Service Providers, Communities Seek Partners, New Methods To Overcome Rural Broadband Challenges

At the **Broadband Communities** Virtual Summit 2020, participants shared stories about finding new methods to extend broadband into underserved and unserved rural markets. Following are some highlights of conference sessions focused on the rural broadband market.

A BBC Staff Report

At the **Broadband Communities** Virtual Summit 2020, participants addressed driving broadband into rural markets to provide connectivity and make communities more attractive to prospective residents and businesses. Given the cost of building network facilities in rural areas, service providers are not going it alone to build out last-mile and middle-mile fiber facilities. To overcome rural challenges, a growing number of service providers are creating partnerships with communities and, in some cases, power companies – both investor-owned and cooperatives. Notably, states such as Arizona have focused on leveraging existing electric utility assets and state funding mechanisms to expand rural broadband. By extending broadband to more communities, consumers can access remote telehealth services – a need the current COVID-19 crisis amplified.

Finding a Broadband Partner

Sometimes the whole is more than the sum of its parts. That's what broadband providers are finding as the classic, single-actor broadband model gives way to diverse arrangements among private companies, public agencies and utilities. In a session organized by the Coalition for Local Internet Choice, broadband providers explained how they found partners with complementary assets and skills and why the resulting partnerships yielded better results than providers could have achieved on their own.

David Finn, director of corporate development for Google Fiber, said his company's most recent partnership, with the city of West Des Moines, Iowa, was its most exciting. In West Des Moines, the city government is constructing a citywide conduit network and leasing space in it to Google Fiber. Google Fiber, whose 20-year lease will help finance the deployment, is the anchor tenant, but the city hopes to find additional providers to use the conduits.

Partners in a variety of broadband projects debated the merits of different forms of partnerships.

"Everyone is doing what they do best," Finn said, explaining that the city was stronger at deploying infrastructure, permitting and navigating rights of way and that Google Fiber had the advantage in network operation, sales and marketing, and logistics.

In West Des Moines, the approach is similar to that of Huntsville, Alabama, but there, the city ended its infrastructure at the curb, leaving providers to build drops to homes and businesses. Google Fiber was also the anchor tenant in that network, but, Finn said, the requirement to build drops made the price for providers "so high that it didn't change the financial calculus for other tenants." As a result, no other citywide tenants have appeared in Huntsville. In West Des Moines, the city will build all the way to the premises, which Finn said would make the network "much more open and competitive."

The partnership between West Des Moines and Google Fiber took only five months to negotiate – a short time for a complex agreement. Finn said the negotiations proceeded so quickly because "early on, there was a commitment on both sides to do something great."

FEELING THE POWER

C Spire, a fiber-to-the-home (FTTH) provider in Mississippi, began considering expanding into Alabama two years ago. In conversations with Alabama Power, an investor-owned utility, C Spire discovered that the utility had deployed excess strands of fiber when it connected its facilities. However, Alabama Power had no intention of using that fiber to provide broadband directly.

"We forged a relationship with them," said Ben Moncrief, C Spire's senior vice president for strategic relations, explaining that C Spire leased Alabama Power's fiber to reach several Alabama communities and then built local networks within those communities.

Construction of C Spire's first Alabama network, in the city of Jasper, is nearly complete, and several other cities are in construction or planning stages. Jasper was first in large part because local leadership was committed to the necessity of symmetrical broadband service for economic growth.

RINGING IN FIBER

Ting Internet, a fiber overbuilder in many parts of the United States, has entered a variety of partnership arrangements with communities. Today, according to Monica Webb, the company's head of market development and strategic partnerships, it is leaning toward the partnership model it uses in Holly Springs and Fuquay-Varina, North Carolina. In those communities, the city governments built fiber rings that they make available at competitive rates to service providers. Ting leases fiber from the cities and then builds its own fiber from the rings to individual neighborhoods and premises.

This model works well for both parties, Webb said. For a municipality, building a fiber ring is "an easier financial lift" than building a full FTTH network, and having a lease agreement in place makes it more certain of recovering its costs – an important consideration because municipalities are risk averse and must justify their expenses to taxpayers, Webb said.

Ting believes the cities can build fiber rings through their main streets at lower expense than it could. These streets are highly trafficked, they often have railroad crossings and digging them up may require permits from state transportation departments. Municipalities are better positioned to solve these problems than private service providers are.

Ting collaborates with Holly Springs and Fuquay-Varina on planning fiber routes and marketing the networks to the end customers. In part because the cities have skin in the game, they have been helpful to Ting in resolving the issues that inevitably arise, whether that means helping negotiate pole access or "making sure permits aren't left on someone's desk."

Fresno, California, took an approach similar to that of the North Carolina cities. Bryon Horn, the city's chief information officer, said Fresno has fiber through its major corridors from its intelligent traffic system and added fiber conduit while implementing a

recycled water project. In 2015, it issued a request for quotes (RFQ), asking service providers to propose leasing the city's fiber and conduit. A single, open-ended RFQ was the best vehicle for enabling the city to enter multiple contracts because it reduced the red tape municipal procurements involve.

The first partnership to come out of the RFQ was with XG Communities, which built more than 100 4.9G/5G small-cell sites using city-owned infrastructure. Other partners include Verizon, which is implementing a 5G cell network; CVIN (Vast Networks), a competitive fiber overbuilder owned by a group of independent telephone companies; and several school districts. The RFQ remains open, and the city hopes to attract more partners. "We'll work with any vendor," Horn said.

COVID-19 Transforms Telehealth

"COVID-19 forced us into a new world," said Roberta Levy Schwartz, executive vice president and chief innovation officer at Houston Methodist Hospital, speaking of the hospital's experience with telemedicine. Before the pandemic, she said, consumers and providers were only "sort of ready" for telemedicine, which totaled about 5 percent of all visits, mostly in the urgent care department. Things ramped up quickly once the pandemic began. Nearly all ICU beds were connected for remote monitoring to protect medical personnel (and bring in reinforcements from elsewhere). The hospital found a way to transmit patient information along with the video feed for appointments, and the percentage of doctors' appointments conducted virtually rose to about 80 percent.

As the hospital environment was brought under better control, the percentage of video appointments fell to about 30 percent – still far higher than in the pre-pandemic days. Schwartz believes the numbers may rise again as the technology matures. For all the devastation wrought by COVID-19, she said, it gave the hospital a gift – a new way of providing care.

Schwartz distinguished several types of telehealth: the face-to-face doctors' visit; remote patient monitoring using connected devices, which doesn't involve communication with a health care provider unless readings are abnormal; and the "air traffic control" model in the ICU, in which remote specialists can view patients in many hospital rooms at once. The ICU model requires enormous bandwidth, she said, adding that broadband providers had succeeded in supporting the hospital's needs almost all the time.

NO TELEHEALTH WITHOUT CONNECTIVITY

The Utah Telehealth Network provides robust connections to 1,100 educational and health care organizations, mainly in rural communities. Matt McCullough, the network's associate director, said, "Our purpose is to make telehealth possible. There's no telehealth without connectivity."

Everything changed in March and April 2020, when the network saw a 300 percent increase in remote VPN accounts for home-based workers. "The whole idea of telehealth got flipped on its head," McCullough said. "We used to talk about patients at home or in rural clinics reaching specialists in urban hospitals. Now, the providers are at home, too." Though the network connects only institutions, McCullough emphasized that good bandwidth is needed to support both providers and patients at home.

The Utah Telehealth Network is also working on integrating telehealth into schools. McCullough cited one town with 10 schools – six of them on Navajo land – and only two school nurses. "It's a big job, and they travel a lot," he explained. "Getting telehealth technology would let them communicate with all the schools they're responsible for and deal with all the sick kids."

OVERCOMING INERTIA

Frederick Memorial Hospital in Frederick, Maryland, already had a telehealth program before the pandemic, said Robert Wack, the hospital's medical director of continuum of care. Remote monitoring of discharged patients in their homes was helping the hospital minimize readmittances and saving millions of dollars, even though it used relatively simple technology and cellular networks. But the hospital wasn't ready to move on to online doctors' visits; neither insurance companies nor doctors were set up for that. "There's a lot of

Telehealth experts said the pandemic was driving the development and adoption of telehealth.

inertia in health care," Wack said.

COVID-19 forced the hospital to accelerate the deployment of virtual visits. The hospital had to figure out workflows, appointments, virtual waiting rooms, queuing, and making charts available to doctors. "At the beginning, it was a mess, but within weeks we had figured it out," Wack said. "I don't think we're going to go back. Insurers and [the Centers for Medicare & Medicaid Services] see that it works. We've crossed a threshold into the future of what health care is going to look like."

Rural Success Stories

A rural broadband success story needs several ingredients, said Joseph Franell, president of Blue Mountain Networks in Oregon and Washington and chair of the Oregon Broadband Advisory Council. First and foremost, a broadband champion or a broadband action team is required. "A single person can drive broadband transformation," Franell said, citing a city councilor in Canada whose broadband advocacy led to the city's designation as one of the "intelligent communities" of the world for its use of technology to transform the community.

Other necessary factors include a strategic plan (which depends on having clear goals); engaged industry partners, including ISPs; political will ("There's a community that almost missed out on having fiber to the home built for free – it was funded through their county – just because the political will was so absent"); and a focus on solving problems rather than deploying specific technology.

For example, a community with no access to broadband might benefit more from a hybrid fiber and wireless model that evolves gradually toward fiber than from a network that was all-fiber from the outset. Wheeler and Sherman, the two most sparsely populated counties in Oregon, are pursuing this strategy. Funded by the state to build FTTH in their population centers for economic development purposes, they leveraged those projects, in partnership with Blue Mountain Networks, to build robust fixed wireless networks in the outlying areas and provide 100 Mbps satellite service in the remotest areas. Today, all residents in those counties have access to broadband – something they would not have had if they had held out for fiber-wiring all premises at once.

These counties had hoped to encourage broadband competition, but their combined population of about 3,000 was insufficient to attract a second provider. However, under a long-term contract, Blue Mountain Networks was able to offer the prices, price stability and speeds the counties would have expected from a competitive market.

In another part of Oregon, the three small wheat-farming communities of Adams, Athena and Weston joined forces to invite Blue Mountain Networks to build FTTH. With the political leaders' strong support and some small grants, the ISP was able to connect the communities. The mayors then applied the franchise fees they would have received for the first two years to digital literacy training for their residents. "Availability is not enough," Franell said, quoting the mayors. "We need to know how to use this wonderful tool."

Two decades ago, The Dalles, a city about an hour east of Portland, collaborated with Wasco County to build a middle-mile fiber network that private ISPs could use. The network brought a Google call center and data center to The Dalles, anchoring the local economy. However, the more rural parts of Wasco County were still unserved. Recently, when the middle-mile network expanded south into rural areas, Blue Mountain Networks built FTTH in the tiny, tourist-dependent town of Maupin. "Now, tourist season is wildly different there," Franell said. Businesses that once had difficulty accepting credit cards are now able to function in the modern economy.

To increase digital literacy levels, Tri-Co Connections recruited high school seniors to teach senior citizens how to use computers and the internet.

CONNECTING RURAL SENIORS

In north-central Pennsylvania, Tri-Co Connections, the broadband subsidiary of an electric cooperative, has begun wiring a very rural area with FTTH. Bill Gerski, senior vice president for business development of Tri-Co, described some of the challenges the company faced. First, about 42 percent of residents are second-home owners who live there only on a seasonal basis. Second, a large percentage of permanent residents are senior citizens who don't use computers or the internet. To address the digital literacy issue, Tri-Co Connections created the

Senior 2 Senior Educational Program, in which high school seniors teach senior citizens how to use computers. The program provides a face-to-face, hands-on, classroom-style course in partnership with the county educational council, a career technical center and the county agency for the aging. Local banks donated training, computers and printers. Training was conducted at four senior centers in the county.

The eight-week curriculum begins with how to turn on a computer and continues with such subjects as staying connected with family and friends, using telemedicine, banking and shopping online, accessing government websites, telecommuting (some have gotten jobs through this program) and improving hand-eye coordination. Forty seniors have graduated from the program, making them eligible for free fiber installation and a free month of broadband service.

Tri-Co is now expanding the original Senior 2 Senior program through intensive outreach and planning a follow-up program with more advanced classes and resource materials in the form of posts on blogs and social media.

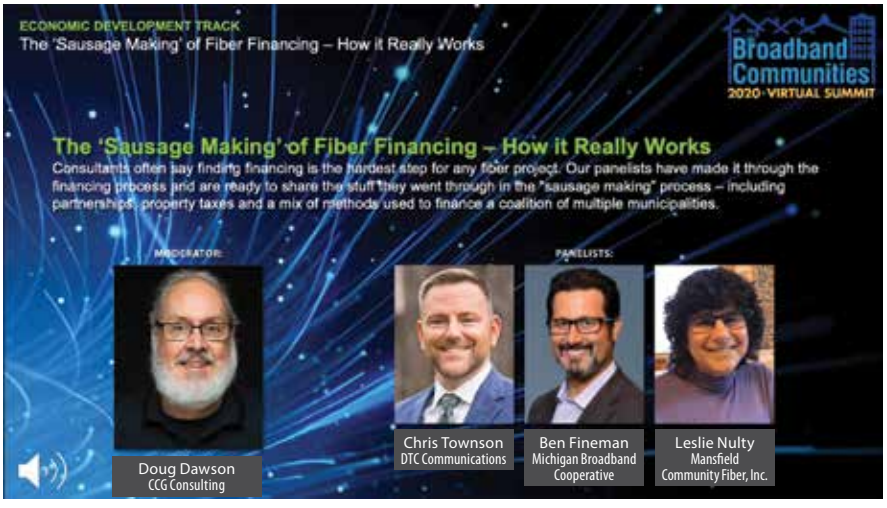
Fiber Financing

Interest rates are at a historic low, but does that mean banks are lending money for broadband deployments? Banks have tied up huge amounts in Payroll Protection Program loans, said Doug Dawson, president of CCG Consulting, and some are now short of cash. Dawson said he expected some banks to tighten their lending requirements or even shut off the tap without formally announcing that they are doing so. However, government lending programs, such as the Rural Utilities Service, will still have money available. "It's a good time to borrow from them," Dawson said.

Panelists spoke about several other methods of financing broadband, including issuing bonds and borrowing from a state agency.

Ben Fineman, president and co-founder of the Michigan Broadband Cooperative, a volunteer group, participated in a fiber broadband initiative in Lyndon Township, a small, underserved, rural area in Michigan. After examining several options, residents and the township board decided to issue a bond backed by property taxes, build a network, and contract with a private operator – an electric co-op – to deliver services. Residents now have, or soon will have, symmetrical gigabit service for $70 per month, plus a property tax increase of $23 per month.

Because the bonds were backed by property taxes rather than revenues, the township was able to secure a favorable interest rate. And although general-obligation bonds can be risky for taxpayers, in this case the project turned out well; the take rate is about double what the network needed to break even, and the housing market in the township is booming. Now, through the Michigan Broadband Cooperative, Fineman is working to replicate the Lyndon Township model throughout two counties.



Panelists shared their fiber financing success stories.

INVENTING CROWDFUNDING

ECFiber, a network owned by an interlocal association of 26 Vermont towns, saw its original funding plan collapse when the 2008 recession began. The group then "invented crowdfunding," as Leslie Nulty put it, by creating a series of subordinated bonds sold to residents for as little as $2,500. Bondholders were often potential customers for the network, but their investments did not ensure them any priority in the network rollout, whose schedule was determined on a "technical and economic basis." At tax-exempt interest rates of 7 to 9 percent, the bonds were attractive to small savers, and $7 million worth were sold. By 2014, ECFiber was able to go back to the public municipal bond market and raise $40 million to complete the buildout.

Nulty, along with her husband, Tim Nulty, then retired from ECFiber and went to northern Vermont to launch Mansfield Community Fiber (MCF), where they are now CFO and CEO, respectively. Unlike ECFiber, MCF was organized as a private but "socially responsible" company, which allowed it to get going more quickly than if it had been a public entity. Like ECFiber, however, it has attracted local private investors.

Nulty said she was skeptical about broadband grant programs because

they "fail to impose discipline on the recipients," but she has advocated for loan programs that require robust business plans. MCF urged the Vermont legislature to institute such a program, and in 2019 it agreed, creating a broadband loan program in the Vermont Economic Development Authority. Following MCF's recommendations, the program requires borrowers to contribute equity to the project; it also gives them a two-year loan repayment holiday and in the third year charges only interest. This gives borrowers time to secure pole access and deploy fiber before having to start repaying their loans.

MCF became the first borrower in the broadband loan program and plans to request another loan as it continues its network expansion.

Arizona Focuses on Existing Assets, Funding to Expand Rural Broadband

Arizona's rural broadband needs traditionally have been hampered by a couple of key issues: sparse populations that make it tough for large carriers to expand services and restrictions on how other utilities can provide service.

The state has 15 counties. In many of Arizona's rural counties, nearly 60 percent of homes today don't have broadband service.

As in rural areas in other states, the lack of broadband is the result of availability and cost issues, particularly for low-income families.

Ben Blink, transportation and technology innovation policy advisor in the office of Arizona Governor Doug Ducey, said the lack of broadband has a broader impact on communities overall.

"This is a big issue for economic development and public safety response," Blink said. "With some of our unique challenges in the Southwest, particularly with large expanses of desert, mountains and a lot of areas with sparse populations, it has made broadband expansion tough."

LEVERAGING EXISTING ASSETS, FUNDING

To overcome its broadband problems, Arizona is focusing on how it can leverage existing assets from other entities, such as electric utilities. It is also developing state funding measures. This allows broadband expansion to flow while keeping costs low.

"One key area we think about is what role electric utilities have and what services reach these rural areas," Blink said. "The electricity infrastructure is one of those key areas, so we have worked hard to eliminate the barriers that would inhibit an electric provider from offering broadband."

Another issue that prevented electric cooperatives from offering broadband is that many electric transmission lines run over state land. The state land department oversees 9.2 million acres of land. A new rule now eases restrictions on that land.

Following in the footsteps of other states, such as Georgia, Indiana, Missouri, Tennessee and Texas that recently passed laws facilitating rural broadband, Arizona put in place new legislation that allows electric cooperatives to deliver and support broadband services on their existing utility lines.

Ben Blink

Such a bill makes sense. Today, Arizona electric co-ops bring electricity

MARYLAND GRANT PROGRAMS REQUIRE PARTNERSHIPS

Kenrick Gordon

Kenrick Gordon, director of the Governor's Office of Rural Broadband, Maryland, said, "In our smaller grant program, the local jurisdictions apply on behalf of an ISP. Many times, the local jurisdiction is contributing to the match. The local jurisdictions have a vested interest in getting broadband out to their constituents. All of the dense areas are taken [by larger providers], and trying to get a local provider to come into an area where it may not have a presence yet takes a lot of back and forth, a lot of cooperation, a lot of information. Tying in the local jurisdictions as a partner helps those smaller providers that might be interested in coming in to cover 800 or 1,000 households.

Even in our larger program, we still require the ISP to partner with the local jurisdiction. The partnership is a little looser, because the ISP is doing much more of the legwork, much more of the heavy lifting. But it's important for the local jurisdictions to be able to say, 'We know you want to go *here*; but over *here*, nobody seems to want to be. What can we do to get you there as well?'"

and broadband services to more than 400,000 customers in Mohave, Pima, Pinal, Graham, Greenlee, Navajo, Apache and Cochise counties.

"We did not have an easy way for easement holders or rights of way holders to allow electric utilities to add broadband on top," Blink said. "Our state land department started a new application and rent schedule that allows electric utilities to sublease their own lines or partner with a third-party provider without the state land department getting in the way."

CLOSING THE MIDDLE-MILE, LAST-MILE GAP

Easing restrictions on electric co-ops is just one solution Arizona is using to close the broadband gap. The state also is looking for ways to use the interstate highway system to create a more robust middle-mile network.

Unlike other states, Arizona does not have fiber along its highway right of way.

"We're looking to remedy a lack of fiber along the interstate highway system," Blink said. "We released a request for information and got responses about public-private partnerships to leverage our interstate rights of way to provide core middle-mile capacity."

Governor Ducey also made funding available in the state's budget for fiber conduit to encourage partnerships in rural areas. The budget included funding for 514 miles along certain interstates for conduit.

"This will minimize the cost of digging in sparsely populated areas that are prohibitively expensive to dig and build when there are not a ton of people living in those areas," Blink said.

It also included a provision for transportation – or what the Arizona government calls "smart highway corridors" – to put in cameras, road weather detection and many surplus microducts to allow public-private partnerships.

Blink said that although with the "COVID-19 pandemic, we did not get funding, we are using $40 million on two stretches of highway that extend from our metro areas to rural areas that we believe will close the middle-mile gap and allow some last-mile partnerships to happen."

As it builds out more middle-mile infrastructure, Arizona is increasing demand for broadband. The state hopes that as it does this, it will inspire other providers to build.

"Our assumption is as there's more interest in purchasing broadband services in rural areas of Arizona, it will increase the interest in broadband providers to build out connections to those rural areas," Blink said.

A key focus will be on enabling applications such as telemedicine. In 2019, Arizona's Medicaid system expanded funds for telemedicine.

With nearly 2 million of its citizens on Medicaid, Arizona enabled broader telemedicine coverage.

"We removed restrictions on disciplines for telemedicine and allowed asynchronous coverage, which previously was not covered for things such as radiology and dermatology. We also removed restrictions on telemedicine for people who live in urban areas," Blink said. "We think just increasing that pipeline of telemedicine and service providers will help people in our rural areas."

To help close the last-mile divide, the state also is providing funding through its rural broadband development grant program. Arizona awarded $3 million in funds to three grantees, including an electric co-op that is providing service to about 35,000 members and another partner that is using electric utility poles to provide services across state land.

"We're trying to use the last-mile funding in partnership and collaboration with some of the middle-mile projects and state initiatives we are working on there," Blink said.

Unraveling Middle-Mile Connection Opportunities, Challenges

As service providers begin rolling out broadband to communities, particularly in smaller markets, there is a need to put in place robust middle-mile connectivity.

The middle mile is the segment of a network that links a service provider's core network to the local network plant, typically situated in a central office that provides access to the local loop. This includes the backhaul network to the nearest aggregation point and any other parts of the network needed to connect the aggregation point to the nearest point of presence on the operator's core network. The middle mile also provides connectivity to major internet hubs.

The interconnection between middle-mile and last-mile networks has become increasingly important in recent years, as last-mile networks expand into rural areas of the United States. Middle-mile connectivity has become increasingly important in rural markets that lack options to access internet hubs.

Service providers partner with a growing number of alternative players, including Zayo and Fatbeam, to get middle-mile networks. These providers come at the middle-mile concept from different angles. ThinkBig Networks, an emerging FTTH provider, works with middle-mile providers to get access to internet hubs.

Zayo, a Tier-1 provider, can offer fiber-based services in major markets in North America and Western Europe. It currently has more than 13 million miles of fiber across the United States, Canada and Europe.

When it works to connect with local last-mile providers, Zayo likes to interconnect with other last-mile players at its point of presence or other major interconnection points.

"You have to protect from slicing and dicing the network such that it becomes delicate because it has so many splice points should someone look for a ring around the network," said Dennis Kyle, senior vice president of Zayo. "We try to direct people toward aggregation

Middle-mile and last-mile providers must overcome challenges to work together effectively.

points in the network as a way of consolidating services, aggregating services and improving the reliability of the network."

He added, "The more splice cases you touch, the more unknown line errors, so you try to avoid making your network delicate."

Fatbeam, a business-to-business provider of fiber-based network solutions to enterprise, health care, government and education customers in the Western United States, faces similar challenges. Focusing on communities with populations under 200,000, Fatbeam goes where there's an existing ILEC. It initially provides WAN connectivity to schools and installs high fiber counts.

"We build fiber through the community," said Greg Green, CEO of Fatbeam. "We'll start with a core fiber network, run through downtown, and ultimately look to connect with others."

RURAL OPPORTUNITIES, CHALLENGES

As service providers roll out middle-mile networks in rural areas, network operators need to be aware of various scenarios that could hold up a build or get in the way of completing a project.

For Fatbeam, the move into a rural market means that it has an opportunity to differentiate itself from other providers.

"When you're in a rural market, you basically have the incumbent phone company and the incumbent cable company," Green said. "In rural markets, you get to dictate how you want your fiber to connect into a co-location facility."

But Green emphasizes that Fatbeam likes to build out diverse routes separate from other providers. "If we're not the first one in a location, we're going to create diversity there," he said. "Like an artist, a new provider has its own brush to create its own strokes. It is able to think about how it is going to interconnect and interface."

ThinkBig Networks, an emerging FTTH provider that offers service in Maryland and Virginia, agreed and added that developing new ways to get into a community is key. The service provider today provides service to Kent County, Maryland, with plans to bring it to other Maryland towns, including Sudlersville, Church Hill, Centreville, Ocean Pines and Ocean City. It also plans to expand to Captain's Cove, a community in Greenbackville, Virginia.

ThinkBig is completing several grant projects to bring services to towns with little or no internet.

Mark Wagner, CEO of ThinkBig, said that a new player must start a dialogue with local incumbent telcos.

"When you're thinking rural, there's going to be less competition," he said. "You do have the ability to be more creative with the local telephone co-ops and power companies to get them

MICRO FUNDING OPPORTUNITIES


Darrell Maynard

According to Darrell Maynard, CEO, Eastern Telephone & Technologies, "The large funding that's available generally is tied to the requirement of minimal services, and if you've got one little area that's served with 25 Mbps/3 Mbps, or even sometimes 10 Mbps/1 Mbps, it disqualifies the whole thing. So if you take a micro view of these communities – and these communities know which ones need it the worst – they'll tell you, they'll come and complain, and then it's easier to find the smaller grant opportunities. You can fill some of these with a public-private relationship. A hundred thousand dollars or $300,000 … will be a start to getting it done and fixing those areas forgotten by the big guys."

excited about your business plan and how to work together."

He added that rural markets are unlike urban markets in which new providers have a wider range of providers to work with for interconnection.

Zayo, which serves a mix of denser urban and rural markets, attributes to thoughtful preparation its success mapping out and working with the communities it serves.

"Rural areas take longer," Kyle said. "When you enter a rural market, you need to help people plan and educate them."

UNDERSTANDING DEPLOYMENT OBSTACLES

In addition to dealing with a smaller number of providers, the other challenge middle-mile providers encounter when going into new markets is dealing with unforeseen deployment obstacles.

For a fiber provider, getting permission from landowners and state agencies to lay fiber across railroads and bridges can hold up a fiber build.

Fatbeam saw these issues firsthand when it started laying fiber under a bridge in Yakima, Washington. It took 12 to 14 months to attach fiber conduit.

"Here we are bringing broadband to a rural community by going under the bridge that is on a separate path from the other nine carriers that are connected to a nearby PoP on a railroad," Green said. "This route is going to help this community, yet no one sees that, so there can be an education process."

But according to Zayo, if a network is already in a market, it can perform an interconnection to a building quickly.

"Assuming our network is there and our equipment is there, and the partner's network is there, it can take 30 days or less," Kyle said.

Nevertheless, there are always other issues, such as getting access to utility poles and the associated make-ready process and railroad crossings.

"You might think you have plenty of room in a location, but a lot of little nuances could come up," Green said.

Wagner agreed that every deployment and interconnect ThinkBig does is unique and is never easy.

"Every single interconnect I have ever been associated with during my entire 19-year career has always been in cases where there's a different floor or a different location," he said. "I have never seen a deployment where the partner says 'we have a 2-foot cross-connect.'"

Ensuring Communities Are Ready for New Providers

As providers identify communities in which to deliver broadband service – particularly unserved or underserved communities – the challenge and opportunity is to understand what the communities need.

This has been the case not only for emerging FTTH providers, such as Allo Communications, Connect C and MetroNet, but also for Facebook, which is building fiber through communities to connect its data center facilities. Service providers seek communities that want to engage in partnership to build out fiber or wireless broadband or partner with other local providers.

For example, consider MetroNet, an emerging FTTH provider. In 2017, Lexington, Kentucky, Mayor Jim Gray announced an agreement with MetroNet to build a fiber network in the city.

Gray's move was motivated by sticking to his promise to give citizens a new choice in television providers and to transform Lexington into a gigabit city with ultrafast internet access attracting high-tech businesses and good jobs. MetroNet completed laying 4.4 million feet of fiber in neighborhoods across the city this August.

"What MetroNet looks for in choosing one community over another

Community enthusiasm is a draw for fiber providers, panelists agreed.

is this partnership: Will the city work with us?" says Scott Shapiro, a consultant to MetroNet. "Construction is an enormous undertaking not just for MetroNet, but also for a city."

He added, "MetroNet is looking for across-the-board cooperation to ensure that construction is going to go smoothly for us and the people."

Allo Communications, which has also been building out FTTH, weighs various options to conduct partnerships with cities. Like MetroNet, Allo will fund its own builds, but in some cases, such as in Breckenridge, Colorado, construction costs are very expensive.

To overcome the cost issue, the town got creative. "Breckenridge said, 'We know you won't fund it yourself because we know you won't get a return, and we won't get a return,'" said Brad Moline, president of Allo. "However, we realized that having fiber is important, so Breckenridge paid for it, and we did a revenue share."

Moline added that Breckenridge is the exception rather than the rule. Allo looks for communities that are enthusiastic about getting fiber and can provide access to public rights of way and other related facilities.

"In most of the communities we work with, we either identify a community to build out to, or they come to us and say they want fiber," he said. "We ask them if they have an efficient pole attachment and right of way permitting process, and if the community is excited about getting fiber."

For other providers, such as Facebook, the key is to work with communities and partners that have a similar vision. Facebook is leasing excess capacity on the fiber routes it's building to connect its data centers.

In North Carolina, Facebook formed a partnership with MCNC, a nonprofit provider that provides fiber and services to the North Carolina Department of Education via the North Carolina Research and Education Network.

Michele Kohler, the business development manager of network investment for Facebook, said the company's partnership with MCNC will directly complement the 140 miles of fiber it is building through the state.

"Working with MCNC was an opportunity to leverage the infrastructure that it did not have in the state and connect 26 anchor institutions into the state's backbone," she said. "It is a unique partnership in that MCNC owns, operates and knows how to construct its own fiber, so we contributed fiber to it and identified anchor institutions."

Facebook is now looking to replicate the model it had with MCNC in other states. "As we evaluate other types of partnerships, it's all about finding the common goals where we can have the greatest impact together," Kohler said.

COMMUNITY READINESS

Another key question providers should consider before deciding to go into a community is whether the city or town is ready to embrace a new fiber provider.

Service providers about to enter communities face challenges many of them have not seen since towns and cities were wired for cable television in the 1960s and 1970s.

To obtain streamlined access to rights of way and infrastructure, providers need to convince city and town leaders that they can provide solutions that will help the communities.

"It's difficult when someone has a new idea about how to deliver services," says Allo's Moline. "Getting through the new idea is hard." He adds that after a provider builds out fiber in a community, communications with all stakeholders should continue to be open.

When MetroNet decided to build out Lexington, the service provider's plan got support from the city's administration. "The reason it worked was that there was top-down agreement

EXPERT PERSPECTIVES

"We believe that by resolving the broadband issue, we could accelerate high-wage job creation."

– Matt Sayre, managing director, Onward Eugene

"Even if a community is rural, people will move out to the rural areas so they can get away from the hectic lifestyle because they have high-speed internet and can work remotely."

– Phil Sharps, manager, technical services, Clarksville Connected Utilities

"The digital divide has consumed the oxygen and the air as it now overlays how the systemic inequalities are affecting society generally."

– Nicol Turner Lee, fellow, Governance Studies, Center for Technology Innovation, Brookings Institution

"In places where the utility is local or very small, you're going to see those providers be the leader in broadband because they know what the community needs."

– Hank Blackwood, chief technology services officer, Dalton Utilities

"We need an all-hands-on-deck broadband plan that not only brings in national providers, but also recognizes the role municipalities, cooperatives, anchor institutions, and states play."

– Christopher Ali, assistant professor, Department of Media Studies, University of Virginia

from the mayor that we needed fiber in Lexington," said Shapiro. "The city said it needed the fiber network to be competitive and for economic development."

OVERCOMING CHALLENGES

Bringing fiber or an alternative service to an underserved community is a positive development, but providers face challenges to do so, such as a lack of resources and potential political pushback.

MetroNet sometimes faces challenges in getting community buy-in regarding the importance of fiber, even during the pandemic.

"While COVID-19 has shown how crucial fiber is for jobs, health care and schooling, you still run into this political process where there are 100 ways a wrench can be thrown into the works," Shapiro said.

Facebook finds similar issues when it proposes to work with rural communities to extend its fiber. The social media company approaches communities with the promise that it can add value to the communities because it can provide middle-mile fiber networks.

"As we get close to the end of our construction phase, people aren't always willing to have a conversation with me," Kohler said. "This is challenging and is hard to overcome."

Compounding the problem, particularly in rural areas where there is only a small telco, is that these smaller telcos don't have enough staff to meet with Facebook or other partners.

"Because they are focused on their core business mission, which is to make sure their existing customers are up and running, they don't have the resources to look at business development and expansion outside of their current territories," Kohler said.

DigitalC, a nonprofit organization focused on creating an equitable digital future in Cleveland, Ohio, said educating the city's residents about its ability to provide broadband service is an obstacle. In 2018, DigitalC completed its pilot project called Connect the Unconnected, which provided devices and internet access to more than 500 households.

The organization plans to begin a $40 million fundraising campaign in partnership with the city, schools and businesses.

"Our biggest challenge is that we are different as a WISP within a nonprofit organization," said Dorothy Baunach, CEO of DigitalC. "We know that the public-private partnership Cleveland launched in the 1980s is still alive and well, and we're carrying that down into the neighborhoods. The challenge is convincing people that we have an alternative solution that will serve the underserved." ❖