BROADBAND COUNTRY

Tapping into unused wireless spectrum brings affordable internet access to rural communities

A small company based in California's Silicon Valley is changing the way rural communities access the internet.

The company, Adaptrum, with its dynamic spectrum access technology, has garnered the support of global tech giants such as Microsoft and Google. The technology essentially takes advantage of unused bands of spectrum to deliver wireless internet service.

Photos courtesy: Adaptrum

"There's an insatiable demand for spectrum technology in the U.S. military," noted Brett Cusker, executive director at TechLink, a key DoD technology transfer partner. "Technology that would help pack or more effectively use the spectrum would be great for both military and civilian application."

In the early 2000s, Adaptrum's founder, Haiyun Tang, was among those who assisted the Federal Communications Commission (FCC) in redeveloping the rules surrounding spectrum. Parts of the spectrum—which carries wireless signals from TV, radio, and mobile broadband—are licensed by the FCC to private companies for their exclusive use. Around the year 2000, the commission changed the way it sold and leased these specific bands.

In 2010, the FCC issued a new set of regulations allowing Adaptrum to begin deploying its technology commercially.

Tang knew that many of the bands were underutilized. There were unused channels (called "white space"), particularly in parts of the country with smaller populations. The smaller the population, the fewer the overall users taking up that spectrum. The key was finding out which channels were unused and tapping into them to deliver wireless internet access.

In 2005, the Air Force awarded a Small Business Innovation Research (SBIR) contract to Adaptrum to develop a proof of concept around the technology.

It turns out that Google keeps a database of spectrum that lists the bands in and out of use in a certain area at any given time. Tang and his team built a device that could query the database and tap into unused bands.

Even after Adaptrum proved the technology, the regulatory bodies lagged several years behind. But in 2010, the FCC issued a new set of regulations allowing Adaptrum to begin deploying its technology commercially. According to Keith Sinclair, Adaptrum's senior director of marketing, the company spent a significant amount of time waiting for regulatory approval. "It was a multi-year process," he said. But eventually there was a paradigm shift.

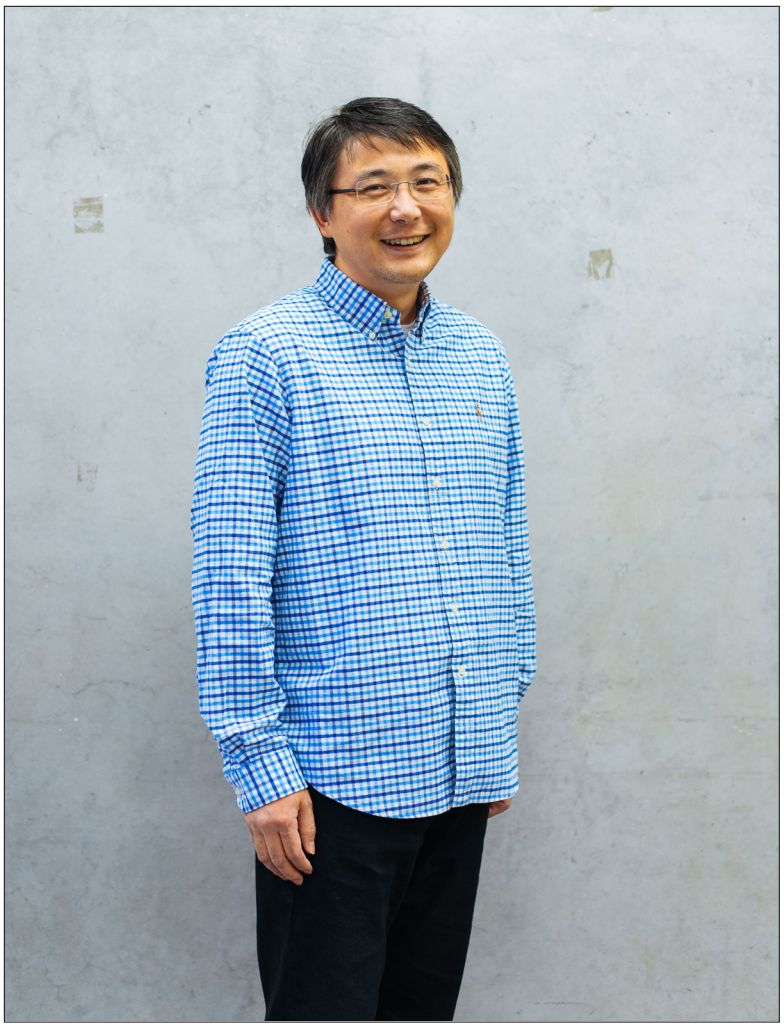
The company partnered with Microsoft, who began putting the technology to use by buying equipment from Adaptrum. Microsoft, in turn, provided the equipment to local internet service providers.

"We're a younger tech, but we're pushing to drive down the raw cost of the equipment," Sinclair said. "It really is affordable."

Maine was the first state to benefit, receiving the technology in 2013. People in eastern Maine who previously might have traveled 100 miles round-trip to have doctors check their medical equipment, could now do so remotely, thanks to an internet connection through Adaptrum's TV White Space (TVWS) technology.

The largest successful commercial deployment has been in southern Virginia, where Microsoft worked in cooperation with the Mid-Atlantic Broadband Communities Corporation to bridge

Widespread access to fast internet is increasingly a prerequisite for small-business success.



Adaptrum founder Haiyun Tang was among those who assisted the FCC in developing rules surrounding the use of spectrum.

the digital divide in rural communities. Their collaboration brought coverage to about 1,000 homes across two counties, giving residents affordable access to educational and work-related materials, closing the opportunity gap between rural students and workers relative to their urban peers. Along with those examples in the U.S., the Adaptrum technology has found its way into homes in 25 countries around the globe.

Though speeds aren't yet comparable to traditional broadband internet, Sinclair said that accessibility is the key to the tech's success.

"There's this notion that broadband is necessary these days to compete in the world, this notion that if you're in rural America and don't have access to the internet you're at an economic disadvantage," Sinclair said. "We identify with that, and our tech is a key piece."

The next step, according to Sinclair, is to get costs down to where the technology can compete with satellite-based systems and, eventually, traditional broadband. Adaptrum is working on systems that would access multiple spectrum bands at once, dramatically increasing speeds. As more countries adapt regulation framework surrounding spectrum use, the technology will find its way into an increasing number of homes.

"We're starting to see a snowball effect," Sinclair said. "The tech has gotten to the point where we can make it available to more people and, in the end, get more people online effectively."

Adaptrum, Inc.
Modernization Priority: 5G
San Jose, CA • SBIR Contract: FA8750-05-C-0067 • Agency: Air Force • Topic: AF04-105, Dynamically Sensing and Adapting Wireless Network