EVERY TOWN – LARGE AND SMALL – NEEDS GIGABIT SPEED BROADBAND FOR EVERY RESIDENT OR BUSINESS.

An Article by the C Spire Rural Broadband Consortium
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As the C Spire Rural Broadband Consortium[1] continues to research new ways to deliver and encourage the adoption of broadband internet in rural areas, we felt the need to identify why broadband speeds are necessary, particularly in rural areas. While the FCC has defined broadband service as 25/3 Mbps DL/UL based on typical in-home usage as of 2015, some countries are moving to higher speeds, including Canada, whose current standard is 50/10 Mbps.[2] While these service levels suffice for basic internet usage, they are not enough to encourage economic growth or enable rural areas to compete with their urban neighbors. This article provides an overview of the necessity for true, high-speed rural broadband service and how millimeter wave (mmWave) technology can enable Gigabit speed connections more economically.

Deploying Gigabit internet in urban areas (usually via fiber) is becoming more common, particularly as competition heats up from multiple service providers. Deploying broadband services in rural areas has always been problematic; however, the return on investment is poor in areas with fewer potential customers with a much higher cost to build. Fiber optic-based broadband in cities is a relatively straightforward profitable prospect as, for instance, a fiber optic line a few miles long can pass thousands of potential customers. The high cost of fiber in rural areas quickly becomes unsustainable, not just for access to individual homes or businesses, but even as backhaul to small towns that are located far from existing fiber.[3]

This explains why, according to recent FCC and USDA reports, 80 percent of U.S. households without fast, reliable Internet connections are located in small towns or rural areas. Especially in this day and age (made more urgent by the "work from home" and social distancing requirements caused by the global pandemic), high-speed broadband for rural areas is fundamental for economic activity throughout the U.S. Think of it as a missing piece to a puzzle.

A diverse set of industries, including agricultural production, manufacturing, mining, and forestry, operate in rural areas and need high-speed broadband to serve as a catalyst for prosperity. Gigabit-speed connections are becoming more and more feasible, and they will enable efficient, modern communications between rural American households, businesses, schools, healthcare centers, and markets in the rest of the U.S. and around the world.

According to numerous studies, putting rural areas on an equal broadband footing with suburban and urban locations will have five key benefits:

- **Increased productivity**
- **Improved operations**
- **Enhanced healthcare options**
- **Expanded education opportunities and**
- **Enhanced business competitiveness**

Even in a post-pandemic world, certain practices look like they will remain (at least partially), such as the increased reliance on telehealth, telework, and tele-education services. Gigabit-speed services will be necessary to accommodate the growing interactive video component of all three. When it comes to improved operations, there is a growing movement within agriculture to use IoT technologies and broadband to create "precision agriculture" to increase crop yields and improve animal husbandry. For instance, the USDA states that enhancing digital agriculture technologies already in the U.S. today and increasing producers' usage to full-scale could create at least $47 billion each year in additional gross benefit for the U.S. economy.[4]

As for increased business competitiveness, studies over the years have shown that rural areas and smaller towns have "above average" rates of entrepreneurial activity.[5] Many companies in industries ranging from tech to manufacturing and services are often founded in smaller towns. As these companies grow, their broadband capacity needs to increase as well. If the infrastructure in that community cannot support those needs, the companies may feel compelled to relocate to a metropolitan type area, despite the fact that they have become an integral part of the local community and economy.

A recent example from California illustrates this well. Santa Cruz has quite the reputation amongst beach lovers and the surfing set, but this town of approximately 65,000 is off the beaten track and somewhat remote when it comes to the region's fiber optic penetration. A growing company in Santa Cruz had outgrown its current facility and was looking to move, and Gigabit-speed broadband was a prerequisite. Company management could not find suitable locations in Santa Cruz and considered moving 30 miles away to San Jose.

However, an ISP operating in the town heard about the problem and requested a meeting. They advised company management that they had access to a fiber optic line and experience with mmWave-based service to the customer premises. They essentially said, "Find the right size facility and location you need – anywhere – and we will bring the Gigabits to you – with mmWave equipment." As a result, the company relocated within Santa Cruz, and the good-paying jobs and tax base remained in town. This type of example also shows the "pays for itself" nature of investing in improved broadband for a region.

In general, small towns can have a hard time luring companies and their payrolls without having Gigabit-class network infrastructure. While a new fiber build may not pay for itself, recent advances in mmWave wireless technology provide a hybrid fiber-wireless way forward – a more economically feasible way to go Gigabit and foster a boon in local economic activity. When a fiber optic line does eventually reach a smaller town, it usually runs down the "Main Street" area and can service customers literally right on top of it. mmWave can tap into the hundreds of Gigabits of capacity in that fiber and extend them to outlying businesses and residents – at distances from a hundred feet to several miles. In terms of wireless technology, only mmWave equipment can reliably reach Gigabit speeds to end-users due to the amount of bandwidth available in these spectrum bands and the lack of interference from competing equipment (such as Wi-Fi in the 5 GHz bands).

Further, in a promising development for the rural sector, Gigabit wireless solutions have exploded on to the market. Siklu, for example, recently launched its fourth line of 60 GHz products – all of which have enabled Gigabit access speeds with single-digit latencies, and more is coming in 2020 from the industry as a whole.

The Gigabit fiber extender capability can be seen in another example, this one concerning the upgrade of a town's broadband infrastructure after a natural disaster. After a major wildfire destroyed what little fiber the town of Alamosa, Colorado, had, the local ISP decided to use mmWave to tap into the fiber PoP in a neighboring town several miles away. The new service runs much faster and more reliably than the previous offering and actually costs less. Another benefit, especially given the circumstances, was the relatively little amount of time it took to set up the networks and install connections at the customer premises. Based on this success, this ISP is now rolling out fiber/mmWave service to other small towns that might have had to wait years before being served by fiber alone.

With the growing internet needs of towns small and large and the economic advantages inherent for rural towns that have high-speed broadband service, now more than ever is the time to find more economical ways to deploy gigabit Internet, particularly through mmWave infrastructure. The technology is improving all the time and driving down capital and operating expenses. mmWave is the only fixed wireless technology that can provide definitive Gigabit connections now and has the capacity to provide multi-Gigabit speeds in the future.

[1] https://www.cspire.com/cms/wireless/rural-consortium/
[2] https://muninetworks.org/content/why-25-mbps-3-mbps-reasonable-minimum-standard-2018
[3] https://www.cspire.com/resources/docs/rural/CS_RuralBroadband_CaseStudy2.pdf
[4] https://www.usda.gov/sites/default/files/documents/case-for-rural-broadband.pdf
[5] https://www.usnews.com/news/national-news/articles/2017-03-20/6-charts-that-illustrate-the-divide-between-rural-and-urban-america