Fiber Moves Forward

Speakers at the 2019 **Broadband Communities** Summit, held in Austin in April, agreed that every community wants – and needs – great broadband. How best to deliver great broadband to MDUs, master-planned communities, underserved towns and rural areas is still up for debate, however. Following are some highlights of speaker presentations.

A BBC Staff Report

Verizon, CenturyLink Diverge on Copper Retirement

CenturyLink and Verizon agree fiber is the future for their last-mile networks, but in the Conversation With the Big Carriers session, they expressed different points of view about what to do with their legacy copper networks.

CenturyLink, which deepened its business and wholesale service lines with fiber gained via its acquisition of Level 3, is not trying to migrate customers from copper. Dan O'Connell, senior director of consumer markets for CenturyLink, said the company plans to maintain dual networks of copper and fiber: "Where we do fiber builds, we will run copper and fiber in parallel, and I am not aware of any strategy that says that is going to change anytime soon."

CenturyLink, the slowest of the major telcos to build FTTH, is moving to expand its consumer fiber reach. "In terms of coverage, fiber expansion is an ongoing initiative," O'Connell said. "If you ask anyone from the CEO all the way down what the company's No. 1 mission is, it's fiber expansion to bring these capabilities to our consumer base as quickly as we possibly can."

O'Connell added that "the pace of the fiber expansion is accelerating, and you can expect over the next five years that a large percentage of our residential base will have fiber."

Verizon, on the other hand, is actively retiring copper plant in parts of its Northeast wireline footprint. Although it has slowed the pace of its Fios buildout, it continues to roll out fiber in select markets.

Michael Weston, senior leader, Verizon Enhanced Communities, told attendees that it is "aggressively deploying fiber" to reach about 25 million households in its territory.

In a recent FCC filing, Verizon asked to retire copper in several parts of New York, New England and Pennsylvania as it continues moving customers to fiber-based technology. Specifically, Verizon is addressing 50 wire centers in New

Shawn Cullingford, Ruckus Networks

IN-BUILDING WIRELESS

Shawn Cullingford, Ruckus Networks: Never put wireless access points in the hallways of multifamily buildings! WAPs are now critical infrastructure. Their bandwidth drops off very quickly with distance because they operate at high frequencies, so they should be placed as close as possible to tenants. In addition, a hallway is a radio-frequency wind tunnel, and if its walls are constructed with chicken wire in plaster, it will act as a Faraday cage, blocking electromagnetic fields. Multiple WAPs may be required for each unit.

York City. The copper retirement plans in New England will target four wire centers in Massachusetts.

"It's a lot like having a Microsoft Windows 1995 computer, as I do, in the basement," Weston said. "It still works fine, but Microsoft no longer supports Windows 95, and for good reason: It's outdated, and the company is putting its capital toward newer and more modern technology." Weston added, "We're doing the same thing by bringing people off the copper network as part of our strategy. Copper, by definition, is subject to degradation from the elements."

Broadband, Smart Technologies Drive Housing Choices

Consumers' choices of home purchases and apartment rentals are increasingly influenced by the presence of broadband connections.

Service providers and property managers outlined their responses to this trend.

Telcos and cable operators are equipping more single-family and MDU locations in their footprints with higher-speed broadband via fiber or HFC-based services. Meanwhile, property developers are taking advantage of the latest technologies to deliver higher speeds to consumers.

CENTURYLINK, COMCAST FAN OUT BROADBAND

CenturyLink, which recently enhanced its MDU division by bringing on telecom and cable veteran Dan O'Connell as senior director of consumer markets, is finding new growth opportunities for consumer broadband using a mix of fiber and hybrid technologies such as G.fast.

For example, O'Connell's team focuses on securing agreements with residential real estate developers, owners and property management companies, and delivers CenturyLink ON technology to new developments. This technology enables residents to activate symmetrical internet service up to 1 gigabit in minutes, without help from a CenturyLink technician.

"Broadband connectivity is a critical component of the household," O'Connell said. "It is key for life simplification."

O'Connell added that providers need to ensure the service delivery and overall experience is smooth.

"We can't lose sight of the when, how, what and where that residents demand service," he said. "How and what that experience is, is just as critical in this process as the service itself and the price point."

Having built out 1 Gbps capabilities across its HFC footprint, Comcast noted in its first-quarter earnings report that it had added 375,000 new broadband subscribers.

The cable MSO is seeing more consumers base apartment rental decisions on the presence of broadband. "According to our surveys, 94 percent of residents said internet service was a major factor in their rental decisions," said Mike Slovin, vice president of national field sales, Xfinity Communities, during the same panel.

PROPERTY OWNERS, PROVIDERS BANK ON THE GIG

Property owners and providers serving planned communities also see the value of broadband connections.

Speaking on the Great Communities panel, representatives of the Whisper Valley and Walsh Ranch communities explained how fiber-based broadband makes their communities attractive to buyers.

Working with Google Fiber, Whisper Valley delivers 1 Gbps to each home in its community in Austin, Texas. Besides offering smart-home and energy services, the company sees broadband as a key amenity, particularly for telecommuters who require broadband to conduct daily work.

Kara Weinstein, homeowners association and lifestyle director for Whisper Valley, said potential home buyers tell her broadband is at the top of their priority lists in considering new homes.

"A third of all the people I talk to about Whisper Valley are looking specifically for communities that have dependable, fast internet service," she said. Weinstein added, "If our EcoSmart system, which includes geothermal [heat pumps] and solar panels, is our bones, high-speed internet service is our nervous system."

A similar trend is taking place at the Walsh development in Fort Worth, Texas. As the development's lead service provider, Frog offers consumers a low-cost migration path to 10G. "Every home is connected at a minimum of 2 Gbps, and we offer residential upgrades of up to 10 Gbps for less than $200 a month per resident," said Michael Voll, CEO of Frog.

Additionally, Frog equipped the Walsh community with small cells to support future 5G deployments.

"We're not just focused on the wireline side," Voll said. "We're working with the wireless providers on deploying small-cell nodes throughout the community for 5G coverage and building for the future."

The company uses high-speed connections to enable services such as telehealth, musical playgrounds and an augmented-reality map of the community.

Voll said the endgame for its wireline and wireless technology is to empower members of the Walsh community by "creating a place that will inspire human innovation for every resident and every business."

> Ninety-four percent of residents said internet service was a major factor in rental decisions.

Run Muni Networks Like Businesses, Not Like City Hall

A community that wants to run a network business must realize that good business practices, not politics, should rule decision-making. In other words, municipal network operators must have clearly developed operational plans.

Panelists in the Lessons Learned From Turnaround Communities session agreed that to overcome the perception that municipal networks are not feasible, community leaders must be willing to listen to new points of view.

Consider Highland, Illinois-based Highland Communication Services, a provider that offers residential customers 1 Gbps service for $70 a month. When Angela Imming became director of technology and innovation for the city of Highland, the municipal service provider faced the challenges of flat ARPU and inflated video fees. Imming said what kept Highland from moving forward was a lack of focus. "Our take rate was flat because we had not convinced people to leave the perch of Charter Communications," she said. "The big question was, why were we doing this? As soon as we were able to find the answer, we refocused."

NETWORKS ARE DIFFERENT

Municipal providers must also learn that running a network effectively differs from running other town or city operations.

Before hiring Don Patten as the general manager in 2014, MINET, a municipal provider that serves the cities of Monmouth and Independence, Oregon, faced issues with operations, billing, documentation and marketing.

Patten's first order of business was to analyze how the business could be realigned and persuade the board to listen to new ideas.

"After realizing that MINET could be salvaged, one commitment I had to get from everybody involved was that members would be willing to listen to adult conversations and make the place efficient so we could get on with running the business," Patten said.

A six-member board, three from each community, runs the municipal provider. "Unfortunately, whenever you have government involved in something, you have politics involved in it," Patten said. "When you have politics involved in it, you have the need to candy coat everything. When you candy coat everything, that is the recipe for failure in our business."

Imming noted that, besides getting its operations in order, Highland Communication Services had to persuade others that running a network is not like running a water department.

"For the city of Highland, one of the toughest barriers to overcome is that municipalities can build and operate a network, but it can't be operated like city hall or the other utilities," she said.

In Salisbury, North Carolina, network organizers had to overcome not only state legislature leaders but also incumbent providers that did not want a new competitor.

"We had significant areas of the business population saying, 'You don't need to do this,'" said David Post, mayor pro tem for the city of Salisbury. "We also faced a massive PR campaign against us."

FOCUS ON OVERSIGHT, EXPERTISE

Politics is only one challenge for municipal providers. Creating tight cost controls and marketing services correctly are also requirements for success.

To avoid problems, municipal providers need to exercise oversight of their financial processes and spending.

Utah-based open-access operator UTOPIA, which has seen its share of ups and downs throughout its existence, has found solid new ground and embarked on a new life, adding cities, retail providers and subscribers.

In its early years, UTOPIA, one of the first U.S. municipal networks, made mistakes caused by lack of experience. In addition, it was hampered by the state legislature and by a lawsuit from Qwest, now CenturyLink. Qwest accused UTOPIA of creating unfair competition that allowed its contractors to sell services at below-market prices.

Roger Timmerman, executive director and CEO of UTOPIA Fiber, said, "We got a lot of good people with good intentions, and the economics did not pan out. I would encourage any community embarking on a fiber project to do its homework. Then, have a level of in-house expertise to scrutinize the spending and purchasing decisions."

Timmerman added "If you go and just fill your shopping cart, you're toast. But if you pick the right partners that are efficient, you will have a successful project."

In Salisbury, network builders had to face off against anti-municipal broadband marketing campaigns. "We found ourselves having to compete with big boys that were spending more marketing dollars to have people *not* use us than our entire revenue base," Post said.

Bryan Rader, UpStream Network

HEDGING AGAINST UNCERTAINTY

Bryan Rader, UpStream Network:
The multifamily industry always oversupplies housing, and eventually it will have to lower rents. The best strategy for broadband providers is a long-term bulk internet contract. That has a guaranteed rate of return. It's bankable. No one knows what will happen over 10 years, so a bulk platform is a vehicle for predictability.

To overcome this issue, Salisbury created a network operation agreement with Hotwire, which leases the network and provides services. "A few years ago, we ended up in a public-private partnership where we still own the infrastructure," Post said. "Municipalities have to spend the money to build the infrastructure, and we lease the facility and get the revenues. I think we're going to end up on the plus side."

5G Is Nothing Without Deep Fiber

Though wireless operators are excited to build out 5G wireless – a technology that promises theoretical speeds up to 1 Gbps – the reality is that 5G won't work without a large amount of last-mile fiber in neighborhoods. The remote small-cell radio nodes that will carry millimeter-wave signals to homes and businesses will depend on fiber for backhaul and fronthaul.

Angie Kronenberg, chief advocate and general counsel for INCOMPAS, said rolling out enough fiber to enable 5G is a national problem, and all stakeholders need to help solve it, not only for 5G but also for a host of consumer and business services.

"We don't have enough fiber in the United States as compared with other countries," Kronenberg said. "On top of that, 5G will require tons of fiber. The densification of fiber at every small antenna will need to be our nation's goal."

Drew Clark, chairman and publisher of BroadbandBreakfast.com and president of the Rural Telecommunications Congress, agreed: "You can't get 5G without deploying fiber deeper into the neighborhoods."

VERIZON BULKS UP FIBER ARSENAL

Wireless operators, including Verizon and AT&T, have been ramping up their fiber deployments to support 5G and other services.

Verizon turned on its 5G Ultra-Wideband network in select areas of Minneapolis and Chicago a week ahead of schedule. It claims customers in Chicago and Minneapolis should expect typical download speeds of 450 Mbps, with peak speeds of nearly 1 Gbps and latency of less than 30 milliseconds.

The wireless operator plans to equip 20 additional cities with the 5G Ultra-Wideband network in 2019, with more to come throughout the year.

As it anticipated building a backbone network to support 5G, Verizon bulked up its fiber arsenal, signing multibillion-dollar contracts with Corning and Prysmian in 2017. These fiber agreements will support wireline builds as well as wireless as part of Verizon's One Fiber initiative to speed 5G deployment, densify its 4G LTE coverage and provide broadband services to homes and businesses.

Verizon signed a $1.1 billion, three-year fiber and hardware purchase agreement with Corning, enhancing its capacity to support the next-generation fiber platform it needs. Under the terms of that agreement, Verizon is purchasing up to 12.4 million miles of optical fiber each year from 2018 through 2020.

Later, Verizon named Prysmian as an additional supplier of fiber cable to support its 4G and 5G wireless and wireline broadband plans, signing a $300 million deal with that company.

Under the terms of the three-year contract, Prysmian will supply Verizon with more than 10.6 million miles of ribbon and loose-tube cables.

"To do 5G, we're driving fiber deeper and deeper into the deployment, so we're becoming more of a fiber company," said Michael Weston, senior leader for Verizon Enhanced Communities.

AT&T GETS FIBER WISE

AT&T is no less aggressive with its 5G network and accompanying fiber builds.

Having launched its mobile 5G network in parts of 12 cities in December 2018, the service provider plans to deploy mobile 5G in parts of seven additional cities in the first half of 2019.

Like Verizon, AT&T is deploying fiber to fit various wireline and wireless needs under its "fiber wise" strategy.

Whether for fiber to the business, fiber to the home or fiber to the picocell site for 5G densification, AT&T is deploying fiber deep in its network. Over three years, the service provider spent roughly $130 billion between its fiber network, wireless ugrades and the FirstNet network.

"At the end of the day, fiber is fundamental to expanding our networking capabilities," said Jackie Arbour, general manager, national sales and mixed-use, AT&T Connected Communities, during the Big Carriers panel. "It's fundamental to expanding our 5G network, and it's fundamental to our ultra-fast, highly personalized customer experience that consumers are looking for."

Jim Baller,
Baller Stokes & Lide

THE SWISS CHEESE PROBLEM

Jim Baller, Baller Stokes & Lide:
If you can't overbuild 10 Mbps/1 Mbps networks, and you have to deal with a world that looks like the holes in Swiss cheese, that's going to put a significant constraint on the intelligent use of the $600 million [ReConnect fund for rural broadband]."

WHAT ABOUT RURAL AREAS?

Clark said during the Big Picture panel that the most likely scenario is that wireless operators will concentrate their 5G rollout efforts in Tier 1 cities.

"To the extent we get something that's 5G, according to the standards, you're going see it in denser markets," Clark said. "We still have a long way to go before we get 4G networks in rural America."

Community Broadband and Telehealth

Craig Settles, CJ Speaks: Why should a community broadband network care about providing telehealth? Here are four reasons:

1. If a network's mission includes improving quality of life, telehealth is a good way to do that.
2. A strong telehealth service makes customers loyal to the network. This can be especially important if the network faces competition.
3. A telehealth service can boost economic development in the community by providing jobs for medical personnel.
4. Ready accessibility to health services strengthens the community's viability.

Milton Chen, VSee and This American Doc: Three recommendations for community broadband networks considering launching a telehealth service:

1. Provide network testing and setup services for the system's users. For people to accept telehealth, it has to work seamlessly.
2. Offer consulting for medical professionals to help them understand legal, billing and related issues. Medical professionals won't sign up to provide telehealth services unless these problems are solved ahead of time.
3. Offer a broad selection of localized telehealth services, including medical, nursing, pharmacy and digital home monitoring.

Addressing MDU Deployment Challenges

Cory Douglas, Pavlov Media

Cory Douglas, Pavlov Media: When deploying broadband in an existing building, make sure you understand who owns the cabling infrastructure. We've found cases where the owner had invested in the infrastructure in a building but wasn't aware of it. That makes the difference between being able to reuse the infrastructure and having to put in all new wiring.

HVAC and power in the communications rooms can also be challenging – you may need more than one circuit. Check the bonding and grounding throughout the property because lightning and other electrical problems can ruin electronics.

Make sure there are good vertical and horizontal pathways. Sometimes an owner thinks a building has good conduit, but it may not be passable, or even there. In a high-rise, make sure the fill ratio in the conduits is acceptable – is there room to add more wiring? If you have to add vertical pathways, find out whether the owner is OK with conduit going up the side of a building – putting the pathways inside is costlier. When there is no horizontal conduit down the hallways, be prepared for construction *and* repair. The result has to look good!

In garden or cottage apartment communities, you will have underground drilling, trenching, and cutting up sidewalks and driveways as well as work inside the buildings. It can be pretty intense.

Find out where the fiber enclosures will be placed. Ideally, they should be in back of the building, but you have to have conversations about that with the owner early on. Similarly, inside the units, find out whether the ONTs should be placed in living rooms or hidden in closets.

For a deployment in new construction, try to get involved in the planning phase. Ask questions: Should we put conduit down a corridor? Should we future-proof the building now for lower operational expenses down the road? That's a business decision to be made in the early stage of the project.

And don't downsize the communications room!

5G Wireless Inside MDU Buildings: Yes or No?

Kara Mullaley, Corning Optical Communications: Inside buildings, we already have infrastructure that can manage many devices. I don't personally know how 5G is needed in my home right now unless I'm a day trader or hosting my own video website.

Taylor Jones, Boingo Wireless: I disagree. People will see a dropoff in speed when they walk into an MDU building from the outside, so owners will have to extend 5G into their buildings.

Shawn Cullingford, Ruckus Networks: It's going to be hard to penetrate buildings with 5G. 5G will be good for stadiums and highways, but it will be a losing proposition for residential buildings.

Rural Broadband Funding Models: Katahdin Fiber Network

Lindsey Brannon, Neighborly: In the Katahdin Fiber Network project, several underserved communities are looking to connect to the Three Ring Binder, Maine's middle-mile network, to help drive economic development. Neighborly, by pooling private investments to fund the network, is helping to revitalize the area, of which about 82 percent is designated as opportunity zones. [Opportunity zones were created by the 2017 tax law as an incentive for investors to reinvest unrealized capital gains into distressed areas.]

Neighborly will own the network originally, but it will be branded as the community's.

Most of the investors in the project are high-net-worth individuals; there is also funding from a technology company. We're bringing together private investors with local banks. To be eligible for this type of funding, a community should want to own the network eventually so there will be an exit opportunity for the investors. The investors are venture capitalists, not long-term owners.

Once we get the Katahdin Fiber Network up and running, the municipalities can take out bonds, which they can't do now because there aren't any revenues. In addition, bringing in partners from the outside is important. Without statewide support, this project might not be as suitable.

We're using local nonprofits to spread the word about the project. We hold community engagement events to recruit fiber champions for the neighborhoods and tell potential customers how to sign up for service. Mainers are very determined and community focused.

Eventually, about 4,000 residents will be connected, mostly to fiber but some to a fiber-fed wireless tower. We're partnering with an ISP that wants to make an impact. The goal is to get the network to the point of being self-sustaining so it can build fiber to remote areas. The project is a proof of concept that we can extend to other areas of Maine.

THE FIRST-MOVER ADVANTAGE

Michael Wachtmann, RTC Fiber Communications: First to fiber wins.

Fiber Versus Fixed Wireless for Rural Areas

Keith Montgomery, Declaration Networks Group: There are now some really good wireless technologies. Using a wireless network, some kids recently invented a mechanical hand that can pick up a dime, and they won the National Science Award. You need a toolbelt with lots of tools. First see where people live and what their services are, then figure out what works for them.

We don't supply upload speeds below 10 Mbps, particularly for small and medium-sized businesses. Even in a residence, the more people there are in a house, the more speed they need. Another critical issue is latency. Old wireless technologies had bad latency; transactions were always rewinding and couldn't complete. Newer wireless technology has lower latency, so the transactions complete, and there is more capacity in the network.

Jameson Zimmer, BroadbandNow.com: Fixed wireless tends to have high customer satisfaction rates. People mostly approach their internet connections as good or bad. Above a certain point, they stop noticing. Below that point, they get upset. People don't tend to notice upload speed as much unless they're telecommuting. There's a huge economic impact for symmetrical gigabit service, but not for the average user.

Keith Gabbard, PRTC: 10 Mbps symmetrical is OK for telecommuters. Some can't keep their jobs if they can't find that.

Christopher Ali, University of Virginia: People need symmetrical speeds for work. Winnebago, Minnesota, has an agricultural drone company that uploads terabytes per day. It has fiber to the building and could not exist in Winnebago without that.

Keith Gabbard: Is it reasonable to say that wireless is temporary but fiber is the end game? Well, that's a good goal, but it may not be achievable. It's all about money. It's going to take a while.

Keith Montgomery: For really remote areas, wireless can be 1/20th the cost of fiber to the home. Also, people want to be mobile and secure.

Christopher Ali: Precision agriculture is the coolest thing. Getting the signal out to the fields is important – there are a number of connected devices, including tractors. It's a regulatory issue. Regulators think about a farm as a home, not a business. Dedicated funding is needed to move toward cropland broadband.

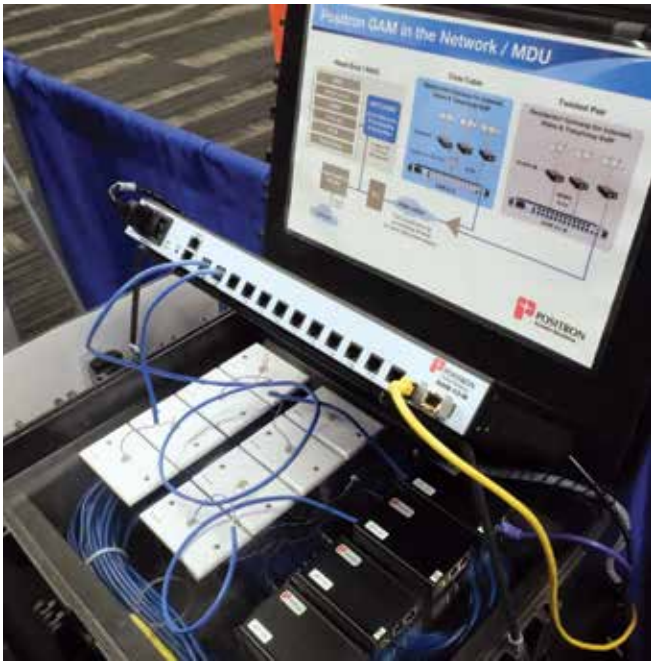
> There's a huge economic impact for symmetrical gigabit service for telecommuters, but not for the average user.

News From the Expo Floor

Kentucky-based Blue Diamond industries (www.bdiky.com) offers a full line of conduit for telecom and other applications. Lengths of HPDE conduit are often joined by aluminum couplers with interior barbs that hold fast. Here are a few examples.

Dura-Line's FuturePath line (www.duraline.com) includes multiple variations of duct and microduct bound together with an oversheath for easy placement. The duct slides against the sheath so it can be delivered on spools. The ducts are lined with long-lasting, superslick silicone to reduce friction during cable placement. Reduced-diameter microcable ducts like those shown can accommodate up to 432 fibers. For outside use, these ducts are normally made of HPDE, but they can be manufactured in fire- and smoke-resistant plastics for risers, plenums and so forth.

Multicom's MUL-HDENC-C-100 HD digital encoder (for converting HDMI to QAM) caught our eye because it costs less than $600, is tiny and has a nice, web-based control interface. The prices for this equipment category have been coming down – they are typically only half what they were a year ago. This is another example of why private cable operators, MDU owners and managers who priced a broadband upgrade last year and put the idea aside should reconsider. See https://multicomstore.com.



In a re-imagining of technology that many considered obsolescent, G.hn from Positron (www.positronaccess.com) can deliver gigabit broadband inside an MDU, even over old RG-59 coax. Positron offers 12- and 24-port solutions (using coax, one port can serve multiple customers). The price/performance ratio is attractive for a wide range of wiring types, including good twisted pair cable, and the management software is solid.