



UNDERSTANDING THE SOCIETAL BENEFIT OF THE 12 GHZ BAND

THE 12 GHZ SPECTRUM BAND HAS THE POTENTIAL TO CREATE OVER \$1 TRILLION IN TOTAL SOCIETAL BENEFITS. HERE'S HOW.

Spectrum is a crucial, but finite, resource. As the Federal Communications Commission (FCC) works to free up more spectrum resources to accelerate 5G deployment and help connect all Americans, it must seize the opportunity that the 12 GHz spectrum band offers for providing next generation connectivity and for closing the digital divide. The 12 GHz band – the “goldilocks” of spectrum due to its ideal coupling of mid-band positioning with coverage and capacity characteristics – is a contiguous 500 MHz spectrum block with zero federal encumbrances that can be put to use immediately, without auction, at no cost to consumers, jump-starting a variety of network deployments across both rural and urban America.

As a comprehensive economic analysis developed by the Brattle Group – a highly respected global economics firm – clearly demonstrates, the 12 GHz band is the answer to meeting burgeoning U.S. 5G spectrum needs and has the potential to generate \$50 billion in value created by mobile services and over \$1 trillion in total societal benefit. With its unique propagation characteristics, as outlined by several robust engineering analyses, the 12 GHz band is especially valuable for adding mobile 5G capacity, deploying fixed wireless access (FWA) networks in a variety of community settings, facilitating opportunistic indoor factory and enterprise use, adding backhaul capacity, and fostering a variety of other technical applications. The more than 30 members of the diverse 5Gfor12GHz Coalition – which range from academic organizations to public interest groups, to providers and equipment manufacturers – are working to prepare equipment and deploy 12 GHz supported networks for a variety of customers and communities. Learn more below about some of the ways these networks have the potential to provide real-world impact to consumers across the country.

HOW 12 GHZ CAN BE USED TO IMPLEMENT NEXT GENERATION NETWORKS FOR UNIVERSITIES AND RURAL COMMUNITIES

CASE STUDY: HOW XIBER, GO LONG WIRELESS, RISE BROADBAND, AND A-SIDE TECHNOLOGIES ARE WORKING TO PROVIDE 12 GHZ POWERED NETWORKS TO PURDUE UNIVERSITY'S RURAL CAMPUS, POWERING NEXT-GENERATION INNOVATION

Purdue University – located an hour outside of Indianapolis and two hours from Chicago – is known for, in addition to its respected science and agriculture programs, its scenic campus nestled in the predominantly rural area near West Lafayette, IN. The campus itself lies on the Wabash River and is home to nearly 50,000 undergraduate and graduate students,

who rely on access to fast and reliable networks for their coursework and research. As a rural institution, this poses a particular challenge for Purdue.

Adjacent to Purdue's campus lies the Discovery Park District, a 400-acre region West of the university developed to facilitate innovation, which is home to a

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variety of Fortune 100 companies, early-stage startups, and everything in between. Other tenants of the district include advanced aerospace labs (who take advantage of a 6,600-foot runway), residential neighborhoods, restaurants, and entertainment venues. To reach its full potential and power this vibrant community, the District, like Purdue's campus, also needs access to next-generation connectivity.

Earlier this year, Purdue Research Foundation (PRF) and Purdue University announced the launch of the "Lab to Life" (L2L) digital innovation platform in the Discovery Park District to develop new strategies for connecting rural areas. L2L plans to leverage a unique government structure and open, neutral host technology infrastructure that is currently being deployed throughout the district to advance the development of next-generation wireless which has proven especially useful in enabling businesses in rural areas to keep their operations local.

Partnering with the L2L platform, service providers and a spectrum holder are collaborating in an effort to use the 12 GHz spectrum band to provide next generation wireless networks for the Discovery Park District.

If the FCC modernizes its rules that govern the band, these providers and manufacturers can use 12 GHz for two-way terrestrial operations – leading to faster and more reliable networks for those at Purdue.

Xiber, Go Long Wireless Group, Rise Broadband and A-Side Technologies and several partners including the NineTwelve Institute are working to deploy a 12 GHz powered fixed wireless access (FWA) network on the Discovery Park District campus, which will provide connectivity for on-campus businesses and residents – solving high-speed connectivity challenges associated with this unique geographical and topological site in rural Indiana.

The NineTwelve Institute (a key strategic partner to PRF) is working with Xiber to implement both a multi-band FWA network and a 12 GHz backhaul mechanism for manufacturing facilities on Purdue's Discovery Park District Campus. This initiative is a part of the NineTwelve's ongoing work to build 5G labs throughout the country (including for example in

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Boston, Seattle, and Hawaii).

The network relies both on 12 GHz spectrum licenses held by Go Long Wireless Group and A-Side Technologies' second prototype radio that, when fully developed in early 2022, will be available for hands-on testing by interested ISPs. A-Side anticipates that their production radios will be shipped and available for installation by fall of 2022. A-Side's product will provide incredible opportunities for FWA internet service providers (ISPs) like Xiber who are currently struggling to meet the demands of broadband starved regions – such as the rural areas surrounding Purdue University.

These ISPs and equipment manufacturers are positive they can implement a successful FWA network for Purdue's Discovery Park District, but current FCC rules governing the 12 GHz band are currently preventing them from using the band to its fullest potential.

A multi-band FWA network like the one they are hoping to implement in the band would be incredibly powerful if it could use 12 GHz spectrum for up- and downlink capabilities – which, in turn, would allow innovative research and industry organizations to conduct operations on this campus (not to mention better connectivity for residents and students who live nearby and rely on the Internet for their education).

FCC rules governing the 12 GHz band require any broadcast over the spectrum (how networks deliver signals to users) in an only one-way capacity. So, A-Side's radios would be forced to broadcast 12 GHz from the tower to the customers at Purdue and another frequency (5 GHz) to broadcast from the customers back to the tower. The FCC rules also stipulate those radios must broadcast 12 GHz at a fraction of the power other bands enjoy. Allowed power levels in immediately adjacent bands are 66 dB higher (4 million times higher). This severe restriction limits not only the distance 12 GHz can be broadcast across the Purdue campus, but also the transmitted signal's capacity – leading to less reliable and slower connections for

Fortune 100 companies and students working on class assignments.

If the FCC modernizes its rules that govern the band, these providers and manufacturers can use 12 GHz for two-way terrestrial operations – leading to faster and more reliable networks for those at Purdue. A multi-band FWA network like the one they are hoping to implement in the band would be incredibly powerful if it could use 12 GHz spectrum for up- and downlink capabilities – which, in turn, would allow innovative research and industry organizations to conduct operations on this campus (not to mention better connectivity for residents and students who live nearby and rely on the Internet for their education). Further, wireless 12 GHz technology eliminates the need to lay extensive fiber wires throughout the campus, instead relying on strong point-to-multipoint beams delivered from a nearby base tower. For rural areas particularly, this wireless approach is extremely cost effective and will allow for students, researchers, and industry members alike to reap the benefits of next generation connectivity without facing the potential deployment challenges of wired technologies.

With FCC action to update the rules for the 12 GHz band, they will be able to maximize the services they're able to provide, delivering a state-of-the-art wireless system for Purdue that could then be implemented at universities and rural communities across the country.



ENSURING U.S. GLOBAL LEADERSHIP