



5G Fixed Wireless Broadband

Helping close the digital
divide in rural America

Introduction

High-speed broadband connectivity has become increasingly important to Americans to unlock economic opportunities, quality education, access to healthcare and civic participation. A stable video stream is integral to many of these connectivity use cases and requires a high-speed broadband connection at home. In rural America, however, such bandwidth is often much harder to come by.

Fortunately, wireless providers have been actively working at an accelerated pace throughout the pandemic, investing in and deploying 5G technology. Fixed Wireless Access (FWA), powered by 5G technology, offers a robust, high-speed connectivity option that can serve millions of homes in rural parts of the United States.

With the recent historic infrastructure investment of \$65 billion to close the digital divide, it is key to acknowledge that 5G FWA is a future-proof technology that has the potential to offer better economics and speed of deployment. The advancements in 5G fundamentally enhance the viability of wireless as a home broadband solution.

To ensure that everyone—particularly in rural areas—is able to take advantage

of truly high-speed internet like 5G FWA, now is the time to expand innovation capacity and investment to ensure that no one is left behind. The goal of truly high-speed internet for everyone can be reached even faster and more cost-effectively thanks to broadband policy that is inclusive of both wired and wireless connectivity solutions. This is particularly important as federal and state policymakers implement the broadband funding in the infrastructure legislation.

To that end, it is critical for policymakers to recognize the potential of 5G FWA, which can provide higher-speed and more consistent service than underserved areas have often experienced.

Our analysis shows that rural and underserved communities stand to benefit significantly from 5G FWA, with this wireless technology capable of bringing robust broadband connectivity to nearly half of rural households in the U.S. It is time to bring their full participation in the digital economy up to speed—and work toward eliminating America's digital divide.

What is 5G FWA

FWA is an innovative way of providing high-speed internet access. Instead of fiber-optic or cable lines running into every household, FWA uses wireless links between fixed points—such as a cell tower and an antenna on a person’s roof. Essentially, it is a last-mile method capable of delivering speeds in excess of how consumers typically use their internet connectivity.

Newer generations of wireless technology such as 4G/LTE have improved FWA and have expanded coverage thanks to mobile networks. Advancements in 5G network technologies have significantly improved the download, upload and latency capabilities of FWA services. By leveraging advances in wireless network technologies like 5G, an FWA connection can potentially deliver sustained download speeds, through the air, of 1 Gbps up to four miles¹—the distance between the Hart Senate Office Building and Ronald Reagan Washington National Airport or, say, between an Iowa farmer’s house and the nearest tower. Given that upgrades to FWA service will rely upon the same standards and equipment of 5G and future mobile network generations, this interoperability makes FWA relatively future-proof and scalable.

The average household now has multiple, high-bandwidth devices all running simultaneously, serving multiple purposes. With 5G FWA advances, this technology can more than meet the connectivity demands in terms of speeds and bandwidth.

FWA networks in the U.S. can be expected to deliver at least 100 Mbps download speeds to individual subscribers (potentially up to 1000 Mbps, depending on specific markets and each customer’s location).

As advanced 5G technology rolls out with high-band spectrum, FWA will have 10 to 100 times more capacity than 4G, allowing for increasingly higher—and potentially symmetrical—download and upload speeds. Additionally, future 5G-enabled FWA services will provide ultra-reliable service with under 10 millisecond latencies that are critical to many emerging 5G use cases. Many 5G FWA offerings feature unlimited data packages; ensuring these services can continue to offer such robust data capacity depends on the availability of more licensed spectrum.

As policymakers look to close the digital divide in rural America, it is key to recognize that 5G FWA has the potential to offer at least three significant benefits.



Lowered Cost-to-Serve

FWA offers a transformative alternative by removing many of the cost impediments by as much as 40% compared to fiber-to-the-home (FTTH).² Moreover, part of the improved cost equation will rely on the use of existing cellular towers, minimizing the need for new construction. With FWA it is estimated that the cost per bit to connect a household could be reduced up to 80% due to radio innovations such as massive multiple-input and multiple-output (MIMO) and beamforming.³ Overall, these improved unit economics have transformed the ROI equation by driving down the last mile cost-to-serve of FWA broadband.



Streamlined Deployment

Since FWA uses point-to-multipoint radio links to connect network access

units (AUs) with consumer premise equipment (CPEs) installed in homes and businesses, new subscribers can be granted broadband access through simple self-installation methods, instead of requiring time-intensive traditional installations and incurring truck roll costs.⁴



Network Efficiency

In legacy network architecture, many of the costs are driven by the deployment of radio access networks (RAN). Network function virtualization (NFV) and software-defined networking (SDN) enable improved RAN economics and network optimization.⁵ By leveraging these 5G network innovations, operators can achieve better economics by virtualizing RAN to flexibly manage download and upload capacity based on real-time user requirements. Combined with improvements in spectral efficiency and beamforming, operators can optimize resources to maximize performance.

It is important to note, too, that the journey is already underway since wireless providers currently deploying 5G FWA are well-positioned to accelerate their efforts.

Close the digital divide and bring everyone up to speed

Bringing everyone in America up to the same internet speeds and connecting people and institutions in a fair and equitable manner is within reach and stands to provide an immediate impact.

 **43% or 8.4 million**

Accenture estimates that wireless providers' 5G FWA deployment could serve up to nearly half of America's rural⁶ households, with at least one new 5G FWA provider serving each of those communities.*

While there are myriad synergistic benefits that accompany expanded deployment of 5G in rural areas (such as new infrastructure to support either 5G FWA or additional mobile infrastructure that upgrades and expands coverage for both at-home and mobile networks), improved connectivity and speeds for both homes and businesses will be particularly impactful. Economic benefits will follow these improvements, no matter the type of industry a particular area calls home. Consider the likely impact on the following areas:

Illinois's 16th Congressional District

Approximately 30% rural, this large district spans 14 counties beyond Chicago's commuting suburbs to the north, west and south. Up to nearly 51% of rural households in the area could be served by future 5G FWA deployments, and the district's agriculture and manufacturing sectors stand to capitalize with 5G FWA connectivity advancing those sectors' embrace of new technologies and use cases.

New Hampshire's 2nd Congressional District

Although the district includes the state's second-largest city as well as the capital, the district spans New Hampshire's entire western border, covering largely rural areas between Massachusetts and Canada. Up to nearly 52% of rural households in this area could be served by 5G FWA expansion, particularly impacting the state's health care and social assistance (16% of employment), education (9.5%) and manufacturing (13%) sectors. Expanded high-speed internet access could also help those looking to move out of the state's lowest-paying sectors, retail trade (12.8%) and accommodation and food services (6.1%).⁷

* **Methodology:** Increased service was determined based on the potential economic feasibility of market entry. Estimates for market size, potential operating costs, and the capital investment to deploy were developed for target rural markets. The actual deployment feasibility will vary for individual FWA providers; new entrants will be influenced by the time and costs associated with factors such as market topography, construction, and permitting.

Of course, the feasibility of market entry varies in each area. Considerations such as each market's size, the potential operating costs for FWA providers and the capital investment required to deploy were included in Accenture's analytical dataset of several markets. However, it is important to note that the analysis also accounted for key characteristics in each district, including population density, land area, existing broadband penetration rates, the quality of nearby network infrastructure and other factors, such as the potential variations in natural and man-made obstacles. Still, actual deployment feasibility will vary for each FWA operator and area.

America's main wireless carriers are forging ahead with 5G investments in rural areas.

T-Mobile

Sees rural expansion as one of its most promising growth opportunities. The company has already begun to roll out 5G FWA in rural communities and plans to hire 2,500 experts serving small towns over the next two years.⁸



Has already invested more than \$105 billion in 5G over the past five years and began rolling out 5G FWA services in certain areas in early 2021.⁹



Has set the goal of offering service to 50 million homes by 2025—particularly in areas harder to service.¹⁰



Has been investing in its fixed wireless broadband network with upgraded equipment, such as 5G indoor routers, as well as announcing plans to launch 5G millimeter wave trials where it will test out significantly higher broadband speeds.^{11 12}

How America can unlock 5G FWA's potential for more households

Wireless providers are well positioned to deploy 5G FWA quickly and efficiently to rural areas and offer more than sufficient speeds to meet consumers' needs. First and foremost, the U.S. government has the ability to accelerate and expand the reach of 5G FWA by recognizing the significant role that 5G FWA can play as federal and state policymakers implement the recent broadband infrastructure funding programs.

Moreover, two policy levers are integral to unlocking 5G FWA's full potential for even more U.S. consumers.

The first is [mid-band spectrum licensing](#). The U.S. needs to more than double its licensed mid-band to match the progress already seen in Japan,

China, South Korea, Canada and the UK.¹³ While some progress has been made, publicly identifying additional spectrum bands for 5G will enable more widespread deployment of 5G FWA services as well as help support increased speeds, better coverage and higher usage capacities.

In the near term, policymakers should focus on the lower half of the 3 GHz band and identifying a set of spectrum bands for auction in the future. The 3 GHz band is ideal for a timely reallocation for licensed use in the U.S. and is harmonized with global efforts from other leading nations as well as equipment manufacturers. Making this spectrum available could be instrumental for rural and suburban communities, particularly if paired with technical rules optimized for 5G.

C-band case study: The C-band (3.7–3.98 GHz) spectrum auction concluded earlier this year. The C-band sits within the highly desirable mid-band spectrum, known for its balance of data capacity and reliable coverage. These spectral efficiencies allow wireless providers to offer competitive speeds while minimizing the cost of new tower deployments required for full market coverage. Moreover, the advantages of the mid-band can be effective at extending 5G FWA networks, particularly into underserved markets like rural communities. For instance, one major wireless provider noted their C-band spectrum “will help to increase total [FWA] wireless broadband services to nearly 15 million homes” by the end of this year.¹⁴ While this auction represents good progress to reallocate licensed mid-band spectrum, the full potential of wireless operators' 5G FWA offerings will be unlocked by additional licensed mid-band access with technical requirements optimized for commercial 5G services.

The second issue of importance is [streamlining nationwide regulatory frameworks](#). More work is necessary at the federal level to accelerate deployment, so that processes such as zoning, permitting and other regulatory matters can be handled in an expedited, efficient manner. Under current frameworks, these processes can be costly and take months to complete. Moreover, this challenge is exacerbated by the relative lack of licensed mid-band spectrum, as the need for additional wireless infrastructure is greater than it would have otherwise been with reasonably

priced and readily available mid-band licenses. Thus, both the scale of FWA deployment and pace of deployment can be impeded, including in rural areas.

Fortunately, the FCC has adopted several reforms, and progress has also been seen at the state and local levels. But for the U.S. to catch up and bring truly high-speed service to everyone, particularly in rural areas, further clarifications may be required to speed up zoning, permitting and other processes required for deployment.

Start making the connections

Digital innovation is not slowing down anytime soon; in fact, it only picked up the pace with the pandemic. The more connected devices improve and change society, the more likely it is that American businesses, educational systems and households will be left behind without a commitment to bring truly high-speed internet access to everyone.

Fixed wireless access technology offers a future-proof and cost-effective option for delivering high-speed broadband, including in rural areas of America. 5G FWA offers enormous potential to level the playing field and improves health and economic opportunities and

outcomes to the most underserved parts of America.

5G FWA has enormous potential and can be a powerful catalyst for developing digital economies and ensuring access to high-quality social services. Federal and state officials should recognize the benefits of connectivity solutions like 5G FWA as they implement the historic investment in broadband infrastructure set forth by Congress and make a concerted effort to expand the availability of licensed mid-band spectrum and streamline administrative approvals of network deployments.

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