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Operationalizing
Wi-Fi 7: Strategies
for Seamless
Deployment and
Management



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The Dawn of a New Wi-Fi Era

Wi-Fi, a wireless local area network (WLAN), is one of technology's greatest success stories. Today, Wi-Fi networks are the preferred way of accessing the internet for millions of homes, businesses, and public spaces worldwide. The majority of smartphone data consumption occurs over Wi-Fi, and outside the home, Wi-Fi use accounts for up 84% of the traffic. The value of Wi-Fi to the global economy is forecast to reach almost \$5 trillion by 2025.¹ Since 2019, home internet data usage has increased by 94%. In 2024, home internet subscribers consumed about 700 GBs per month.²

Wi-Fi's success rests on its continuous evolution. With each new Wi-Fi standard, the technology has advanced to produce faster speeds, increased capacity, lower latency, and greater security. This progress has allowed Wi-Fi to meet the growing demands of bandwidth-intensive applications, such as 4K/8K video streaming and immersive real-time gaming experiences—ensuring it remains the technology of choice for an increasingly connected world.

The evolution continues with the latest standard: Wi-Fi 7. Over the coming years, this new Wi-Fi standard will be incorporated into the latest consumer and enterprise devices. In September 2024, Apple announced the new iPhone 16 which supports Wi-Fi 7, making Wi-Fi 7 the emerging mainstream Wi-Fi technology. As it continues to gain traction, it will open lucrative new markets for services that depend on higher-capacity, higher-performance wireless connectivity.

However, the dawn of this new era raises questions for broadband service providers (BSPs). Do my subscribers need Wi-Fi 7 today? Is my network ready to support it? Will upgrading to Wi-Fi 7 add complexity and costs to my operations?

In this eBook, we'll answer those questions and define a strategy for deploying Wi-Fi 7 that maximizes impact and delivers sustainable growth.



What Is Wi-Fi 7?

The Next Generation of Wireless Connectivity

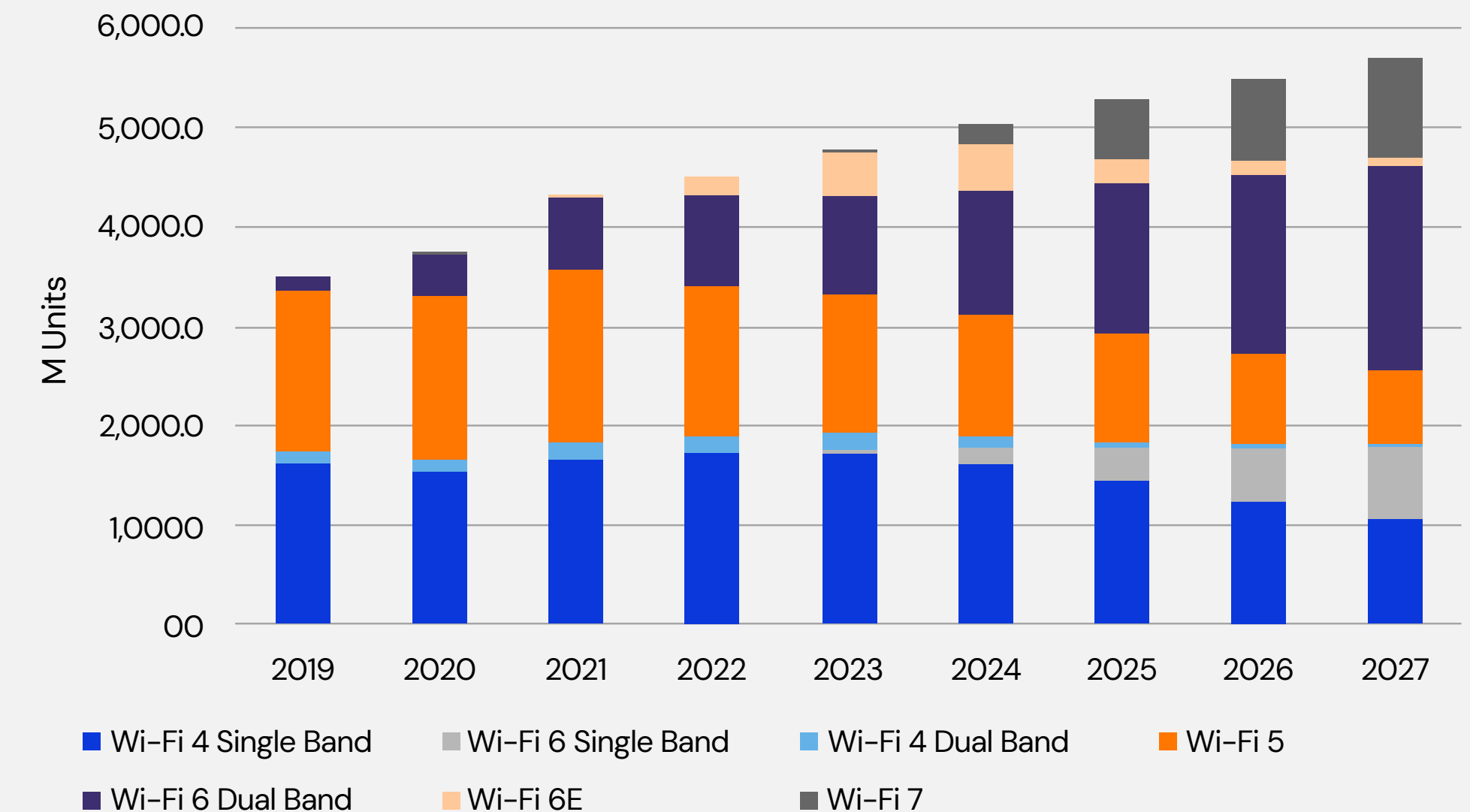
Wi-Fi 7 promises to deliver much faster speeds, lower latency, and greater efficiency than previous standards. It will meet the demand for more robust and reliable internet connectivity, driven by the next generation of smart devices and bandwidth-intensive applications and services.

Compared to its predecessors (Wi-Fi 6 and Wi-Fi 6E), Wi-Fi 7 doubles the available bandwidth to 320 MHz using the new 6 GHz band. This is accomplished by quadrupling the modulation technique from 1K to 4K Quadrature Amplitude Modulation (QAM)—compressing more data into the same-sized channel. If it were a freeway, it would be like adding more traffic lanes without expanding the road's physical size.

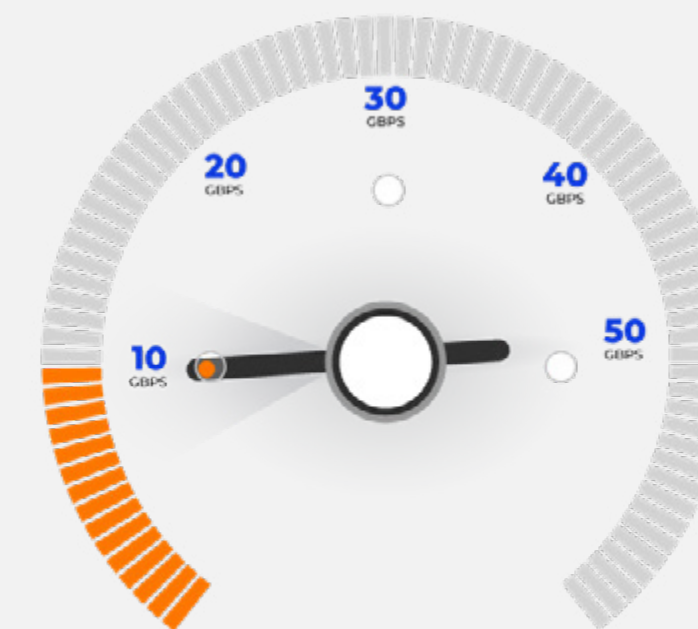
These greater capacity channels give Wi-Fi 7 a theoretical top speed of 46.4 Gbps, a four-fold increase from what was possible before. In real-world conditions, a Wi-Fi 7-equipped laptop can achieve a data rate of around 5.8 Gbps, 2.4 times faster than Wi-Fi 6/6E.³ That's enough to stream 50 8K movies simultaneously without buffering, delay, or congestion issues.

The [Institute of Electrical and Electronic Engineers \(IEEE\)](#) has finalized the Wi-Fi 7 standard (802.11be), enabling consumer devices equipped with Wi-Fi 7 to benefit from the improvements. The [Wi-Fi Alliance](#) predicts that around 233 million Wi-Fi 7-enabled devices will enter the market in 2024, rising to 2.1 billion by 2028 as mass-market adoption ramps up.⁴

Wi-Fi Market Forecast by Standard, 2019–2027⁶



The maximum speed for Wi-Fi 6/6E is 9.6Gbps.




The maximum speed for Wi-Fi 7 is 46.4Gbps. (Over 4x increase!)








Benefits of Wi-Fi 7


Wi-Fi 7 offers several key features and improvements over previous Wi-Fi standards.


 **Faster data rates.** Wi-Fi 7 supports more high-capacity channels up to 320 MHz on 6 GHz, double the 160 MHz available via Wi-Fi 6. Extending channel width enables more simultaneous transmissions at the fastest possible speeds.


 **More data in each signal.** Wi-Fi 7 uses the 4096-QAM (4K) modulation technique, an upgrade to the 1024-QAM used in Wi-Fi 6, enabling more data to be packed into each transmission.


 **Frequency band aggregation.** Using multi-link operation (MLO), Wi-Fi 7 aggregates multiple frequency bands (2.4 GHz, 5 GHz, and 6 GHz) simultaneously, allowing for higher throughput and more reliable connections.


 **Maximize bandwidth usage.** With Multi-RU Puncturing, Wi-Fi 7 provides adaptive bandwidth transmission to maximize available bandwidth, translating to the most efficient bandwidth usage.


 **Enhanced multi-device support.** Improvements in multi-user multiple input multiple output (MU-MIMO) technology increase the number of spatial streams from eight to 16, allowing Wi-Fi 7 to handle more devices simultaneously and maximize performance in crowded environments.


 **Improved resiliency.** Adding MLO and other enhancements improves resiliency, supporting services via multiple spectrum bands.


 **Less interference.** The 6 GHz spectrum provides 1.2 GHz of channel width, translating to substantially more channels and allowing Wi-Fi networks to transmit without interference from each other.

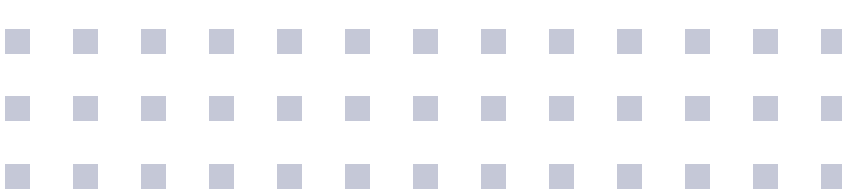
 **Standard power transmission.** Wi-Fi 7 incorporates Automated Frequency Coordination (AFC) technology to enable standard power transmission at the 6 GHz band, greatly extending the reach with true multi-gig bandwidth.

 **Spectrum efficiency.** Improved frequency shifting leads to more efficient spectrum use, including routing traffic to spectrum bands with available capacity.

 **Backwards compatibility.** Wi-Fi 7 maintains compatibility with previous Wi-Fi standards, ensuring existing devices can still connect to Wi-Fi 7 networks even if they don't benefit from the new standard's enhanced capabilities.

 **More efficient power usage.** Like Wi-Fi 6, Wi-Fi 7 devices feature power-saving technologies, such as Target Wake Time, which help reduce power consumption and improve battery life.

 **Greater security.** Wi-Fi 7 continues to drive the adoption of the Wi-Fi Protected Access 3 (WPA3) security protocol, which offers more robust encryption, improved authentication methods, and additional features for high-security enterprise environments.



Unlocking New Use Cases

With the introduction of the iPhone 16, Wi-Fi 7 is quickly becoming a commercial reality. Once mass-market adoption is achieved, it will mark a significant step forward in wireless networking. The enhanced features and increased speeds enabled by Wi-Fi 7 unlock new use cases across consumer, small business, and enterprise segments.

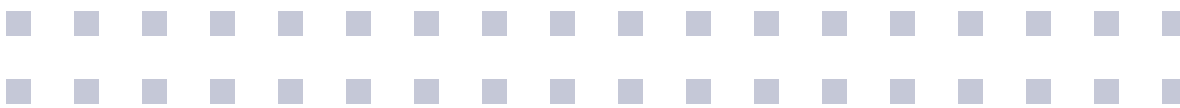
Consumer Use Cases

- **Ultra-fast streaming.** Seamless 8K (and higher) video streaming without buffering or latency issues.
- **Augmented and virtual reality.** Immersive augmented reality (AR) and virtual reality (VR) experiences for gaming, training, and remote collaboration.
- **Cloud gaming.** High-bandwidth gaming via the cloud without the need for a wired connection.
- **Advanced smart home.** Support for a more extensive range of smart home and Internet of Things (IoT) devices with greater range, efficiency, and reduced power consumption.
- **Extended Wi-Fi.** Enhanced range and coverage using advanced beamforming and improved mesh networking.

Work-From-Home / Enterprise Use Cases

- **Remote healthcare.** Instant video and data transmission for telemedicine allows remote diagnostics and even remote surgery.
- **Industrial automation.** Real-time monitoring and control of systems and processes in industrial settings such as manufacturing.
- **Smart cities.** Connectivity for municipal services such as traffic control systems, public safety networks, and environmental monitoring.
- **Enhanced collaboration.** New video conferencing and remote collaboration tools for remote working, training, and education.
- **Automated transportation.** Improved communication between vehicles and infrastructure, supporting automated driving and traffic management.
- **MDU deployment.** Substantial improvement in Wi-Fi quality of experience (QoE) by leveraging many channels without interference in a dense MDU environment.

Wi-Fi 7 will drive innovation across multiple sectors by enabling new use cases. As these capabilities are operationalized, Wi-Fi 7 will enhance existing services and pave the way for entirely new applications, shaping the future of wireless connectivity.



Developing a Market Strategy

Preparing for the Market Opportunity

With major changes in the Wi-Fi 7 standard, early adopters are likely to be found in performance related applications and market segments like multi-dwelling units. Households with multi-player gamers can benefit from the performance improvement while MDU owners will benefit from the extra capacity offered in the 6 GHz spectrum. BSPs should target these opportunities as a means to evolve their service offering and incorporate the technology to help create differentiated services.

Understanding the Market Opportunity

BSPs need to consider several factors when developing their Wi-Fi 7 strategy. The first step is understanding their subscribers' current needs and pain points to assess the demand for Wi-Fi 7's increased speeds and enhanced features and capabilities.

For BSPs already offering advanced access technologies such as XGS-PON, offering Wi-Fi 7 will allow subscribers to take full advantage of the higher speeds available. XGS-PON can deliver speeds up to 10 Gbps, but the actual speeds experienced by subscribers can be constrained by their current premises equipment. On the flipside, Wi-Fi 7 allows the wireless network to match the capabilities of the access network.

However, even with high-speed WAN and LAN capabilities, subscribers will need Wi-Fi 7-compatible consumer devices to take full advantage of the technology. The Wi-Fi Alliance began certifying Wi-Fi 7 devices in January 2024, but the first wave of devices is prohibitively expensive for most consumers. The higher cost is due to extra electronics and processing capability to support new features such as MLO and Multi-RU Puncturing. Mass-market adoption will likely accelerate once retail costs decline and support by high-profile device brands increases.

Fixed devices such as smart TVs and set-top boxes will initially benefit most from Wi-Fi 7. While enhancements such as MLO can be challenging for mobility, smart TVs will fully benefit from the increased capacity and reliability improvements when performing high-bandwidth tasks such as 8K streaming.

Market readiness also varies depending on the sector. Small businesses and municipal customers may have a more immediate need for Wi-Fi 7 capabilities than residential subscribers. For example, efforts to provide better coverage and capacity at public venues, such as sports stadiums, will likely be an early use case. Businesses may also have greater financial means to invest early in Wi-Fi 7.

By aligning offerings with your market’s specific needs and capabilities, BSPs can ensure a smooth transition to this next-generation technology and realize its full potential.



Deploying and Optimizing Wi-Fi 7

While rolling out managed Wi-Fi 7 will be more or less business as usual, BSPs must address three critical areas to ensure a successful deployment: software-enabled intelligent Wi-Fi systems, end-to-end cloud-based management, and developing a winning strategy.

Software-Enabled Intelligent Wi-Fi Systems

Wi-Fi 7 requires intelligent systems that deliver high performance, integration, compatibility, flexibility, and scalability. The systems also need to integrate rapidly with existing network platforms, along with service delivery and management workflows.

- **High performance.** Wi-Fi 7's tri-band functionality requires systems to perform more tasks across more frequency bands—controlling functions such as band steering, node steering, and channel management. These systems must also be optimized for high performance and capable of delivering Wi-Fi 7 advancements in reduced latency, increased throughput, and improved efficiency.
- **Integration and compatibility.** Wi-Fi 7 systems must be backward compatible with existing Wi-Fi standards and support open standards such as TR-069 (for remote management) and TR-369 (IoT and smart home management). They must also be sufficiently future-proof to accommodate enhancements via firmware upgrades.
- **Flexibility and scalability.** Wi-Fi 7 systems must offer flexible deployment options for various environments, such as residential and small business settings. This gives BSPs the scalability to expand Wi-Fi 7 capabilities in line with growing demand.



End-To-End Cloud-Based Management

Wi-Fi 7 needs cloud-based management to enable centralized control, enhanced analytics and monitoring, quality of experience assurances, proactive support, and marketing insights.



Centralized Management and Control

- Cloud-based solutions allow BSPs to centrally manage and configure Wi-Fi 7 networks across multiple locations, including remotely configuring SSIDs, security protocols, and firmware updates.
- Establish best practices associated with installation and service turn-up to minimize cost. Verify coverage, capacity, and performance during installation—this will help reduce or eliminate repeat visits from field technicians.
- Offer data-driven, cloud-enabled subscriber self-installation options and capabilities to accelerate growth and increase subscriber satisfaction while reducing OpEx.

Residential Wi-Fi system installation options are critical to BSP growth, as the fiber-to-the-home (FTTH) market is expected to expand steadily over the next decade. While subscribers are increasingly comfortable installing their Wi-Fi systems, field visits are sometimes necessary. There are essentially three types of Wi-Fi system installation options available for BSPs:

- 1 “Do-it-yourself” subscriber self-installation via a mobile app provides a powerful way to elevate the subscriber experience without initiating a truck roll. By leveraging a cloud platform, BSPs can pre-configure the Wi-Fi system to automatically provision and sync with the subscriber’s mobile app when plugged in.
- 2 Assisted subscriber self-installation with guidance from a remote cloud-enabled BSP customer service representative (CSR). This assisted option combines the flexibility of self-installation with help from their CSR for subscribers who prefer convenience with added support.
- 3 Onsite visit with a field technician that leverages a “smart” cloud-enabled field app that empowers them to deliver white-glove service while reducing operating expenses by consolidating tasks and speeding up resolutions.



Enhanced Analytics and Monitoring

- Cloud-based management provides real-time monitoring of Wi-Fi performance, allowing BSPs to identify trends, optimize performance, and predict potential issues before they impact subscribers.
- Utilize a cloud platform to capture and drive enhanced visibility of data and performance levels, resulting in more detailed troubleshooting capabilities for generating tracking reports on customer-impacting issues such as dropped connections, Wi-Fi signal strength, or slow data throughput speeds.
- Leverage cloud-based tools to provide real-time and historical performance data to proactively identify issues, remotely troubleshoot, and resolve problems to minimize costly truck rolls or customer trouble reports.



Quality of Experience (QoE)

- By dynamically adjusting settings based on real-time cloud data—including prioritizing traffic for different services (VoIP, streaming, gaming, etc.)—BSPs can deliver an enhanced Wi-Fi 7 subscriber experience.



Proactive Customer Support

- End-to-end cloud visibility into the subscriber experience enables proactive issue identification and quick resolution, simplifying workflows and subscriber upsell opportunities.



Marketing and Subscriber Insights

- By accessing subscriber intelligence via a cloud-based system, BSPs can identify prospects most likely to upgrade to Wi-Fi 7 services and create personalized offers that drive increased subscriber adoption.





Partnering for Success

A successful Wi-Fi 7 strategy should include external partners you can rely on for expert support, guidance, and regulatory compliance.

- **Expert support.** As with any significant technology upgrade, BSPs benefit from third-party support to seamlessly activate, integrate, and optimize new Wi-Fi 7 systems.
- **Success development.** Access to expert advisors to guide on setting best practices and developing success plans tailored to specific goals and challenges.
- **Regulatory compliance.** Wi-Fi 7 brings new regulatory responsibilities, such as Automated Frequency Coordination (AFC) registration in the latest 6 GHz band. A third-party provider typically offers this, but researching and negotiating with an AFC provider could be expensive and time-consuming. BSPs should consider a provider integrating AFC support in its Wi-Fi 7 solution offering.

Successfully Launching Wi-Fi 7

Wi-Fi performance increasingly defines the subscriber's experience, so all BSPs will eventually offer the latest Wi-Fi technology. The move to Wi-Fi 7 requires planning, strategic investment, and the right partnerships. Not all subscribers will be early adopters, and understanding market demand and industry maturity is critical to developing an effective and successful Wi-Fi 7 rollout strategy.

For the average residential subscriber (even those with 30+ devices connected to their home network⁵), existing Wi-Fi 6 technology will likely be sufficient to meet their needs in the near term. However, growth in high-bandwidth services such as AR/VR and immersive real-time cloud gaming—alongside a maturing and more affordable Wi-Fi 7 device ecosystem—will quickly ramp up demand for Wi-Fi 7.

However, offering the latest and greatest Wi-Fi technology without considering other factors will not increase subscriber retention or profitability. Reliability, ease of use, and excellent customer support are equally important. Adopting Wi-Fi 7 should be part of a broader strategy to take advantage of the latest technology evolutions to deliver and support exciting new services that address the needs and interests of your subscriber base.

Delivering these objectives begins with a platform-based approach to broadband service delivery. A platform ensures the underlying network runs at peak performance and the Wi-Fi connectivity is optimized within the subscriber's premises. Using a software-enabled broadband platform means BSPs can quickly and seamlessly deploy intelligent Wi-Fi 7 systems to subscribers, using cloud-based solutions to monitor performance, troubleshoot, and optimize the subscriber experience.

This approach allows BSPs to deploy Wi-Fi 7 as part of their product roadmap and scale according to market demand. It's the easy way to bring the latest wireless technology to subscribers and usher in a new era of connectivity.



Deploying Wi-Fi 7 on the Calix Broadband Platform

The Calix Broadband Platform empowers BSPs with a revolutionary network and management foundation that provides everything needed to grow revenue and reduce costs. By understanding and improving network, service, and subscriber performance, BSPs can lower expenses, eliminate guesswork, and simplify introducing new services and Wi-Fi technologies.

The software-defined Intelligent Access™ solution lets BSPs use the latest broadband access innovations at software speed to flexibly and cost-effectively deploy anywhere and grow with demand. The Unlimited Subscriber™ portfolio provides a system for every use case and supports Wi-Fi 7. Integrated Calix Cloud® applications deliver end-to-end insights and visibility that enhance operational, support, and marketing workflows for better team productivity and subscriber experience. This includes specialized tools such as Calix Operations Cloud™ and Calix Service Cloud™.

In addition, Calix Success provides resources and professional guidance to achieve and exceed long-term objectives—accelerating time to value and ensuring a maximum return on investment.

Schedule a consult today to discover how BSPs can simplify Wi-Fi 7 deployments on the Calix Broadband Platform.

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