A Fiber Network Spurs a New Northern New Hampshire Tech Corridor

Planning, perseverance and strategic alliances pay off for the rural community of Bristol, NH, as it overcomes obstacles to bring better broadband and better jobs to residents.

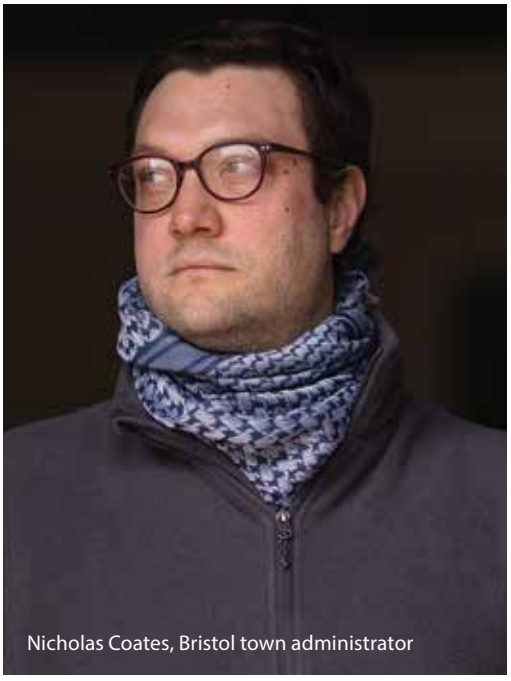
By Sean Buckley / *Broadband Communities*

Bristol, New Hampshire, is either underserved or unserved with broadband according to the FCC definition, but it is eager to provide affordable, high-speed broadband to its residents and businesses. The rural town has some internet options, but they're largely low-speed services from the area incumbent telco and cable operator that can't support demanding applications.

To make progress toward reaching its broadband goals, Bristol developed the Bristol Broadband Now initiative, an effort by the town's Economic Development Committee to build a multipurpose fiber network. The network will provide symmetrical fiber-to-the-premises (FTTP) network internet to residents throughout Bristol and connect businesses, municipal buildings and educational facilities in Bristol and nearby Plymouth.

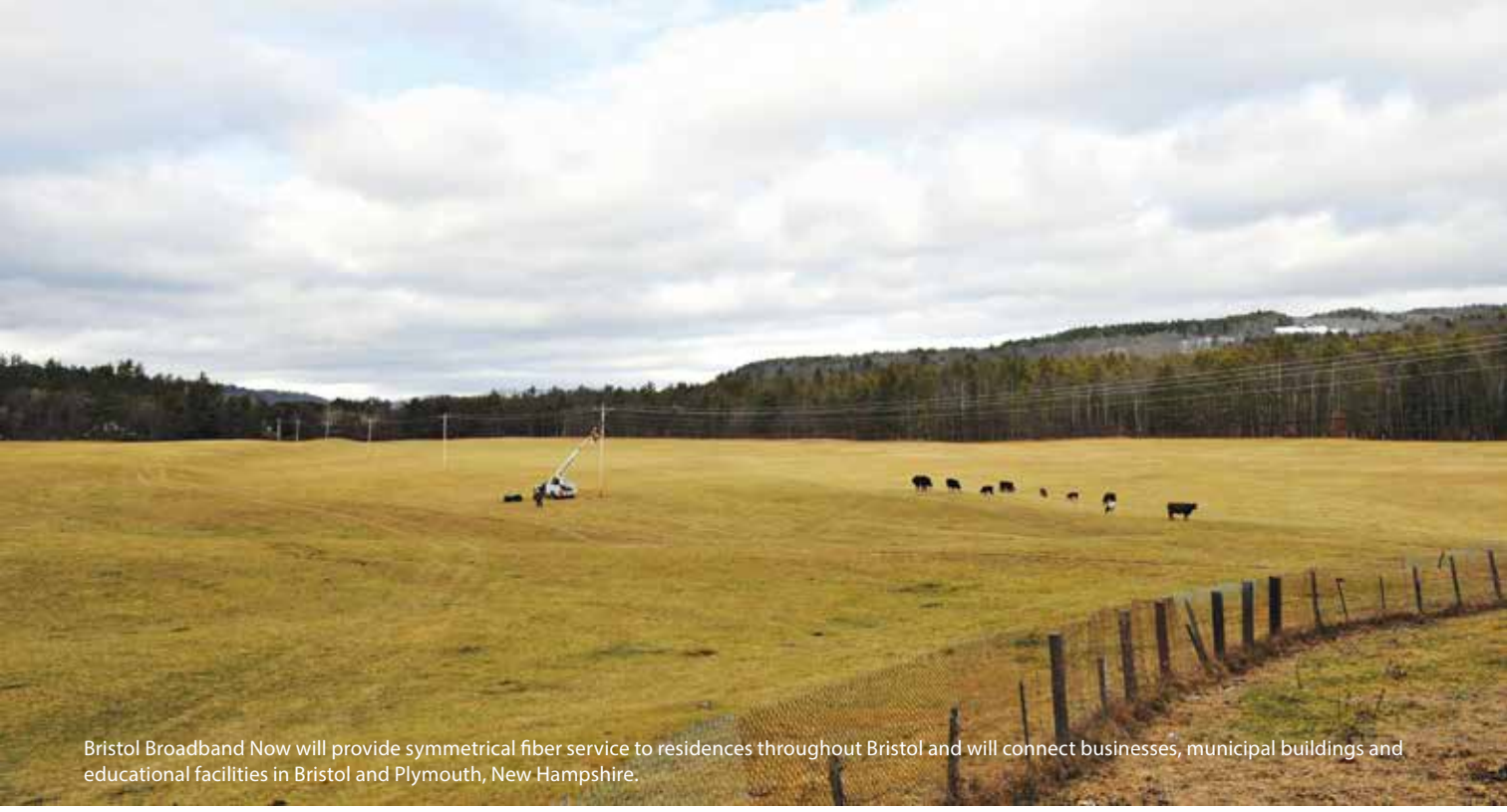
Three desires drove Bristol to consider building its own FTTP and middle-mile fiber network: to improve cellular service, provide adequate residential broadband to meet the demands of the COVID-19 pandemic, and attract new businesses.

"The Economic Development Committee had been looking at how to improve cell coverage in the town," says Nicholas Coates, Bristol's town administrator. "It's a tough problem to attract new business and people who want to settle here if we don't have good cell coverage."



Nicholas Coates, Bristol town administrator

But the town's efforts to engage wireless operators to enhance wireless coverage were unsuccessful. These providers told Bristol that



Bristol Broadband Now will provide symmetrical fiber service to residences throughout Bristol and will connect businesses, municipal buildings and educational facilities in Bristol and Plymouth, New Hampshire.

they would not be able to make a strong business case because the town's location is far from the state's major highway system.

ENHANCING BUSINESSES, JOB CREATION

When the large wireless operators could not prove there would be a strong ROI for enhancing wireless coverage, the town took it upon itself to find a solution. Bristol quickly realized a big part of the cost to connect wireless towers and microcells is the fiber backhaul facility.

Bristol hopes its proposed fiber network will spur further development of a tech corridor along route I-93 in northern New Hampshire. Although the tech corridor already exists in the southern part of the state, northern towns such as Bristol have been looking for ways to create the workforce and educational programs that draw technology companies and enable them to thrive. The towns hope to achieve this by creating a pathway between education and business while expanding the availability of broadband.

In Bristol, for example, Freudenberg-NOK Sealing Technologies, which makes seals and pistons for the automotive industry, has a manufacturing plant in the town that employs 500 people. "As the gas engine switches over to more of an electrical engine, gas parts won't be needed anymore," Coates says. "So, we asked how we can help create a workforce that will be ready for that and how we can help this business retool."

BRIDGING RURAL NORTHERN NEW HAMPSHIRE

Bristol is just one New Hampshire town trying to offer more-robust broadband. The Grafton County Broadband Committee was convened to bring large-scale broadband access to the New Hampshire North Country. The committee's first initiative is to develop a middle-mile network for 30 other rural New Hampshire communities.

"Similar to Bristol, we're looking at how to provide an ROI that would make sense for a company to come in or whether we can conduct a private-public partnership to tie into that backbone and deliver last-mile connectivity into a rural community," says Nicholas Coates, who serves as chair of the committee made up of five Grafton County town officials.

Coates and his colleagues in Grafton County also convened broadband committees with New Hampshire's Coos County and Carroll County. The Carroll County Broadband Committee is working with the Center on Rural Innovation, a Vermont-based nonprofit, and the North Country Council, a regional economic development agency, to complete a comprehensive survey of the county's internet offerings.

"We're taking a similar approach to the one we took in Grafton County and connecting it to what Coos and Carroll counties are doing," Coates says. "We'll have a fiber system for the entire northern rural part of the state that can compete and attract new business from Montreal, Boston, Quebec and New York."

He says "good solid internet will be needed" to help local students as they transition into the workforce. Fifty percent of kids who graduate from Bristol's Newfound Regional High School don't pursue college degrees, so preparing them to compete in the workforce by helping them acquire high-tech skills is central to Bristol's plan.

"You could look at these statistics and say it's a real problem, or you could say it's an opportunity for high-school students to be tracked to jobs at Freudenberg if they learn the skills they need to work there after they graduate," Coates says. "Now, we could solve two problems: losing workers who are retiring and kids not having high-paying jobs and contributing to the economy."

The key to connecting high-school programs such as robotics to Freudenberg-NOK is a fiber network.

"We realized to make this connection, we needed to provide high-speed internet," Coates says. "To get that high-speed internet, we realized we probably would have to build a fiber network."

Freudenberg-NOK isn't the only company that will benefit from the fiber network. A local fluid dynamic company that developed an air purifier to battle COVID-19 plans to move servers from the Netherlands to Bristol.

The medical coding provider Medical Management and Reimbursement Specialists (MRS) pledged to add additional software development staff once the network is fully operational. "MRS plans to triple its workforce because it will be able to have people work remotely," Coates says.

COMMUNITY-LED EFFORT

Like its discussions with area wireless operators, Bristol's efforts to reach out to area incumbent wireline providers also failed to bear fruit. Neither Atlantic Broadband nor Consolidated Communications could see a viable way to work with the town.

Atlantic Broadband, which became Bristol's cable incumbent when it purchased area assets from Metrocast, did not want to enable another competitor.

"We talked to Atlantic Broadband, but their vision did not align with what we were trying to do," Coates says. "They told us we would end up becoming a competitor to them in a territory where they already provide service, so they were not really interested in working with us."

Consolidated Communications had similar thoughts about Bristol's network ambitions. "Consolidated said it already has fiber and doesn't need to build it out anymore," Coates says. "The telco suggested we could rent space on its lines, which we said would not work."

When it became clear the incumbents were not interested in helping Bristol build a network, the town took matters into its own hands. It began by pursuing Northern Border Regional Commission (NBRC) grant funds. NBRC is a federal-state partnership for economic and community development in northern Maine, New Hampshire, Vermont and New York. Every year, NBRC provides funding for critical economic and community development projects throughout the Northeast. These investments, which leverage private-sector investments, drive job creation.

Bristol residents agreed during the town meeting to provide a level of funding if the town could win a NBRC grant, which it did. Between the town appropriation and the grant, Bristol ended up with $260,000 for its new network.

By building its own network, Bristol could have a level of control. Instead of working with a provider that might cherry-pick the most profitable areas, Bristol's fiber-to-the-home (FTTH) network could cover the entire town.

"We are able to build the network the way we want it and aren't beholden to Atlantic Broadband or Consolidated Communications, who said 'you can have a network, but only where we already have it,'" Coates says.

MULTIFACETED NETWORK

The NBRC grant and town appropriation was a start, but Bristol knew it was not be enough to get a network built the way it wanted. The town wanted the network to serve not only residents, but also businesses and the local university.

"One of the things we realized is that we really wanted to make that connection to Plymouth State University (PSU) and that $260,000 would not get us there and to the other things we want to do," Coates says.

But Bristol found a new opportunity to fund Bristol Broadband Now when the New Hampshire government launched the Connecting New Hampshire – Emergency Broadband Expansion Program funded by the Coronavirus Aid, Relief and Economic Security (CARES) Act. This program authorized the allocation and expenditure of $50 million from the CARES Act to address the increased need for internet connectivity resulting from the COVID-19 pandemic.

The first project is a 24-mile fiber route that passes nearly 400 Bristol residences and connects to the NetworkNH system at PSU. The second project will provide the additional fiber backbone and fiber distribution required to connect all Bristol municipal, educational and commercial buildings and is funded by the NBRC grant and town appropriation.

Coates says the focus of the Emergency Broadband Expansion Program was in line with Bristol's plans.

"A lot of the stuff we were thinking about was what the program was touching on, such as telemedicine, remote schooling and telework," Coates says. "As we were planning this project, we were talking about it from an economic development standpoint – we were going to connect businesses, schools and municipal buildings, but we did not have enough money to do fiber to the home."

To get the support of Bristol voters, Coates felt the town needed to also have the funds to build an FTTH network.

"I had been pushing our economic development chair, saying that if we're going to get buy-in from the voters on the vision of doing a full build for the entire community, we're going to have to do fiber to the home," Coates says. "The focus of the Emergency Broadband Expansion Program grant was related to three areas: deliver fiber

to the home to about 450 residences, make the connection to Plymouth State University, and branch out into other areas that we identified as high priorities."

After years of planning and strategizing with project stakeholders, the town issued a request for proposals in August 2020 for the design, engineering and construction of the network, which was completed in December 2020 to meet CARES Act funding regulations.

Following a formal procurement process, Bristol selected eX² Technology to build out a hybrid FTTH network architecture using Active Ethernet and GPON. "Bristol chose eX² because it was not affiliated with any provider, which allows us to make the best decisions for the town," Coates said.

Jay Jorgensen, COO of eX² Technology, says the nature of the CARES Act funding posed an interesting challenge for completing the Bristol fiber project.

"The unique part about it was that it had a quick burn," he says. "The CARES Act money needed to be spent by the end of the year, so we had a 90-day cycle to build 24 miles of fiber in New Hampshire, where winter obviously becomes an issue."

ELECTRIC CO-OP PACT

After securing funding, Bristol also had to clear another hurdle in its network plan: gaining access to existing utility poles.

"We started to look at what we should do and banged our head against the wall for three years," Coates says. "Our insurance company would not provide us insurance because the rates are too high, and the area utilities, Eversource and Consolidated Communications, would not change their insurance policies on pole attachments, because we would be a competitor."

When it could not find a solution to the pole attachment and insurance issues, Bristol went back to Consolidated and Atlantic Broadband and proposed a public-private partnership in which the town would build the network in exchange for the utilities insuring, managing and operating it. "We got a tepid response of no, not really," Coates says.

> Bristol was the only municipality in New Hampshire to receive Coronavirus Aid, Relief and Economic Security (CARES) Act grant money for telecom infrastructure.

Bristol eventually found a kindred spirit in New Hampshire Electric Co-op (NHEC). Unlike traditional investor-owned utilities, NHEC is a member-owned electric cooperative.

Headquartered in Plymouth, NHEC connects its members through 5,600 miles of energized lines, crossing 115 communities throughout rural New Hampshire.

"As we were going through our process, I thought it would make sense to partner with NHEC because it's in its mission to provide rural electricity," Coates says. Broadband was initially not part of NHEC's plans, but the co-op was being told by some of the towns it serves with electricity that it needed to get into the broadband game.

Coates reminded NHEC that it had a lot of fiber on poles that had been overbuilt and could be turned into a revenue stream. He says he told the co-op, "Since it's in your mission to provide electricity in rural areas,

ELECTRIC CO-OPS MAKE RDOF GAINS

It's clear that electric cooperatives are making broadband a priority. According to the National Rural Electric Cooperative Association, nearly 100 electric co-ops have started offering high-speed internet access to rural homes, businesses and schools.

As electric cooperatives work to bring broadband to the rural United States, some have formed partnerships with telecom operators and towns. In Georgia, for instance, the city of Colquitt has partnered with Windstream, and the New Hampshire Electric Cooperative has partnered with Bristol, New Hampshire.

Electric cooperatives had a big showing in the FCC's Rural Digital Opportunity Fund (RDOF) reverse auction, securing $1.6 billion to serve more than 900,000 locations in 31 states. In total, 180 electric co-ops competed as part of five consortiums that garnered a total of about $1.5 billion. Five individual electric co-ops won a total of $59.4 million.

For example, Conexon, a rural fiber network design and construction management provider, and members of its Rural Electric Cooperative Consortium were awarded more than $1.1 billion through the RDOF Phase I auction to provide gigabit-capable broadband. Consortium members will use these funds to launch and operate fiber-to-the-home networks in more than 600,000 rural areas across 22 states.

Cooperatives have continued to step up to provide rural area broadband service. More than 100 co-ops are engaged in broadband projects. CAF II, the last FCC reverse broadband auction, was the first time electric co-ops were eligible for FCC rural broadband funding. Thirty-two electric co-ops won 35 bids in that 2018 auction.

why would you not do the same with broadband?"

When Bristol looked at the FCC's Rural Digital Opportunity Fund (RDOF) site to see what it could fund with an Emergency Broadband Expansion Program grant, it found there was a large area of town that met the definition of underserved or unserved.

Coates learned that NHEC was pursuing funding on its own for other areas, but as the owner of most of the poles in Bristol, the co-op promised cooperation.

"We told them the pole attachment process and getting insurance had been hard," Coates says. "NHEC assured they would work with us and figured out how to make it happen if we got the money."

STREAMLINED MAKE-READY PROCESS

As a new player in the market, Bristol is not immune to the pole attachment make-ready process, which can cause lengthy delays. But the town's agreement with NHEC streamlined the make-ready process to attach fiber to the utility's poles.

eX² Technology's Jorgensen says because Bristol had already done the legwork to get the pole attachments in place, the process to build what will be mainly an aerial network was accelerated.

"Oftentimes the permitting and approval process for pole attachments could take several months or more," Jorgensen says. "For the town to have relationships in place and for the electric co-op to work with us like that was unique and key to getting the project done on time."

Though it had NHEC on board as a pole attachment partner, the short time frame to get the network built meant Bristol could not wait for the lengthy make-ready pole attachment process. When Bristol got ready to build its network with eX² Technology, it told NHEC it would have to do things out of the ordinary.

"NHEC told us it was good with our proposal because that's what it was going to be doing with its own projects, and eX² Technology was instrumental in having that conversation," Coates says. "The design and the construction process were very streamlined."

Now that the network is built, the next phase will be to reach pole attachment agreements with Eversource and Consolidated, which own the remaining poles in Bristol.

"While we're working on the second part of the pole attachment agreement process, we're interviewing ISPs," Coates says.

WHOLE-TOWN COVERAGE

With an eye set on having an open-access network, Bristol is taking a close look at how different ISPs would work with the town. Bristol expects to have an ISP in the coming months.

One key question Bristol is asking ISP candidates is whether they buy into the vision in which the town retains some level of control and ownership and the ability to build out service to more areas.

"We don't want to build out just half of the town and say we're good because the other side would say 'what the heck?'" Coates says. "Now, we tell these companies that we want them to build out the rest of the town over a one- to five-year period, so we obtain our goals around full FTTH opportunities."

Today, Bristol is evaluating four ISP candidates, all of which have different models. Once it completes the process, it will rank them and ask if they can meet its specific goals.

"The conversation will be that we'll partner with the ISP and write the grants and address 80 percent of the cost if it is able to put in 20 percent of the match money that's required for these grants," Coates says. "Instead of the ISP having to spend 100 percent of the costs to get customers, it only has to spend 20 percent."

BONDING WITH THE R&D COMMUNITY

In addition to connecting residents and businesses, Bristol also saw an opportunity to be a conduit for

the local research and development (R&D) community.

Bristol's relationship with PSU is rooted in the creation of the Infrastructure to Broaden Economic Advancement and Mindshare (I-BEAM-NH).

At the time I-BEAM was devised, New Hampshire proposed building a fiber ring network to connect major community anchor institutions in the state and link together several communities in the western, southwestern, and northern parts of the state that have limited or no means of terrestrial broadband access. The overall infrastructure of I-BEAM was expected to help 50,000 subscribers in New Hampshire upgrade or gain access to affordable broadband services.

"The goal was to build a network backbone to serve anchor institutions," Coates says. "NetworkNH got the money to connect all the universities and the community colleges, but they never got to the next step of connecting all the municipal and county buildings."

Given the initial mission of I-BEAM, Bristol surmised that there was a big opportunity for it to help connect R&D facilities at other New Hampshire colleges.

"Bristol's development chair said there is this really high-speed network tied into research and development for connecting our schools and businesses," Coates says. "So we asked why would we not want to figure out how to tie into that network to bring high-speed internet to researchers at the University of New Hampshire and Dartmouth. We could also bring MIT research to Bristol and its schools and businesses."

Bristol found that the nearest connection point was in Plymouth off River Road, which is one of the main backroads between Plymouth and Bristol. It also is an area that Bristol identified as a potential economic development target.

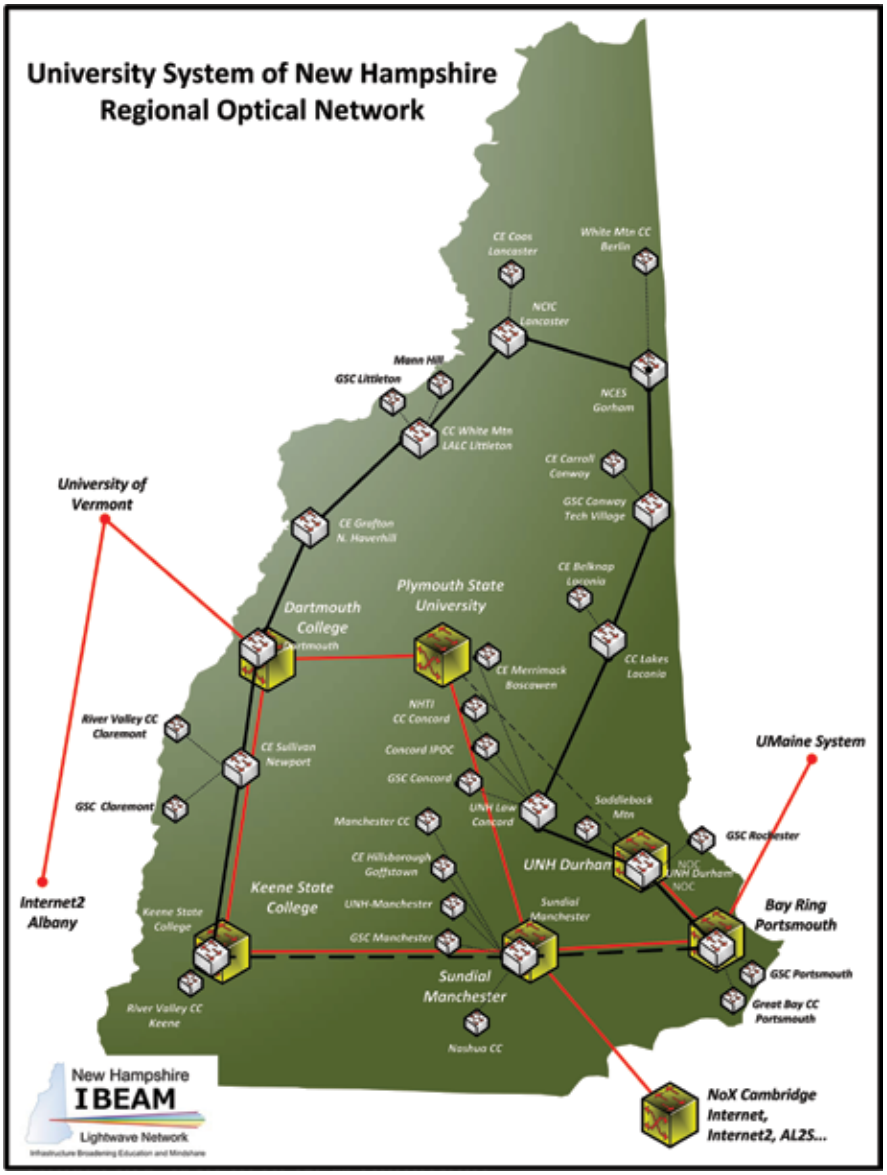
The town's Emergency Broadband Expansion Program grant application was focused on its conversations with NHEC, which owns the poles on River Road along the route to the PSU building.

"We have a friendly company that owns the poles and bought into what we're trying to do," Coates says. "It will get us to the front door of the university system, which is our second goal."

To make the connection into PSU, Bristol will develop an indefeasible right of use (IRU) fiber lease from PSU down to where the university's fiber terminates along River Road.

From there, Bristol will build fiber from the termination point in the municipal network to the water and sewer department, highway department, library, police department and fire department. It also will follow the path of areas it cited as economic development areas with the NBRC borders.

"We got the second grant and had to get the build going quickly," Coates says. "NHEC said it will build what it can build." ❖



Bristol's network connection to Plymouth State University will enable it to reach other New Hampshire and Massachusetts universities including Dartmouth College, the University of New Hampshire and MIT.

Sean Buckley is the editor-in-chief of ***Broadband Communities****. He can be reached at sean@bbcmag.com.*