

Can a metal box the size of a toaster oven bridge the digital divide? Denver startup believes it can.

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Colorado's soaring mountains and its sparsely populated rural areas make it difficult to provide high-speed broadband and wireless services consistently across wide swaths of the state.

Many of the technologies now available to boost connectivity are prohibitively expensive or just not commercially viable, and the number of underserved people in the state, when it comes to broadband connectivity, is greatly understated by as much as a four-to-one ratio, according to one study last year by a consumer group.

A new Denver company, Eucast Global, is introducing "network in a box" technology from South Korea which it claims can bridge the state's digital divide in a more affordable and robust way than other alternatives on the market, providing access to LTE and 4G cellular, internet and soon 5G services in parts of the state that have lacked it.

"You turn it on and you have instant connectivity," said Chris Medina, one of four founding directors of the company. "We don't have to create cell towers or dig fiber."

The beige metal boxes, about the size of a toaster oven, require a little more work than flipping a switch. A [power source](#) is needed, and so is a broadband connection—either a fiber optic node, a link to a low-earth-orbit satellite, or a reachable cellular tower. Once a connection is established, the [base stations](#), which have a radius of a mile to five miles depending on the terrain, can be linked together to create a much larger network.

Base stations cost around \$11,000, making them a much more cost-effective alternative than digging fiber optic cable to every home in an isolated town or building new cellular towers that won't ever pay for themselves. The units cost a fraction of what some better-known rivals like Nokia charge, and they don't come with the national security concerns tied to lower-cost and less reliable equipment made in China.

And because the networks created are private, they are safer from hacking efforts and eavesdropping than public Wi-Fi networks, allowing them to have commercial as well as consumer uses.

Each box can handle up to 200 devices at the same time, making them an option for rural factories and large farms that are using remote sensors and robotics, Medina said. One early application of the technology will be to hook up oil and gas well sites in [remote areas](#), providing producers with huge savings on cellular bills that can run tens of thousands of dollars a month.

A key mission of the company is to expand broadband connectivity into areas where it is

severely lacking, such as on Indian reservations and the Rainbow Family gathering, or disaster areas, [rural communities](#), said Gary Sumihiro, CEO of Sumihiro Investments, who said he quickly realized he had to bring the technology to the United States after witnessing it at work in South Korea and Japan.

"There are 17 million kids in the U.S. who don't have access to the Internet at home and 44% of low-income adults who have limited broadband access," he said. Eucast may not cover that gap completely, especially in [urban areas](#), but it could put a dent in it in rural ones.

The Federal Communications Commission recently released a range of wireless spectrum known as Citizens Broadband Radio Service, or CBRS, for [public use](#) at no charge. Purchasers of CBRS and other wireless spectrum have first priority, meaning Eucast equipment would have competition in dense urban areas—although Glendale is looking at the boxes to boost cellular connectivity on parts of Cherry Creek trail below street level.

The big players, however, aren't as active in rural areas, leaving a door open for lower-cost alternatives to establish a foothold. But that requires equipment that is relatively affordable, durable and easy to operate, a niche Eucast is trying to fill. Next year it plans to roll out a box offering 5G cellular services.

Given that carriers have focused on providing the fastest 5G in more densely populated areas, the technology could allow [rural areas](#) to speed up deployment by months, if not years.

Eucast also sells a self-contained "network in a backpack," which runs about \$95,000 and is designed for very remote areas. The packs come with batteries and satellite antennae. Once onsite, the packs can create a broad-reaching network within minutes, allowing fire or search crews to use the devices they already carry rather than having to use specialized radios.

Eucast successfully created a telecommunications network using a drone. Sumihiro envisions turning trucks purchased at local dealerships into mobile units that could reach remote outdoor events, say

like the Glenwood Canyon after rock slides sliced fiber optic cable lines and stranded motorists in more ways than one.

"Eucast's solution is really promising because of the cost and its use of the CBRS spectrum, which is also free to operate compared to a cellular network that might get stood up temporarily in an emergency," said Tyler Svitak, executive director of the Colorado Smart Cities Alliance. "I see a lot of potential for emergency response, rural and mountain connectivity, and other markets that are underserved by traditional carriers because of a lack of density."

Bringing Cellular on Wheels into an isolated area might run around \$4,000 a month or \$48,000 a year, he said. Buying a single Eucast box would save \$37,000 and provide a more permanent solution.

"Municipalities or special jurisdictions that have an interest in operating a private network now have an opportunity that was too expensive and hard to stand up" in the past, he said.

Complete independence

Earlier this year, Eucast Co. Ltd. established a separate Denver company, Eucast Global, with full rights to market and sell its technology in the Americas and Europe. The Denver company also has rights to the South Korean intellectual property and can manufacture Eucast equipment domestically, which it plans to do with help of Arrow Electronics, a metro-area Fortune 500 company that has access to components from around the globe.

Sumihiro is on the board, as is Medina, who is the chief strategy officer at Clovity, a San Francisco company that provides software solutions related to the Internet of Things, or the connecting of multiple devices and sensors into a unified network. Betsy Markey, a former Colorado congresswoman and past director of the Colorado Office of Economic Development, is also on the board and helping with government relations. The fourth board member is Jaehyeong Kim, CEO of Eucast Co.

Eucast Global has the right to sell equipment made speed down the highway. in South Korea in the Americas and Europe initially and eventually plans to start selling gear that it makes in Colorado. Even though South Korea is considered a close ally, U.S. ownership and manufacturing should eliminate national security concerns that have plagued the adoption and sale of Chinese telecommunications equipment.

Eucast Global also plans to do its own research and development to advance the technology, bringing American ingenuity into the equation. To that end, it has signed an agreement with the University of Denver, which is using students to test the equipment and come up with applications and strategies for how it can best be used.

"It is an opportunity to put technology like this in the hands of students to start testing it and learning about it and get involved in deploying it," said Jim Ducay, program director at Colorado Universities Innovation Council and an adjunct professor at the University of Denver.

His hope is that his students will bring original thinking to the task, allowing them to become some of the early hires at Eucast Global, which Medina said is looking to employ 50 people over the next two years.

One use DU students are studying is whether the Eucast equipment can fill in dead spots along the Interstate 70 mountain corridor that have created problems for the Colorado Department of Transportation and Colorado State Patrol. A particularly nasty stretch, given the terrain, runs from the Bakerville to Silver Pume exits.

"They demonstrated it for me and my team and the initial review looked positive. They would like to test it in an area that is on a highway," said Bob Fifer, deputy director of operations at CDOT. "If this is the technology we can use on a state level, we will explore it and see where it goes from there."

Fifer said CDOT radios have good coverage but gaps do exist. Although a network that is up and running could serve the public in theory, the state doesn't want drivers distracted trying to connect to a CDOT or Eucast network as they move at full

Hee does envision using the network, if it proves itself, to keep state workers connected. And if the need arises, stranded motorists could also be told via signage how to access the network. That would allow them to request help on their phones or call friends or family about their status even in dead zones. Surfing the internet could also help pass the time while snow plows or other crews do their work.

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