of Wi-Fi technology is key to shaping our everyday experiences. As the industry continues to rely on Wi-Fi as a necessary transmission medium, Wi-Fi 7 with its unprecedented technological advancements is poised to revolutionize how we connect, communicate, and collaborate.

Wi-Fi 7 is an interoperability certification by the Wi-Fi Alliance (WFA) and is based on the IEEE 802.11be standard, with "EHT" standing for "Extremely High Throughput." Its focus is delivering significantly faster speeds and improved throughput over previous Wi-Fi generations. While the maximum PHY aggregate link rate is theoretically capable of reaching 46 Gbit/s under ideal conditions, actual performance will vary. Wi-Fi 7 is expected to drive innovations that require high throughput, low latency, and enhanced reliability for critical traffic. With its enhanced capabilities, Wi-Fi 7 offers a substantial increase in data throughput and network capacity compared to earlier Wi-Fi standards. Building on the foundation laid by previous generations, Wi-Fi 7 promises to deliver unparalleled speed, reliability, and network efficiency meeting the growing needs of modern digital enterprise networks. This new standard is not just an upgrade, but a transformative evolution in connectivity, set to redefine digital experiences. Here are some of the key factors driving this change:

Key Drivers of Wi-Fi 7:

1. Support for Advanced Technologies:

Wi-Fi 7 delivers groundbreaking advancements in wireless transmission, powering the next generation of technologies like extended reality (XR) and artificial intelligence (AI.) XR is an umbrella term that incorporates various immersive technologies that combine the physical and digital worlds. It includes a range of experiences such as virtual reality (VR) which is a fully immersive environment that replaces the real world with a simulated world and is commonly experienced through VR headsets. Augmented reality (AR), which overlays digital information such as images, sounds, or text onto the real world, is often viewed through smartphones or AR glasses. Mixed reality (MR) blends elements of both VR and AR, enabling real-time interaction between physical and digital objects. This leads to immersive, more interactive experiences. XR is used across various industries, including entertainment, education, healthcare, and training, offering innovative ways to engage users and enhance experiences by blending the real and virtual worlds. These advanced technologies require fast, reliable, and seamless wireless connections to function effectively.

Key Drivers of Wi-Fi 7:

2. Demand for High Bandwidth Applications::

The demand is increasing for applications, such as:

- Ultra-high-definition streaming: 4K and 8K video content without buffering or interruptions)
- Rapid transfer of large files, such as high-resolution images and videos, within seconds
- Supporting high-quality video calls and virtual meetings with multiple participants without lag
- Supporting IoT real-time data collection and analysis in smart factories and intelligent connected environments.
- Online gaming support in educational facilities: enabling low-latency connections for competitive gaming and real-time multiplayer experiences
- Others including cloud-based services, online collaboration tools and more

3. Improved User Experience:

An optimized user experience is vital for user satisfaction and productivity. Wi-Fi 7 offers high-speed connectivity by reducing latency and buffering, allowing for efficient interactions with applications and services.

4. Network Scalability:

Wi-Fi 7 promises to enhance network scalability by adapting to the evolving needs of growing businesses. A well-designed high-speed wireless infrastructure can easily support additional users and devices for the life cycle of the installation without the need for extensive rewiring or major changes to the existing network.

5. Data-Driven Decision Making:

As enterprises increasingly rely on real-time data analytics and business intelligence tools, high-speed reliable connectivity facilitates faster data access and analysis, enabling timely decision-making.

6. Competitive Advantage:

Investing in a more advanced high-speed wireless infrastructure allows enterprises to stay competitive by enhancing operational efficiency, improving customer experience, and enabling innovative and effective business practices.

7. Managing Increased Device Density:

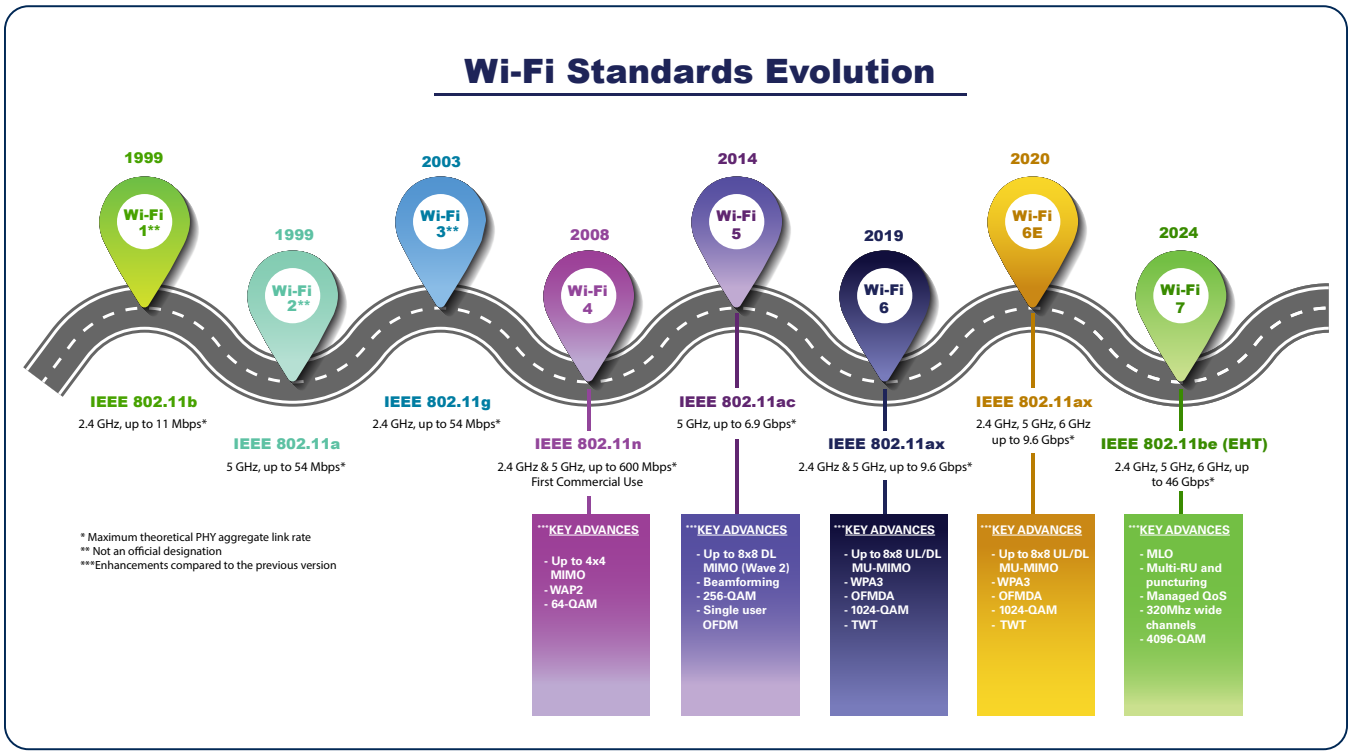
With the rapid growth and integration of IoT devices, powerful laptops, smartphones, and other advanced connected technologies, businesses are facing the challenge of supporting an ever-expanding number of devices. A reliable and robust wireless network is critical to ensuring seamless connectivity and optimizing the performance of each device as device density increases. The ongoing evolution of Wi-Fi technologies is driven not only by the demand for faster, more reliable, and efficient wireless communication but also by the need to accommodate the growing number of devices, which place increasingly complex demands on networks for both businesses and consumers.

These key drivers emphasize the growing need for advancements in high-speed wireless connectivity to support the demands of modern enterprise networks. Wi-Fi 7 is specifically designed to address these needs, as well as to accommodate emerging, high-bandwidth applications, and enhance user experiences such as greater immersion and interactivity.

Shaping the Future of Connectivity: Key Advancements in Wi-Fi 7

With its cutting-edge advancements, Wi-Fi 7 is set to transform the Wi-Fi experience with improved performance and reliability for both enterprise and consumer markets. Wi-Fi 7-enabled client devices and networking equipment are already being integrated into both enterprise and consumer environments, where its transformative technology is optimizing performance, boosting reliability, and delivering faster, more efficient connectivity.

In this section, we will explore the key innovations that Wi-Fi 7 brings, highlighting how these developments enhance connectivity in the real world and improve the overall wireless experience.



Setting the Stage: How Wi-Fi 6 and Wi-Fi 6E Pave the way for Wi-Fi 7

Before diving into the advanced features of Wi-Fi 7, it's essential to first recognize the revolutionary technological strides made by Wi-Fi 6 and Wi-Fi 6E, which serve as the crucial foundation for the innovations found in Wi-Fi 7.

Wi-Fi 6, referred to as IEEE 802.11ax, marked a significant turning point in the world of wireless connectivity. As the need for faster, more reliable connectivity increased, Wi-Fi 6 introduced several key advancements that significantly enhanced the overall performance of wireless networks. One of its most notable features is its ability to increase speed and capacity, allowing networks to accommodate high-density environments like enterprise offices, stadiums, educational institutions, and healthcare facilities. The following are the key technological innovations of Wi-Fi 6 that reshaped connectivity.

Groundbreaking Innovations of Wi-Fi 6:

OFDMA:

Orthogonal Frequency Division Multiple Access (OFDMA) is a technique used to transmit data by splitting a signal into multiple smaller sub-signals, each delivered over a different frequency. This method helps to improve data rates and reduce interference in wireless communication. OFDMA is an advanced version of OFDM used in previous Wi-Fi iterations, where the available sub-channels are divided among multiple users or devices simultaneously. While OFDM allocates the entire spectrum to a single device, OFDMA allows multiple devices to share the same channel by assigning them specific sub-channels, improving efficiency and reducing congestion in high-traffic environments.

8 x 8 MU-MIMO UL/DL:

(Multi-User - Multiple Input, Multiple Output Uplink/Downlink), which was previously only available for downlink traffic in Wi-Fi 5. Wi-Fi 6 MU-MIMO supports both uplink and downlink transmission, allowing the router to simultaneously serve multiple devices in both directions. This significantly boosts network capacity and reduces wake time for each device, improving overall performance when multiple devices are connected. One of the key differences between Wi-Fi 6 and Wi-Fi 5 lies in the number of spatial streams supported. Wi-Fi 5 (802.11ac Wave 2) typically supports up to 4x4 DL MIMO, allowing it to transmit data across four spatial streams simultaneously (four transmit and four receive.) This configuration works well for environments with moderate device density but can become strained as the number of connected devices increases. In contrast, Wi-Fi 6 (802.11ax) introduces 8x8 MU-MIMO UL/DL, doubling the capacity to handle up to eight transmit and eight receive spatial streams at once both uplink and downlink. This enhancement significantly improves network throughput, especially in high-density environments with many connected devices.

TWT:

(Target Wake Time) is a key feature designed to improve energy efficiency, particularly for battery-powered devices in the Internet of Things (IoT) ecosystem. TWT allows devices to schedule specific times to wake up, transmit data, and then return to sleep mode, rather than constantly listening for transmissions. This reduces the amount of time devices need to be active on the network, conserving battery life and reducing overall power consumption. TWT is especially beneficial for devices like smart sensors, wearables, and other IoT devices that rely on extended battery life. By optimizing how and when devices communicate with the network, TWT helps to improve overall efficiency and performance, while also allowing for longer usage times between charges.

1024-QAM (Quadrature Amplitude Modulation)

1024-QAM is a significant upgrade from the 256-QAM used in Wi-Fi 5. This modulation technique increases the amount of data that can be transmitted in a single signal by encoding more bits per symbol. With 1024-QAM, Wi-Fi 6 can transmit up to 10 bits of data per symbol, compared to the 8 bits per symbol with 256-QAM. The main benefit of this higher-density modulation is the ability to achieve faster speeds and more efficient use of available bandwidth, particularly in high-density environments. This results in faster download and upload speeds, making it particularly valuable for high-bandwidth and streaming applications such as 4K/8K video, online gaming, virtual reality (VR,) and augmented reality (AR.) By packing more data into each transmission, Wi-Fi 6 can provide faster, more reliable connections, further enhancing the overall user experience.

Collectively, these Wi-Fi 6 enhancements tackle challenges such as network congestion, slow speeds, and device overload in high-density environments and demanding applications. They lay the groundwork for future technological advancements in an increasingly connected and data-driven world.

The Leap to Wi-Fi 6E

Building upon the foundation of Wi-Fi 6, Wi-Fi 6E further expands its capabilities by introducing access to the 6 GHz band. The FCC's allocation of 1200 MHz of additional unlicensed bandwidth in the 6 GHz frequency band marks a significant expansion of the available wireless spectrum. This additional contiguous channel spectrum provides crucial benefits, helping to meet the increasing demands of Wi-Fi networks in high-traffic environments. It not only improves network performance by offering more bandwidth for faster speeds and reduced congestion but also lays the groundwork for future advancements. As wireless technologies continue to evolve, this expanded spectrum will play a key role in enabling Wi-Fi to seamlessly integrate with other technologies such as 5G, IoT, and emerging wireless innovations, driving greater connectivity and efficiency across a wide range of applications.

Traditionally, Wi-Fi has operated in the 2.4 GHz (2400 to 2495 MHz) and 5 GHz (5170 to 5835 MHz) non-contiguous channels (Figure 1, next page). Non-contiguous channels in a frequency band refer to frequency allocations that are spread out across the band with gaps between them, meaning the spectrum is fragmented. The fragmentation can also result in more complex signal processing, as devices must manage the gaps between frequency blocks, which can cause inefficiencies and reduce network performance, especially in high-density environments or when many devices are connected to the same network. In contrast, contiguous channels are uninterrupted, with frequency blocks running continuously within the band, without gaps. The key difference between non-contiguous and contiguous channels lies in efficiency and performance. Contiguous channels allow for more efficient use of the spectrum since data can be transmitted over a broader, uninterrupted bandwidth. This leads to higher throughput, better utilization of available spectrum, and reduced latency, as the network doesn't have to jump between different frequency blocks. This is especially beneficial for high-demand applications like streaming, gaming, or large data transfers, which require stable, high-speed connections.

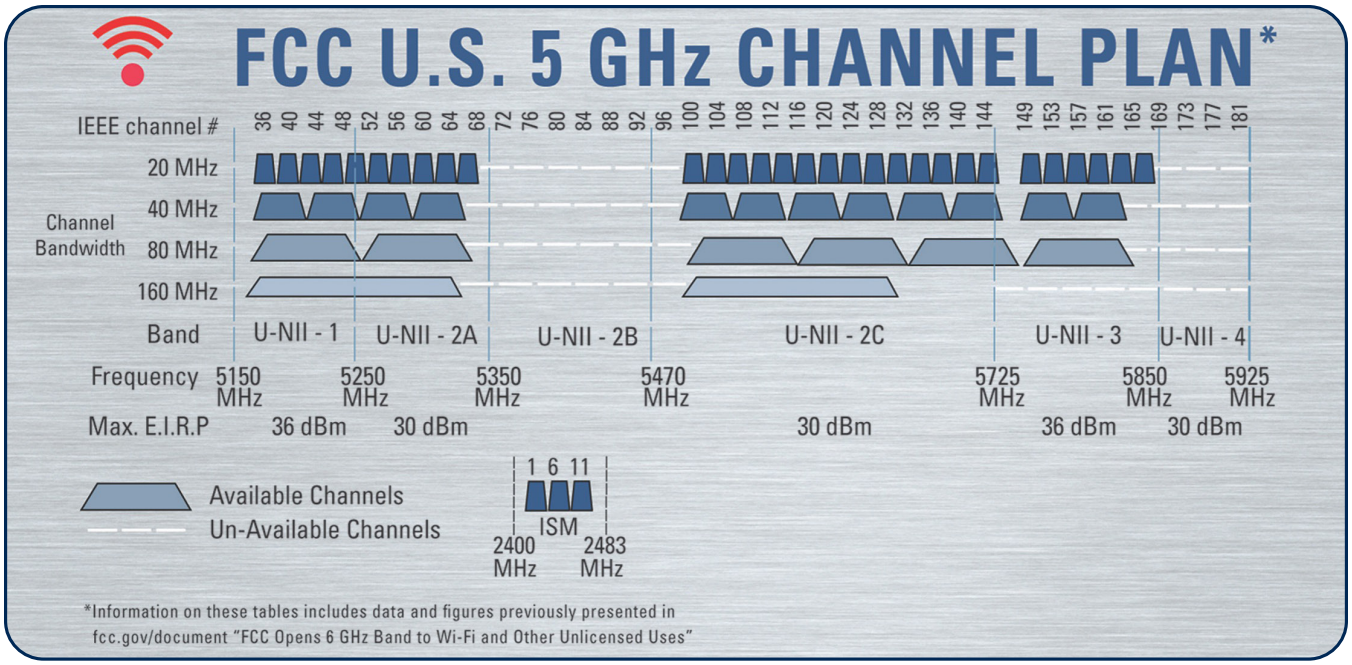


Figure 1: FCC U.S. 5 GHz and 2.4 GHz ISM Channel Plan

The introduction of the 6 GHz band (5.925 to 7.125 MHz) offers a much broader range of frequencies (Figure 2). This additional spectrum provides contiguous wider channels, up to 7 additional 160 MHz, and 14 additional 80 MHz channels, allowing for faster speeds, greater capacity, and reduced interference from other devices. With less congestion in the 6 GHz band and contiguous channels, networks can deliver improved performance, particularly in high density environments. This is especially beneficial for high-bandwidth environments where low latency and high throughput are essential. The 6 GHz band is also less crowded compared to the lower frequency bands, enabling Wi-Fi 6E networks to maintain faster, more reliable connections, even in dense environments. As the demand for faster, more efficient wireless communication continues to grow, the 6 GHz band will play a crucial role in supporting the future of high-performance Wi-Fi.

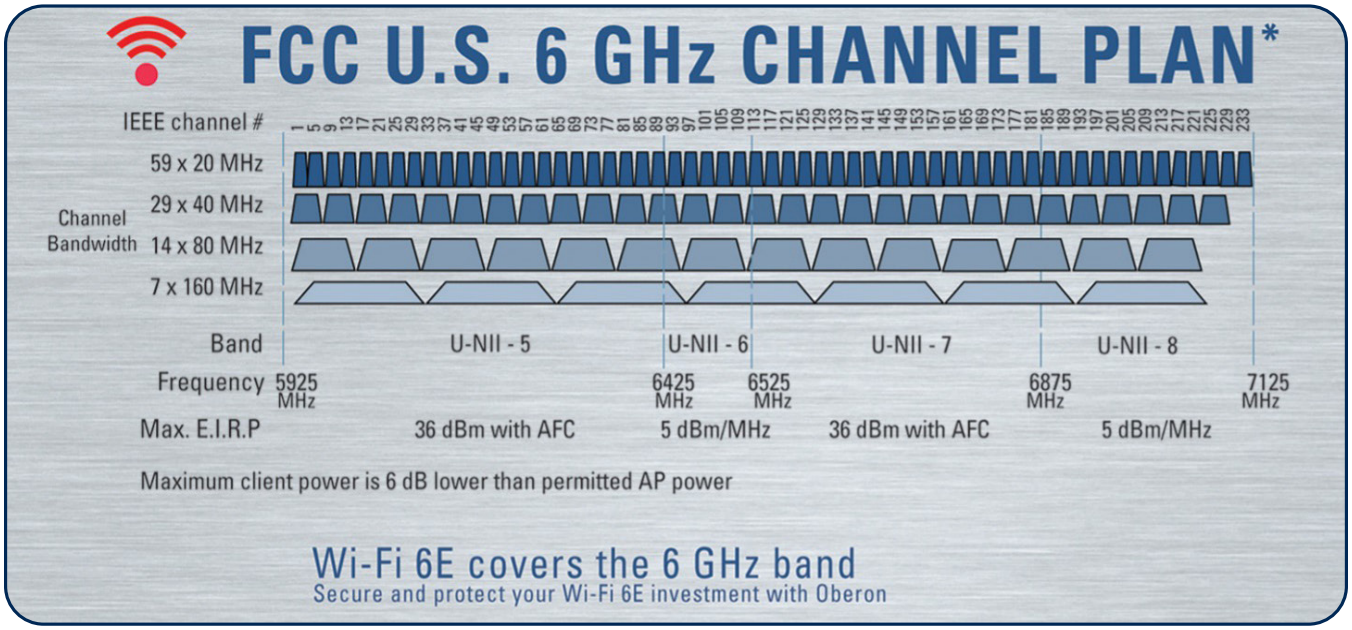


Figure 2 – FCC U.S. 6 GHz Channel Plan

Key Advances: Exploring the Innovations and Benefits of Wi-Fi 7

Wi-Fi 7, based on the IEEE 802.11be standard, referred to as Extremely High Throughput (EHT), is set to revolutionize wireless connectivity by meeting the rising demands for more efficient networks. Building on the foundation laid by Wi-Fi 6 and Wi-Fi 6E, Wi-Fi 7 introduces several key improvements that will empower consumers, businesses, and industries to benefit from faster and more reliable wireless communication. These innovations are essential as connectivity becomes increasingly integrated and interconnected, with the demand for seamless, high-bandwidth applications growing steadily.

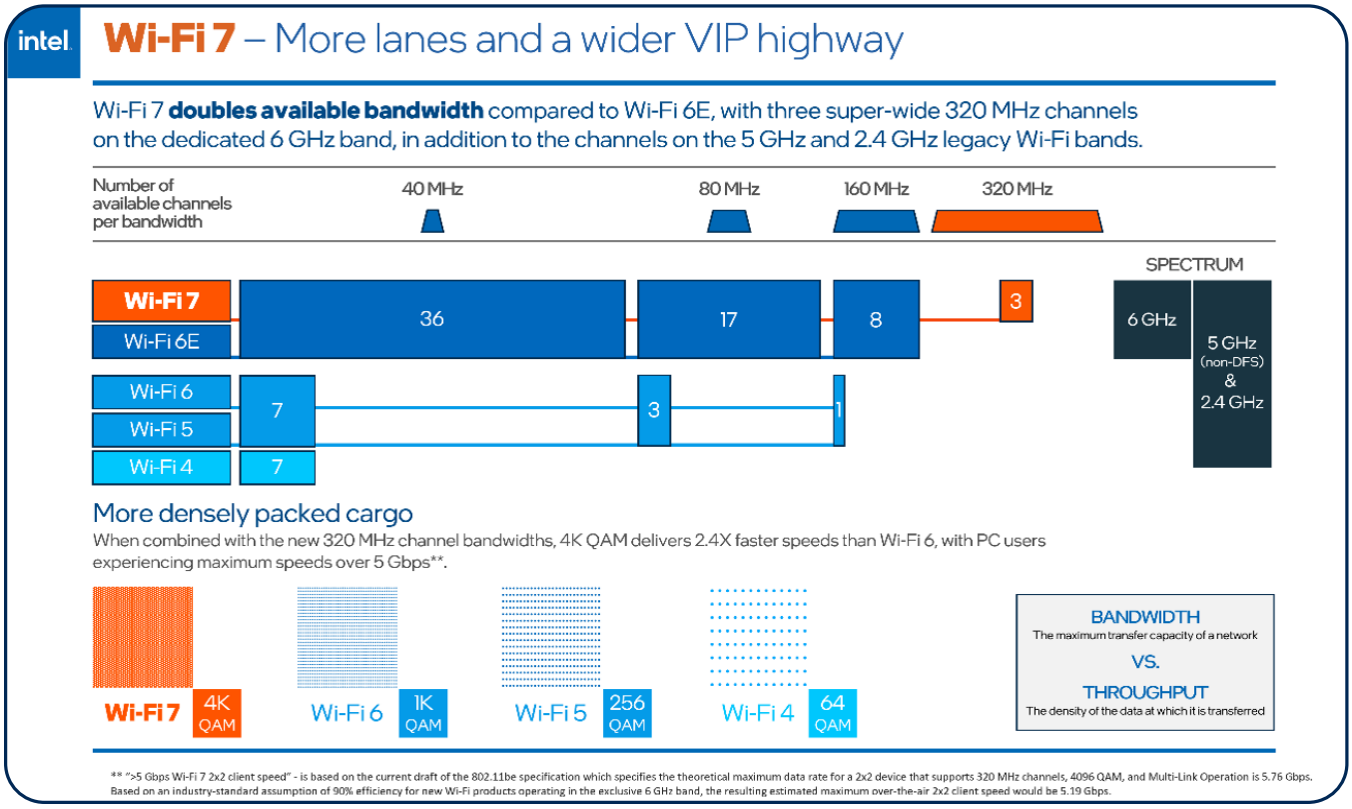


Figure 3 – Wi-Fi 7 doubles the available bandwidth with three super-wide 320 MHz channels
Source: Intel Corporation

Pivotal Innovations in Wi-Fi 7:

Faster Speeds with 320 MHz Channel Width:

Wi-Fi 7 introduces 320 MHz super wide channel widths, which is double the maximum width offered by Wi-Fi 6 (160 MHz). Channel width is a key factor in determining network speed and performance. By doubling the available channel width, Wi-Fi 7 can transmit much more data simultaneously, significantly increasing throughput. This is particularly beneficial for high-demand applications like artificial intelligence (AI), 8K video streaming, virtual reality (VR), augmented reality (AR), and cloud-based networking, gaming, which require ultra-fast and reliable connections. With 320 MHz, Wi-Fi 7 can achieve much higher aggregate link speeds, surpassing the speeds provided by its predecessors.

Enhanced Efficiency with Multi-Link Operation (MLO)

Wi-Fi 7 introduces game-changing Multi-Link Operation (MLO) and enhanced Multi-Link Seamless Roaming (eMLSR), two key features designed to significantly improve wireless performance and user experience. There are many modes of MLO and various versions of eMLSR. The client's capability determines the MLO method for that client; however, the access point is capable of operating in multiple MLO methods at the same time. MLO allows devices to simultaneously connect to multiple frequency bands (such as 2.4 GHz, 5 GHz, and 6 GHz), providing better throughput, reduced latency, and more reliable connections by dynamically choosing the optimal band based on network conditions. This provides a deterministic system ensuring that devices can leverage the full potential of Wi-Fi 7's high-speed capabilities. On the other hand, eMLSR enhances roaming by allowing the client devices to seamlessly switch between access points without experiencing disruptions or delays, even when moving between different networks or locations. This combination of MLO and eMLSR offers a more efficient, stable, and high-performance wireless experience, particularly in environments with dense traffic or high mobility, making Wi-Fi 7 ideal for high-bandwidth applications such as augmented reality (AR), virtual reality (VR), and 4K/8K video streaming.

Increased Capacity with 4096-QAM

Wi-Fi 7 adopts 4096-QAM (Quadrature Amplitude Modulation), an upgrade from Wi-Fi 6's 1024-QAM. QAM is a modulation technique used to encode data into radio signals, and the higher the QAM value, the more data can be transmitted per signal. By supporting 4096-QAM, Wi-Fi 7 can transmit up to 12 bits per symbol, allowing for more efficient use of the available spectrum and enabling faster data transfer rates. This is especially beneficial in high-density environments where many devices are connected to the network simultaneously, such as stadiums, office buildings, and public venues. Higher QAM capabilities increase throughput, making Wi-Fi 7 ideal for applications that require massive amounts of data, such as ultra-high-definition video streaming, immersive gaming, and large-scale enterprise networks.

Lower Latency with Improved Scheduling

Wi-Fi 7 introduces improved scheduling techniques that enable lower latency in wireless communication. One of the key technologies contributing to this is Enhanced Scheduling through OFDMA (Orthogonal Frequency Division Multiple Access). OFDMA allows a Wi-Fi router to divide channels into smaller sub-channels and assign them to multiple devices, enabling simultaneous communication between the router and various devices. Wi-Fi 7 enhances this by allowing even more precise control when devices access the network. This results in faster, more efficient data delivery, reducing lag and improving responsiveness, which is particularly important for real-time applications like gaming, video conferencing, and AR/VR experiences.

Improved Network Management with Target Wake Time (TWT)

Wi-Fi 7 improves upon Wi-Fi 6's Target Wake Time (TWT), a feature that allows devices to schedule when they wake up to send and receive data, rather than continuously listening for transmissions. This feature improves energy efficiency, particularly for battery-powered devices like IoT sensors, wearables, and smart home devices. Wi-Fi 7 optimizes this further by allowing devices to manage their wake-up schedules more efficiently, reducing power consumption and enhancing the overall efficiency of the network. This improvement is particularly valuable in environments with many IoT devices, where maintaining battery life while ensuring reliable connectivity is critical.

Wider Spectrum with the 6 GHz Band

Building on the success of Wi-Fi 6E, which introduced access to the 6 GHz band, Wi-Fi 7 continues to take advantage of this additional spectrum. The 6 GHz band offers more bandwidth, reducing interference and congestion that can be common on the 2.4 GHz and 5 GHz bands. By expanding the available spectrum and offering wider channels (up to 320 MHz), Wi-Fi 7 can support more devices simultaneously with higher performance. This is especially useful in environments with a high device density, such as stadiums, airports, and urban areas, where network congestion can be a problem. The 6 GHz band provides faster speeds and more reliable connections, helping to meet the increasing demand for data in the modern, connected world.

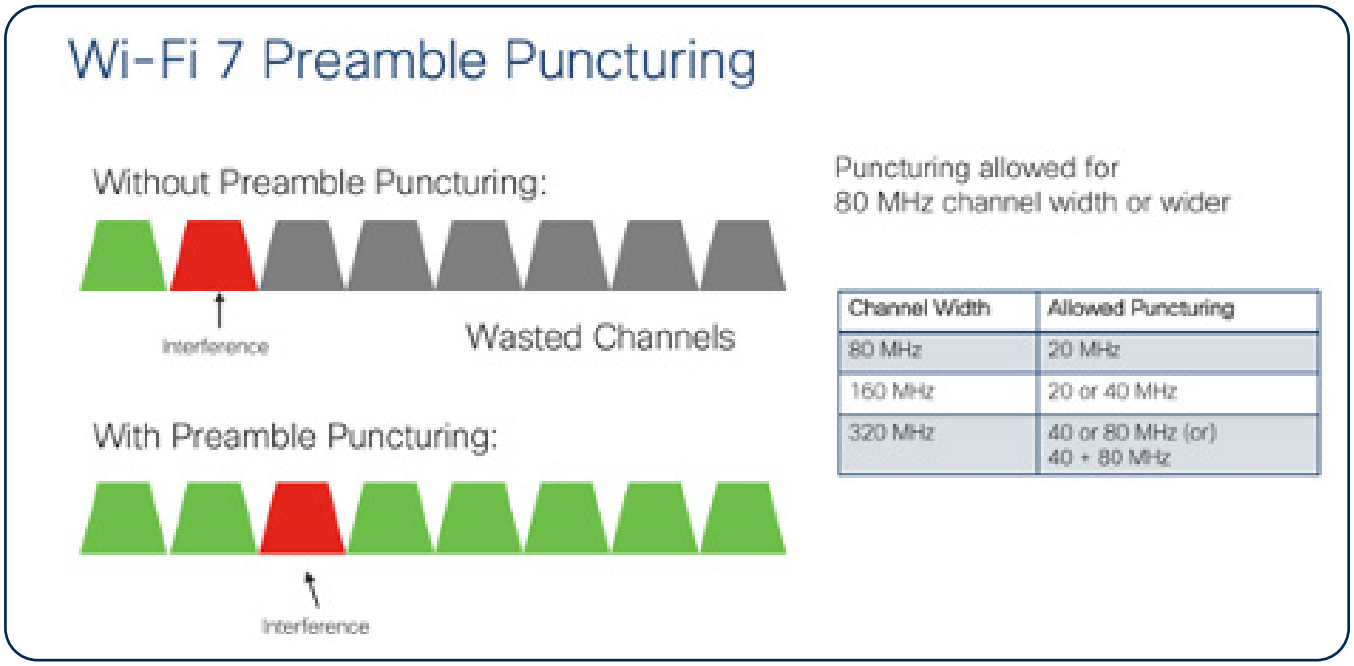


Figure 5 – Wi-Fi 7 Preamble Puncturing enables the system to bypass interference
Source: Cisco

Optimize Bandwidth Utilization with Multi Resource Units (RU) and Preamble Puncturing

The key difference between Wi-Fi 6/6E and Wi-Fi 7 in optimizing bandwidth utilization is Wi-Fi 7's advanced capability to enhance spectrum efficiency through features like Multi-RU and Preamble Puncturing. In Wi-Fi 6, resource units (RUs) are allocated in a traditional single-unit manner, meaning that if any part of a high-speed channel is occupied by a device, the entire channel becomes unavailable, forcing the system to switch to a different channel. This limits flexibility and reduces spectrum efficiency. Wi-Fi 7, however, introduces multi-RU functionality, allowing a single device (STA) to simultaneously access multiple resource units. This flexibility optimizes bandwidth utilization and enhances throughput, particularly in dense environments with many connected devices. Wi-Fi 7 also introduces preamble puncturing in the 80MHz or higher channel width, a technique that enables the system to bypass interference by selectively removing parts (puncturing) of the preamble in a transmission affected by congestion or noise. Wi-Fi 7's puncturing feature can operate in both dynamic and static modes. Dynamic puncturing adapts in real-time based on network conditions, while static puncturing uses predefined patterns to remove parts of the transmission. Both methods help optimize throughput and reduce interference. This allows for more effective use of available bandwidth. By puncturing unnecessary parts of the transmission, Wi-Fi 7 reduces interference, enhances spectrum efficiency resulting in optimized bandwidth utilization which increases overall throughput, and provides a more reliable and faster wireless network.

In summary, these advanced features allow Wi-Fi 7 to address the increasing demand for faster speeds, lower latency, higher capacity, and improved spectral efficiency, especially in dense, high-traffic environments, ultimately leading to an enhanced user experience.

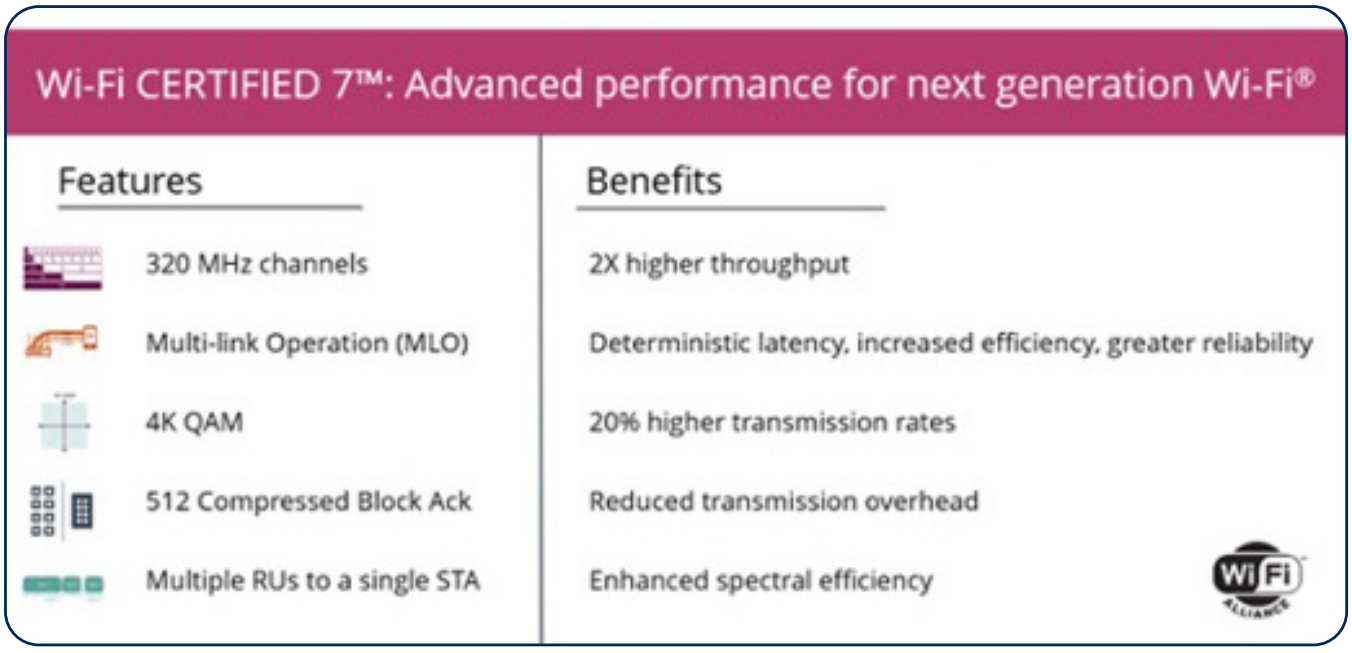


Figure 5 – Wi-Fi 7 Features and Benefits
Source: The Wi-Fi Alliance (Oberon – A division of Chatsworth is a Wi-Fi Alliance Corporate Implementor Member)

Wi-Fi 7 in Action: Use Cases and Its Supportive Role

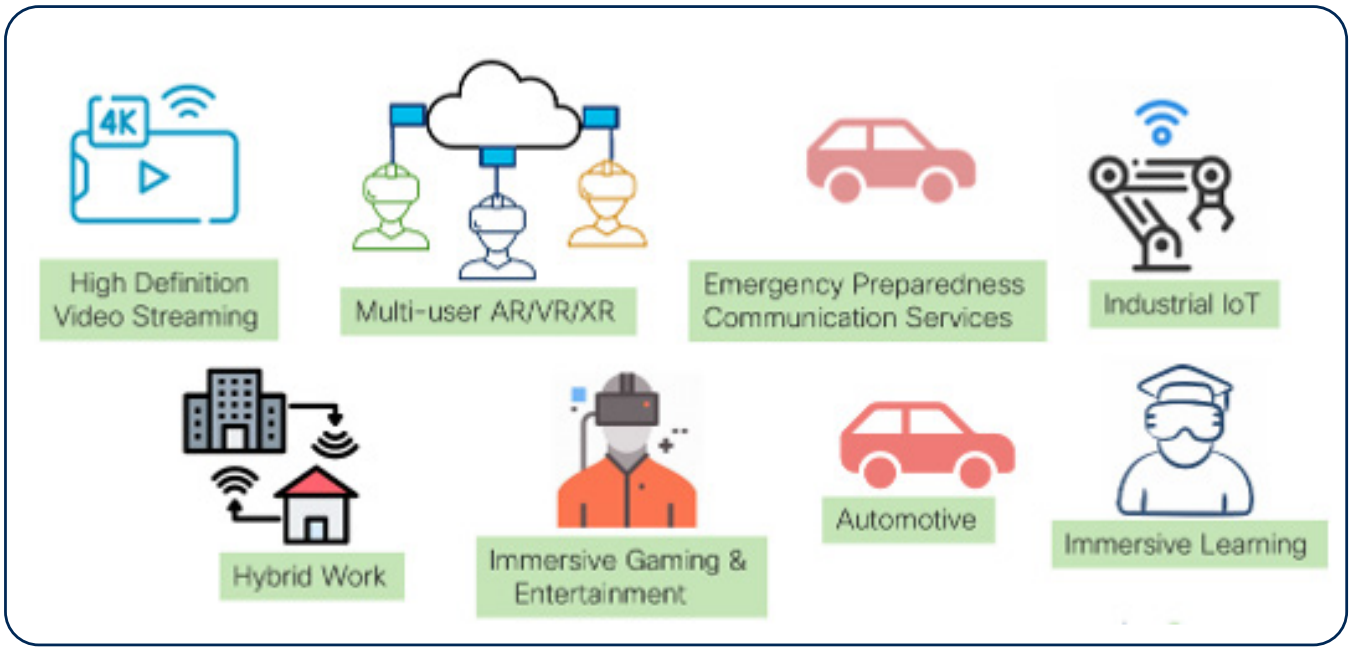


Figure 7 – Example of Wi-Fi 7 Use Cases
Source: Cisco

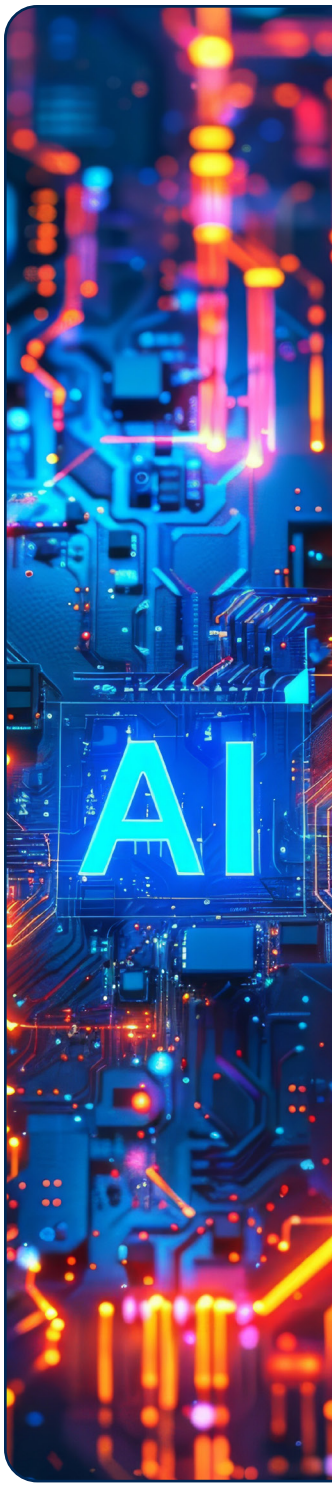
Wi-Fi 7 is designed to meet the demands of next-generation applications, offering a wide range of use cases:

Healthcare:

Wi-Fi 7 enhancements offer significant benefits to the healthcare market by enhancing connectivity, supporting the growing demand for real-time data transmission, and improving patient care. One of the key advantages is its ability to support high-bandwidth applications like telemedicine, remote consultations, and high-definition video conferencing, ensuring smooth and reliable communication between healthcare providers and patients. Wi-Fi 7 also facilitates real-time monitoring (Real Time Location Services - RTLS) of patients through connected devices, such as wearables and medical IoT (IoMT) equipment, providing doctors with up-to-date health data, improving diagnostics, location, and enabling faster response times. Its low latency and high capacity allow for seamless data transfer in critical hospital environments, where large volumes of medical data (e.g., imaging, patient records) need to be transmitted quickly and securely across multiple devices and systems. Additionally, Wi-Fi 7 can support the high-density environments of hospitals and clinics, where many devices and users are connected simultaneously without compromising performance, leading to more efficient workflows and better patient outcomes. With ultra-low latency and high throughput, Wi-Fi 7 ensures that real-time data transmission between AI systems and robotic devices is seamless, which is crucial for applications like surgical robots, robotic-assisted rehabilitation, and automated delivery robots. These robots rely on precise, real-time communication to carry out complex tasks, and Wi-Fi 7's performance allows for minimal delays, even in high-bandwidth environments within hospitals. AI-powered systems in healthcare, such as diagnostic tools or predictive analytics platforms, can also benefit from Wi-Fi 7's ability to handle large amounts of data quickly. This is especially important when dealing with medical imaging, patient records, or sensor data from wearable devices. With Wi-Fi 7's advanced features, multiple AI systems and robots can be connected simultaneously without interference, enabling smooth coordination and enhancing the overall performance of automated workflows and improving overall quality of care.

High-definition video streaming:

Wi-Fi 7 offers significant benefits for high-definition video streaming, providing a more stable and seamless viewing experience. With its higher bandwidth, better interference mitigation, lower latency, Wi-Fi 7 can support 4K, 8K, and other high-bitrate video content without buffering or interruptions. The ability to transmit large amounts of data quickly ensures smoother streaming, even in environments with multiple devices connected simultaneously. Additionally, Wi-Fi 7's advanced features, like Multi-RU and Preamble Puncturing, optimize spectrum efficiency, further improving the quality of video streams and reducing congestion. This makes Wi-Fi 7 ideal for delivering high-quality video content in homes, schools, entertainment venues, and other settings where a smooth and high-fidelity streaming experience is essential.



AR/VR/XR/MR and AI:

Another practical application is in augmented reality (AR,) virtual reality (VR,) extended reality (XR,) and Mixed Reality (MR,) where Wi-Fi 7 supports immersive experiences with ultra-low latency and high data throughput, essential for real-time interaction. These immersive technologies require real-time data transfer with minimal delay to ensure smooth and responsive experiences. Wi-Fi 7's increased bandwidth and advanced features, like MLO, Multi-RU and Preamble Puncturing, enable faster data transmission and better handling of high-resolution content, which is essential for these demanding applications. With Wi-Fi 7, users can experience seamless interaction in virtual environments, whether it's for gaming, remote collaboration, training, or entertainment, even in high-density environments with multiple devices connected. Its ability to deliver stable, high-speed connections ensures that AR, VR, XR, and MR technologies perform at their best, enhancing user experience and opening new possibilities in various fields. Additionally, Wi-Fi 7's technological enhancements support Artificial Intelligence (AI) with extremely high throughput, low latency and robust connectivity, which is crucial for AI applications. Its advanced features provide the ability to handle large volumes of data, allowing AI systems to transmit and process real-time information efficiently. This is particularly important for AI-driven tasks like intelligent network management, where AI can dynamically optimize network performance based on real-time data, ensuring better traffic management, reduced congestion, and improved user experiences. Wi-Fi 7 also supports AI applications in areas like autonomous vehicles, industrial IoT, and smart cities, where large-scale data exchange and real-time decision-making are essential. By providing faster, more stable connections, Wi-Fi 7 helps unlock the full potential of AI, enabling smarter, more efficient systems across various industries.

Enterprise and public venues:

Wi-Fi 7's advanced features, such as wider channel bandwidths, lower latency, and Multi-RU, enable businesses to handle more connected devices simultaneously without compromising performance. This is particularly valuable in high-density environments, such as office buildings, conference rooms, large campuses, entertainment venues where numerous users and devices are accessing the network at the same time. Wi-Fi 7's enhanced spectrum efficiency, through techniques like Preamble Puncturing, minimizes interference, ensuring more reliable and stable connections. These improvements translate to faster and more efficient collaboration tools, video conferencing, cloud applications, and secure data transfer, ultimately boosting productivity and overall network performance in enterprise settings.

Automotive:

Wi-Fi 7 offers significant advantages for the automotive industry by enabling faster, more reliable connectivity for in-car systems and vehicle-to-everything (V2X) communications. With its high throughput and low latency, Wi-Fi 7 supports real-time data transfer for advanced driver-assistance systems (ADAS), autonomous vehicles, and infotainment systems, promising seamless operation and safety. The increased bandwidth and wider channels allow for the efficient handling of large volumes of data from sensors, cameras, and onboard diagnostics. Additionally, Wi-Fi 7's ability to manage multiple devices simultaneously ensures that vehicles can maintain stable connectivity even in crowded environments, such as traffic or parking lots. These improvements enhance vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communication, contributing to safer and smarter transportation systems.

Figure 8 - Digital manufacturing - Industrial automation robot in intelligent factory on real time monitoring system software

Manufacturing/Industrial/Warehouse:

Smart factories leveraging Internet of Things (IoT) devices and real time location services (RTLS) will see improved operational efficiency and real-time monitoring capabilities with the deployment of Wi-Fi 7 networks. Wi-Fi 7 provides robust support for the industrial, manufacturing, and warehouse sectors, particularly for Industrial IoT (IIoT) applications. The industrial internet of things (IIoT) is the use of smart sensors, actuators and other devices, such as radio frequency identification tags, to enhance manufacturing and industrial processes. Wi-Fi 7 enables robust wireless communication between IoT devices, sensors, robots, and automated machinery, which are essential for modern smart factories and warehouses. The increased bandwidth and capacity allow Wi-Fi 7 to handle the growing number of connected devices in industrial environments without compromising performance. Its ability to manage high-density environments ensures smooth operation, even with numerous devices communicating simultaneously. Wi-Fi 7 also enhances real-time data transfer, which is crucial for predictive maintenance, asset tracking, and supply chain management. Advanced features like Multi-RU and Preamble Puncturing optimize spectrum efficiency, reduce interference, and provide more stable connections in complex industrial settings.

There are many other practical use cases such as Immersive Learning, Hybrid Work, Emergency Communication Systems, Smart Homes, Smart Cities, among others.

Preparing Your Network Infrastructure

Preparing your network infrastructure for Wi-Fi 7 involves strategic planning, assessment of current capabilities, and proactive upgrades to accommodate the advanced features and requirements of this next-generation wireless standard. By taking these steps, organizations can position themselves to leverage Wi-Fi 7's transformative potential, enhance connectivity, and support future innovation in a rapidly evolving digital landscape. Engaging with a consultant or design engineer is recommended.

Figure 9 – Wireless AP placement engineering design planning

Wi-Fi 7 Access Point (AP) Deployment Considerations

In today's digital age, deploying Wi-Fi 7 wireless access points is not just a technical task but a strategic initiative that influences network performance, physical security, aesthetics, adaptability, and manageability throughout the installation's life cycle. By thoughtfully optimizing the installation process to align with the demands of modern networks, organizations can strike a balance between performance and the physical requirements of today's networks, while also helping to reduce future AP maintenance or upgrade costs.

Here are a few tips.

1. Clipping APs onto ceiling grid is becoming less desired – many environments need more modernized functionality.
2. Adopt an installation method that gives you confidence. As access points evolve, they may become larger and heavier – making it crucial that your AP installation is secure and will deliver value throughout its entire lifespan.
3. There has been a significant increase in the desire to maintain aesthetics within the buildings. Aesthetic requirements could be present in historical buildings to maintain the history, also prevalent in new modern building architecture. Select an installation method that helps you to blend the AP into the environment.

4. Choose an installation method that offers rapid serviceability. Quick and easy access to the AP and connectivity components for maintenance can help reduce time and labor costs.
5. Select an installation method that provides physical infrastructure security to avoid costly tampering, and unauthorized access.
6. Provide a low-cost migration path to future access point upgrades to help reduce time in the space, material cost to upgrade, and overall project cost. This installation method should provide interchangeable doors and trims on mounts and enclosures.
7. Deploy an installation method that will help simplify hospital infectious control procedures and significantly reduce costs.
8. Exploit the full performance of the AP with proper positioning - provide greater use of the technology by properly positioning the AP.
9. By providing a consistent look and functionality with the installation method throughout the facility, it will help reduce maintenance costs, extra tools, and processes.
10. "The wireless access point infrastructure physical design should consider consistency, compatibility, and ease of operational support while lowering overall cost" - ANSI/BICSI 008-2024 Wireless LAN Systems Design and Implementation Best practices.
11. "Design costs should consider both initial installation costs as well as operational costs" - ANSI/BICSI 008-2024 Wireless LAN Systems Design and Implementation Best practices.
12. "Ease of operational support and consistency" - ANSI/BICSI 008-2024 Wireless LAN Systems Design and Implementation Best practices.

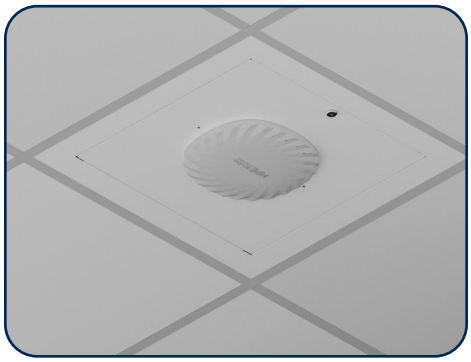
Summary: The foundation of any successful network begins with the installation of wireless access points (APs). By strategically optimizing your AP installation platform, you can not only meet current performance, security, and network operational requirements but also ensure the network is prepared for future deployments and advancements. This approach supports long-term efficiency, scalability, and adaptability as technology continues to evolve.

Oberon® Wi-Fi 7-Ready Infrastructure Solutions

Oberon brings a wealth of expertise and experience to the table, specializing in the design of wireless infrastructure mounting solutions tailored to the unique needs of modern-day network requirements.

Oberon offers wireless installation mounting solutions designed specifically for the integration of wireless network edge components into any environment, from indoor ceiling and wall mounting to outdoor, facilitating compliance with industry guidelines, and recommendations.

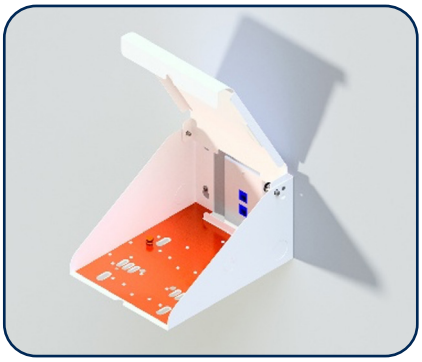
Oberon® Wi-Tile® Ceiling Enclosures: A Modern Approach to Ceiling Mounting Equipment



Model 1047 Series:

- The 1047 Series enclosure is a 2′ x 2′ ceiling tile enclosure offering interchangeable doors
- This sophisticated modern design seamlessly blends into the ceiling structure with attractive textured powder coat finish
- Lockable drop-down doors permit quick and easy access to equipment and cabling WITHOUT the need to open the above ceiling space
- Mounts AP flush to the ceiling, with an AP specific door for optimal wireless coverage
- Solid back-box fills opening behind AP in the ceiling creating an effective fire-resistant, smoke and dust barrier simplifying ICRA compliance
- Firestop grommet to properly seal cable egress in the backbox
- Stow service loop cable and connectivity components in the backbox
- UL 2416 listed for low voltage applications. Designed to meet NEC300-22 and 300-23 for plenum installations. HCAI approved, OPM-0110-13

Oberon® H-Plane™ Right Angle Surface Mount: A Modern Approach to Horizontal Wall Mounting



Model 1011:

- This purpose-built modern design mounts the Wi-Fi AP in preferred horizontal orientation on walls with a professional finish
- The universal design accommodates most manufacturer wireless APs
- The opening in the back enables installation directly over a telecommunications outlet
- Secure cover conceals outlet, connectors, and cabling
- Knockouts on two sidewalls for 1 in. trades size conduit connectors

Oberon® NetPoint™ Wireless Bollards 3032

Wi-Fi 7 is poised to be a game-changer in wireless technology. Expanding on the foundation of Wi-Fi 6/6E, it brings significant enhancements in channel bandwidth, modulation techniques, and the ability to handle multiple devices more effectively. Wi-Fi 7 will transform wireless connectivity, enabling ultra-fast, reliable, and efficient communication for a wide range of applications, from AI and IoT to high-definition streaming and immersive technologies. These advancements promise an exceptional user experience and a future of seamless, high-performance wireless networks. Modernizing your wireless AP deployment will enhance your network's operational efficiency, meet aesthetic and performance goals, and simplify management requirements.

Looking for more Oberon solutions? Visit us at www.chatsworth.com/en-us/products/wireless-enclosures.

References

ANSI/BICSI 008-2024 Wireless LAN Systems Design and Implementation Best practices:
https://www.bicsi.org/standards/available-standards-store/single-purchase/ansi-bicsi-008-2018

Cisco - Wi-Fi 7 (802.11be) Technical Guide:
https://documentation.meraki.com/MR/Wi-Fi_Basics_and_Best_Practices/Wi-Fi_7_(802.11be)_Technical_Guide

Intel Corporation - What is Wi-Fi 7:
https://www.intel.com/content/www/us/en/products/docs/wireless/wi-fi-7.html

IEEE 802.11 Working Group:
www.ieee802.org/11

Wi-Fi Alliance – Wi-Fi Certified 7:
https://www.wi-fi.org/discover-wi-fi/wi-fi-certified-7

Contributors

Bree Murphy, RCDD
Global Technical Training | Applications Engineer
Oberon® A division of Chatsworth Products

Bree brings more than 38 years of distinguished experience in the Information and Communication Technology (ICT) industry, with expertise in management, training, speaking, and sales. A prolific author, her passion lies in making impactful contributions to the industry. A dedicated member of BICSI for 25 years, Bree is a recognized and accomplished RCDD, serving an active role in multiple BICSI Working Groups within the BICSI International Standards Program. She currently serves as Vice Chair of the BICSI Wireless Standards and is also leading initiatives with Wi-Fi NOW Global.

About Us

Oberon, a division of Chatsworth Products has been been at the forefront of pioneering innovative wireless mounting solutions since 1999. We collaborate with top technology innovators to meet the pressing demands of modern business today. From Wi-Fi and 5G cellular to DAS antennas and medical wireless nodes/access points, Oberon delivers mounting solutions that streamline technology transitions, enhance physical security, meet codes and regulations, enable seamless authorized access for maintenance, and optimize performance/aesthetic standards.

oberonwireless.com
sales@oberonwireless.com
877-867-2312