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The Technologies, Policies And Applications Shaping Broadband Deployment

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WALKER NEWS

Making the Connection: TruVista Brings Broadband Home to Rural Communities

By Jeff Lambert
Vice President of Marketing
TruVista

TruVista, headquartered in Chester, SC, is the leading provider of communications services to Chester, Fairfield, Kershaw and parts of Richland Counties in South Carolina, as well as Franklin, Hart, Rabun and Stephens counties in Georgia. Founded in 1897 as the Chester Telephone Company, TruVista offers a wide variety of products and services to residential and business customers including voice, internet, video television, security, long distance, and wireless services.

2020, TruVista announced its partnership with the USDA through the ReConnect initiative, receiving a $9.1 million grant to provide broadband services to rural Kershaw County, South Carolina. With an additional $3+ million investment from TruVista as part of the 75/25 percent grant, the company is deploying fiber optic cable to reach over 1,500 homes and businesses with internet services offering speeds up to 1Gbps as well as video, home phone and home security and automation options. The construc-

Grant, the COVID-19 pandemic emerged which resulted in almost innumerable changes in everyone's lives. Work from home and virtual classrooms became the rule rather than the exception. Visits to the doctor for non-emergency circumstances became e-medicine appointments. Dining out became either pick-up or delivery and even something routine, like grocery shopping, became a remote activity with delivery. The common thread in all of these activities is that they rely on a fast, reliable,

"Households are becoming increasingly reliant on a fast, reliable and always on internet connection for learning, work or to seek medical care and advice."

TruVista's commitment to bringing broadband to rural areas is illustrated in its partnership efforts with Federal, State and County agencies to provide high-speed internet to underserved households and businesses. In February of

tion of this FTTH build is well underway and TruVista will begin connecting these households in the coming months.

Just a few short weeks after the announcement of the USDA ReConnect

always-on internet connection. As the COVID-19 threat grew, and school closures occurred, TruVista recognized the need for student connectivity for virtual classrooms and offered free high-speed internet services to households in its

footprint with school-aged children, but no broadband connection, until the end of the school year.

In August of 2020, with COVID-19 cases still growing and a new school year starting, TruVista partnered with the State of South Carolina, through the Broadband Infrastructure Program as part of the CARES Act, for funding to expand fiber optic infrastructure to homes and businesses in underserved areas of Chester and Fairfield Counties of South Carolina. The funding associated with this program required a very aggressive build schedule with completion necessary before the end of 2020. TruVista engineering, operations, construction and contract partners were up to the task with the resulting FTTH expansion bringing high-speed broadband services to over 500 homes in the two counties. In addition to the expansion of fiber optic infrastructure, TruVista also committed to the State of South Carolina to work with local school districts to provide a broadband offering to households with school-aged children and no internet connection, that also meet certain other eligibility requirements. "Households are becoming increasingly reliant on a fast, reliable and always on internet connection for learning, work or to seek medical care and advice. Between our partnerships with the State of South Carolina and the

" . . . the company is deploying fiber optic cable to reach over 1,500 homes and businesses with internet services offering speeds up to 1Gbps as well as video, home phone and home security and automation options."

USDA ReConnect program, we're bringing broadband services to underserved rural areas in and around our footprint." stated Carla French, President and COO of TruVista.

In spring of 2020 TruVista recognized an opportunity to bring broadband services to underserved areas in lower Richland County, South Carolina. Richland County was in the process of replacing water and sewer lines as part of an infrastructure upgrade effort. TruVista gained the support of county government officials to work along side the utility construction crews in order to extend fiber optic connectivity to underserved households along the route. This $5 million project will bring FTTH services to over 1,300 underserved premises with completion anticipated in mid to late 2021.

Also in 2020, TruVista took part in the FCC's Rural Digital Opportunity Fund (RDOF) auction and won bids to build out to underserved areas in Franklin,

Jackson, Rabun and Stephens Counties in Northeastern Georgia. Winning bids were announced in December of 2020, with preliminary work already underway. At completion, this fiber to the home expansion is anticipated to make broadband services available to nearly 2,800 premises in the four counties. "We will continually look for ways to bring broadband connectivity to households in and around our footprint and we greatly appreciate the partnership efforts that we have undertaken with federal, state and local governmental agencies to make these increasingly important services more easily available to underserved rural areas" stated Ms. French.

SC Officials Post State's Broadband Map Online To Display Connectivity Gaps

By Randy Turner
Director, Marketing Communications
Walker and Associates

The South Carolina Office of Regulatory Staff has posted the state's Broadband Map on its website. The South Carolina Broadband Map shows the availability of broadband service to every residential and business site in the state. Broadband data is provided by the majority of broadband providers in South Carolina. Based on broadband data provided, users can input their address to show the availability of broadband at their location. This includes download speeds, the connection type, and the providers offering service to their address. The map does not reveal the provider, if any, that a consumer may currently have service with at the particular address.

Officials said this map will provide "an accessible platform for the public to see where broadband is – and isn't – available in South Carolina."

The goal of the map is to help identify which areas of the state are dealing with lacking connectivity, which contributes to difficulties with distance learning, telework and telehealth.

The office has adopted the FCC definition of "served," meaning an area must have at least 25 Mbps download speed and 3 Mbps upload speed to count as such.

CARES Act
Under Act 142, the ORS was authorized to expend a portion of South Carolina's Coronavirus Relief Fund included in the Coronavirus Aid, Relief, and Economic Security or "CARES Act" on broadband initiatives related to COVID-19. Part of this funding was allocated for broadband mapping, and the ORS engaged CostQuest Associates, Inc. to help complete the South Carolina Broadband Map.

For more information, and to view the map, go to the state's website at https://ors.sc.gov/broadband/map.

Lessons From the Rear View Mirror

By Doug Dawson
President
CCG Consulting

There has been a huge amount of discussion over the last few years about getting broadband to rural America. The topic reached a fever pitch in 2020 as the pandemic forced adults and students to work and learn from home. Communities with little or no broadband are now clearly at a disadvantage.

Sometimes the best answers to hard issues comes from looking back in history. As a nation we solved a similar problem when we figured out a way to bring electricity to everybody in the country. The challenge of bringing broadband to everybody is amazingly similar to what happened with electrification.

Just like with broadband, electric service sprung up first in cities and larger towns. Electric power systems were introduced in the 1880s and by 1920 most cities and towns in the country were wired for electric service provided by commercial or municipal power companies. But the rollout in rural areas was much slower, due to the high cost of stringing wires. By 1932, only 10% of rural America had power and it was clear that rural America was quickly falling behind the rest of the country.

Franklin D. Roosevelt campaigned on the issue during his 1932 presidential campaign, and after he won, he worked with Congress to create the Rural Electrification Administration (REA). Rather than the government directly funding electric infrastructure, the REA offered 30-year loans to electric cooperatives to electrify rural America. Citizens from all over the country came together and formed cooperatives, borrowed the federal money, and electric networks sprang to life all over rural America. Interestingly, the REA also hired advisors to travel to communities just getting electricity to teach them how to safely operate and maintain electric appliances and equipment.

There is no reason this same idea can't work for rural broadband. The challenge is nearly identical. It's clear that the best long-term infrastructure solution for broadband is fiber. Fiber provides enough broadband capacity to meet the needs for homes today and will meet broadband need decades from now. No other technology can scale to the needed bandwidth demands over future decades.

The ideal endgame is to build fiber to the same rural places that got electricity in the 1930s. In 1932 it was clear that commercial electric companies were not going to invest in rural electrification. For the most part that is still true today with broadband, with exceptions. There have been rural broadband networks built by small telcos using subsidies from the

> **" . . . people living in rural America are acutely aware of areas that have no broadband or poor broadband."**

Universal Service Fund. These same telcos, along with electric cooperatives have spread fiber into many remote corners of the country, generally with the help of grants. There are even small independent fiber overbuilders who have tackled rural broadband networks.

Another round of building new broadband networks will come as the result of the recently concluded RDOF grant program from the FCC. There are other broadband grant programs at both the federal and state levels that are being used to fund broadband expansion.

While all of these various efforts to bring broadband to rural America will put a dent in the problem, there is still a long way to go. Nobody really knows how many homes don't have broadband due to well-known problems with the way that the FCC gathers data about broad-

band deployment. Last year the state of Georgia did an independent assessment of broadband availability in the state and found twice as many homes without broadband than was being counted by the FCC. But people living in rural America are acutely aware of areas that have no broadband or poor broadband. Where 10% of the rural areas already had electricity in 1932, it's likely that somewhere between 20% and 30% already have or will be getting broadband from the various providers listed above. There is a still a long way to go for broadband deployment to match electrification – and it's clear that homes need broadband today, and not a decade from now.

The basic funding method used for electrification still makes sense, as does the idea of doing this through cooperatives. Cooperatives owned by the customers are willing to take on the long-term debt needed to make this work. Cooperatives are largely non-profits since any profits generated by the business must be rolled back into the business. It makes far less sense for the government to subsidize the giant for-profits ISPs like AT&T, CenturyLink, or Frontier – those big companies care mostly about the bottom line and are not willing to operate business with slim margins. We've seen these companies in the past improve rural profitability by cutting back on staff and maintenance. That's not the kind of stewards we want operating rural broadband networks for the next fifty years.

There are a few differences between now and the 1930s that we have to recognize.

The country has experienced many years of inflation since 1932 and it doesn't look feasible in many cases to build broad-

band networks and repay the money with 30-year loans, even at low interest rates. A new program would need to consider longer loans like 40 years, and maybe even 50 years. There is no reason a coop wouldn't take longer loans if it means getting broadband. It is also likely that in many cases some grant monies would need to come with the long-term loans.

These loans could go almost immediately to existing telephone and electric cooperatives. In areas where there are no cooperatives, or where the existing cooperatives don't want to tackle broadband, the government could help with the formation of new cooperatives, just like they did in the 1930s. I've been working in rural areas all over the country and I can't think of a community that would not be excited about this idea.

One of the best features of this plan is that most of the money spent by the government is in the form of loans that will get repaid. That means that expansion of broadband doesn't have to be a big burden on the taxpayer.

There are some big obstacles to overcome to make this work – but mostly it just requires the will of the White House and the Congress to solve the rural digital divide. There will be lobbyists from all of the big ISPs moaning about how this unfairly competes with the private sector. That argument falls apart quickly when you visit a rural county and can't find even one house that has broadband speeds of 10/1 Mbps. The big companies have completely failed rural America and these lobbyists must be ignored.

There will also be many silly discus-

sions about which rural places should be eligible for this money – and those discussions will be couched in terms of talking about the number of homes that have access to broadband speeds of 25/3 Mbps. These speed discussions are a red herring because urban residents have access to far faster broadband. In the 2020 broadband report to Congress, the FCC said that 82% of homes already have access to broadband speeds of 250/25 Mbps. Hopefully, policymakers will agree that rural broadband ought to be as good as urban broadband and we can stop using speed thresholds.

The rural need for broadband is real, just like the need for electricity was in 1932. Rural homes are locked out from the numerous benefits of faster broadband such as the ability to work from home. It's clear that the benefits of broadband for rural agriculture are immense. We also know from definitive studies that students in homes without broadband underperform those with broadband by several grade levels.

The benefits of bringing electricity to rural America was immense for the US economy and we will expect to see the same huge upside from investing in rural broadband. The question that we probably need to be asking is why we aren't already doing this? I think that may come back to those same lobbyists – but with the same kind of vision that FDR had in 1932, we can move beyond the naysayers and get this done. The people who live in rural America would leap at this opportunity. Any government leaders bold enough to push past the roadblocks will be hailed as a hero across the country.

Doug Dawson is the President and founder of CCG Consulting – a full-service telecom consulting firm with over 1,000 clients since 1997. CCG offers a full range of telecom services including engineering, regulatory compliance, business planning, strategic planning and implementation services. One of Doug's areas of emphasis is helping clients find financing for network expansion.

Doug has worked in the telecom industry since 1978 and has both a consulting and an operational background. Doug writes a daily blog called Pots and Pans by CCG.

Keeping Broadband Home In America's Heartland

By Kent Schimke
CEO/General Manager
DRN ReadiTech

2020 marked the 70th Anniversary of Dickey Rural Telephone Cooperative or DRN ReadiTech. DRN ReadiTech is the oldest telecommunications cooperative in the state of North Dakota and delivers telecom services to 7,900 members in 5,644 square miles and 32 exchanges with over 4,500 miles of buried fiber optic cable. DRN ReadiTech is and has been 100% fiber connected since 2012 and was amongst the first in the state and nation to be 100% fiber connected.

DRN ReadiTech utilized the Alternative Connect America Fund 2 (ACAM 2.0) as a support mechanism that enables and affords the cooperative to continue to build, upgrade, and maintain the fiber optic network that provides reliable, cost effective, and the most robust telecom services to its members. The continued investment in the 100% fiber network was instrumental in the successful navigation of what 2020 had in store for all industries, that being the global COVID-19 pandemic.

DRN ReadiTech's relationship with Walker and Associates over the past decade has been beneficial in achieving the cooperative's vision and goals. Walker and Associates is DRN ReadiTech's top vendor. The team of Dan Neitge, Brian Johnson, and Philesa Rutledge ensure the quality and trust we expect and realize from our top supplier. That team aided in a successful implementation of our 100GbE network architecture consisting of 26 Juniper MX480's and one MX960. The 100 GbE architecture enables DRN ReadiTech the ability to provide all its 100% fiber connected members gigabit circuit/connectivity and most recently the ability to roll out 10 GE PON. As social distancing and remote work/school became a necessity during COVID-19 DRN ReadiTech's network was unscathed because of its robust design and capacity.

At the onset of the pandemic there were over 100 students in 13 school districts in the DRN ReadiTech service territory that did not subscribe to a broadband service. DRN ReadiTech was able to connect all 100+ to our network within a two-week period to meet the deadline so that all stu-

Kent Schimke and Jeff Goehring, DRN Inside Operations Specialist, discuss newly installed equipment bays featuring Juniper MX solutions.

dents could participate in remote learning. DRN ReadiTech participated in the FCC's Keep America Connected Pledge to not disconnect phone or broadband services, and to waive any fees associated with non-payment during the time to any residential and small business members. DRN ReadiTech's membership is rural, and its main economic source is agriculture, during the pandemic that industry was heavily weakened. DRN ReadiTech offered one month of free service to all members in effort to relieve some of the financial burden that the pandemic and weakened farm economy posed.

To date DRN ReadiTech's pandemic response includes office closures and by appointment only, remote work force,

mandatory masks and social distancing. This pandemic has not stopped the DRN ReadiTech team from growing, expanding, and diversifying. DRN ReadiTech owns ReadiTech IT Solutions, which is a managed IT services business with locations in Bismarck ND, Grand Forks ND, and Fargo ND. ReadiTech Engineering is the newest addition and will be providing telecom OSP engineering services to clients around the nation. ReadiTech Fiber is a CLEC operation that began in 2020 and consists of the cities of Casselton, ND and Mapleton, ND. In the spring of 2021, an overbuild construction of Horace, ND will begin. These operations will extend our robust network and bring gigabit broadband home to the communities in need of reliable and cost-effective telecommunications/broadband.

"This pandemic has not stopped the DRN ReadiTech team from growing, expanding, and diversifying."

ABOUT DRN READITECH
Founded in November 1950, Dickey Rural Telephone Cooperative was created to bring telephone service to rural southeastern North Dakota. Now, doing business as DRN (Dickey Rural Networks), it continues to offer state of the art telecommunications, advanced technologies and improve the quality of life for our residential and business customers.

Our goal is to keep customers connected to an ever-increasing global community. DRN provides gigabit broadband Internet, local and long distance phone and television on its 100% fiber-optic network, along with custom calling features, voice mail, small and large business phone systems, special circuits, Internet security services, wired and wireless network consulting, web hosting and other vital connections.

Today, DRN's cooperative network serves 32 communities. DRN was named a Smart Rural Community Showcase Award winner in 2013 for its achievements in bringing broadband for education and other vital public functions to a rural area. In 2015, DRN received the NTCA Gig-Capable Certification for its 100% gigabit-capable network.

ABOUT READITECH, A DRN COMPANY
As the use of technology became more common and SMB owners reached out to DRN with networking, hardware, and software requests, DRN stepped up to meet the growing need for knowledgeable and friendly IT assistance and formed the subsidiary ReadiTech in 2011.

Originally created to provide technology solutions to businesses, ReadiTech is headquartered in Ellendale with regional offices in Fargo, Grand Forks, and Aberdeen, SD. ReadiTech is now expanding to offer high-speed and phone service to the City of Casselton, ND through fiber and will be expanding ReadiTech Fiber to Mapleton and Horace, ND in 2021.

With 2020 behind us and with many uncertainties relative to what the pandemic will bring, I hope everyone will push forward, grow, expand, and provide the best possible telecommunications/broadband services to any and all-in need.

I would like to thank the Walker team for their assistance and being a part of helping make DRN ReadiTech's endeavors a success.

Bring Home Broadband, Bring Home the Future

By Chip Pickering
CEO
INCOMPAS

The pandemic has made it abundantly clear: We all need a roof over our head and broadband in our home.

Working from home? You need broadband. Signing up for the vaccine? You need broadband. Three kids at home doing Zoom school? You really need broadband.

In truth, the need for internet access has been an essential requirement for quite some time. But universal broadband access—ensuring that each and every family in America, rural and urban, has access to affordable internet—has not been a top priority. That has changed, and now is the time for policy makers to take action.

INCOMPAS, the internet and competitive networks association, believes competition must be at the core of this effort. As we have seen over the last 25 years since passage of the landmark Telecommunications Act of 1996, smaller players are the ones that bring new ideas and innovations (like VoIP and Ethernet), while also having a better understanding of needs and solutions that best fit the local communities they serve.

That is why last year, we introduced a Broadband Blueprint paper to help give policymakers at all levels of government a roadmap to success. It begins with action from Congress. We are supporting bipartisan efforts to make as much as $100 billion in broadband funding available.

Rep. James Clyburn (D-S.C.), the Majority Whip in the House, is leading an effort that has the potential to be the single most important infrastructure investment in our nation's history. Putting men

and women to work deploying fiber and building towers doesn't just create jobs today in our local communities; it opens up the economies and will support them in the future. And make no mistake, our nation will need more bandwidth if we hope to compete with China, India and the EU for new industries of the future, including self-driving vehicles, drone delivery and telemedicine.

But if we are going to make this level of investment, it's critical that we make a smart investment—one that increases speeds and affordability. That's why federal policy makers in Congress and at the FCC must increase internet speed benchmarks up from the sluggish 25/3 Mbps standard to a faster, national 1 Gigabit and beyond mark for all Americans. Other nations, including the U.K., have already set Gigabit goals by 2025, and if the U.S. doesn't act quickly, we could be stuck in an era of broadband obsolescence.

Policy makers need to increase the upload speed, too. Just think about your own experience at home during the pandemic. It's the UPLOAD speed—like your family's ability to communicate via video meetings—that has really mattered. This is why fiber is the backbone to our broadband future. It's stronger, faster and more affordable. Plus it doesn't discriminate between upload and download speeds and can deliver both download and upload capabilities no other technology offers. Fiber density also is the backbone for our wireless and 5G platforms.

While Congress has the power to kickstart the new internet age, the real superheroes will be local officials—mayors, city and county leaders across the nation who will have the awesome responsibil-

ity of speeding the deployment of next-generation networks that bring more competition and universal connectivity to the millions of Americans who still lack service.

But local leaders need to know the old days of just calling the local cable monopoly are over. City leaders are going to need to be smart and forward looking to best utilize funding and attract greater private investment. With this in mind, INCOMPAS has proposed six principles to help local leaders. They include:

ADD NETWORKS, NOT FEES
Adding new fees and taxes on some online services or competitive fiber providers, and not others, will unfairly skew the marketplace. As we have seen, demand for creative content and innovative internet services is saving consumers' money and driving network growth.

STREAMLINE DEPLOYMENT
INCOMPAS has long championed smart local deployment policy—from dig once to one-touch make-ready. Transparent and streamlined deployment approval processes and reasonable cost-based rights of way fees are critical. Better rights of way policies will speed access to poles and conduit.

> **" . . . our nation will need more bandwidth if we hope to compete with China, India and the EU for new industries of the future, including self-driving vehicles, drone delivery and telemedicine."**

About the Author
Chip Pickering has been CEO of INCOMPAS since January 2014. During that time, INCOMPAS has achieved significant growth with leading internet, backbone, business broadband, wireless, and international companies. Under his leadership, INCOMPAS has led numerous public policy campaigns promoting competition through an open internet and in the business broadband market.

Pickering was a six-term Congressman representing Mississippi's Third District. During his time in the House, he served on the Energy & Commerce Committee, where he was vice chairman from 2002 to 2006 and a member of the Telecommunications Subcommittee.

He also was co-chairman and founder of the Congressional Wireless Caucus and an assistant minority whip of the House. Previously, Chip worked for Sen. Trent Lott (R-Miss.) and served as a staff member on the Senate Commerce Committee, where he helped shape the Telecommunications Act of 1996.

Because of his role in drafting the 1996 Act, he became well known as a Congressional leader on telecommunications issues. While in Congress, Chip served as chair of the subcommittee overseeing the transition to the commercial internet, the establishment of domain names, registries, and internet governance. He also successfully led a bipartisan legislative effort to codify net neutrality principles through the House in 2006.

INCOMPAS represents Internet, streaming, communications and technology companies large and small, advocating for laws and policies that promote competition, innovation and economic development. Throughout the year, INCOMPAS also and provides opportunities to learn, grow business and network at annual events, including The 2021 INCOMPAS Show, taking place October 25-27 at The Cosmopolitan in Las Vegas.

INTERNET FOR ALL

Funding should be targeted to areas where it is needed most. No community should be left behind. To that end, investing where infrastructure is needed in unserved and underserved areas should be prioritized.

BETTER DATA AND MAPS

Our infrastructure dollars must be based on reliable and verifiable maps. Millions of Americans are being ignored and left behind by fake coverage maps. Enough.

COMPETITION FOR FUNDING

Reverse auctions have brought benefits and saved taxpayers money. They should be embraced to close the broadband availability gap. Broadband monopolies and duopolies have punished consumers with terrible customer service, slow speeds and higher prices. They are also a drag on a community's ability to add networks that help small businesses.

FUTURE PROOF NETWORKS

As the FCC finalizes its rule to implement the Secure and Trusted Communications Networks Act, it should explicitly allow wireless providers to use reimbursement funds to "future proof" their networks by purchasing OpenRAN-compatible equipment.

Now, to truly help bring broadband home, it's important to understand where people live. And a whopping 30% of Americans live in multi-tenant environments—apartment buildings, condo complexes and public housing units.

That is a huge number, and low-hanging fruit for increasing the deployment of faster, more affordable gigabit services. The FCC should immediately take action against incumbent's monopoly deals and exclusive agreements that create economic and contractual barriers to competitive entry.

Will this be the year our nation makes the commitment to universal connectivity and launches the next internet driven jobs boom in each and every community from sea to shining sea? I believe so. Home is where the heart is, but broadband at home opens our minds to a future of endless possibilities.

Four Trends that Will Shape Networks in the Year Ahead

By Sally Bament
Vice President of Cloud & Service Provider Marketing
Juniper Networks

The COVID-19 pandemic placed a huge responsibility on service providers around the globe to deliver not just connectivity, but also a seamless service experience to subscribers as traffic patterns shifted and hit peak levels. With recent studies showing that the number of employees permanently working at home across the globe is expected to double in 2021, service providers will need to prepare networks for more prolonged traffic shifts that will become the norm for longer-term remote workers. Delivering a seamless and assured service experience that supports the workforce of the future - whatever it may look like - is essential for service providers next year and beyond. Here are a few key trends we will see take shape as COVID continues to make an impact.

COVID AIMS THE SPOTLIGHT ON PREPARING NETWORKS FOR THE UNKNOWN

The COVID-19 pandemic shifted our world from physical to virtual literally overnight, placing enormous responsibility on service providers to deliver seamless real-time and near real-time experiences at peak traffic levels. Traffic patterns shifted from mobility to Wi-Fi and broadband networks, as work transitioned to the home and the lines between consumers and enterprise users blurred - causing long-term changes in how service providers architect and manage their networks for the "enterprise-at-home." Next year, we will see more focus on ensuring networks are ready for the "unknowns," with service providers accelerating investments in open, agile network architectures built on cloud principles, elastic on-demand capacities, and automation and security for an assured service experience. And with a heightened focus on service experience, we can expect automation, service assurance, AI/ML and orchestration technologies to take on an even more significant role in service provider network operations, guaranteeing service quality and simplifying operations as networks get bigger, more dynamic and more complex.

COVID ACCELERATES THE VALUE OF THE EDGE

Networks have never been more critical than they are right now. Business, education, telemedicine, social, all have moved from engaging in person to engaging virtually, and multi-participant video calls have become a fundamental part of our daily lives. Massive consumption of streaming media and an all-time high in online gaming have driven CDN growth. Service providers have responded fast to manage the surge in traffic while avoiding lagging, downgraded quality and slower speeds. Next year, we'll see service providers double down on investments in edge cloud, moving applications and data closer to users and connected devices to enhance the user and application experience, support new emerging low-latency applications, and make more efficient use of network transit capacity.

COVID DRIVES NETWORK SECURITY

While security has often taken a back seat to make way for faster network speeds, the pandemic has proven that bad actors will take advantage of crises for their own gain. Next year, we'll see service providers take a holistic, end-to-end security approach that combines network, application and end-user security to deliver a secure and assured service experience. This is especially important as many regions experience another wave of lockdowns and working at home becomes the new normal - presenting an enticing attack surface for hackers. In 2021, we'll see companies investing more in Enterprise-at-Home solutions with security at the forefront, ensuring that all endpoints in the network are secure, wherever they are.

5G HYPE FADES AS MONETIZATION OPPORTUNITIES SKYROCKET

Despite the pandemic shifting operational priorities, causing some 5G roll outs to slow, service providers have still been heavily investing in and deploying 5G networks. With over 100 commercial networks launched across the globe, and many more expected in 2021, 5G is now real, bringing new monetization opportunities for operators. With massive speeds, huge connection densities and ultra-low-latency experiences, we expect to see progress in new consumer applications (e.g., gaming, AR/VR/MR), 5G for industry verticals, consumer broadband with content bundling, enterprise broadband and cloud-managed services and fixed wireless access services in 2021.

"Sally Bament, vice president of cloud & service provider marketing at Juniper Networks, is responsible for leading and executing the company's marketing plans to drive awareness and demand for Juniper's industry-leading networking solutions. Sally brings more than 25 years of experience in management, program management, marketing, sales and business development in the networking and telecommunications industries."

Electrics and Their Private Partners: Emerging Powers in the Race to Expand Broadband

By Editorial Staff
Broadband Communities

If we needed proof of the criticality of high-speed broadband networks, a year of living with a pandemic has provided it. Households with fast connections were able to continue working, learning, accessing healthcare – basically getting on with everyday life. Those without found themselves more cut off from the economic mainstream than ever.

Proof that traditional private-sector investment alone cannot close the persistent gap in broadband availability and affordability across the United States has also become undeniable. Nor have most local governments been able to tackle the problem on their own.

What is working is the emergence of a variety of public-private partnerships, ones where each partner basically does what that partner does best: The public entity can tap its ability to access the capital markets at a low cost, then build and maintain the basic infrastructure; the private sector can focus on delivering the service and running the business.

Broadband Communities has found that a growing number of electric cooperatives and investor-owned utilities are creating viable partnerships with service providers and telcos to solve their community's broadband gap.

A key reason electrics get into broadband is to serve communities that are either unserved or underserved. This is very much a reflection of the same spirit that took place in the 1930s, when the Rural Electrification Act passed.

When Colquitt Electric Membership Cooperative determined it needed a solution to its community's broadband problem, "We recognized that while we couldn't do it on our own, we could not put our heads in the sand," Danny Nichols, general manager of the Georgia co-op, told Broadband Communities.

Ultimately, Colquitt chose to partner with privately owned ISP Windstream to get the job done.

"Broadband is a very complicated business from a financial point of view," Nichols explained. "Colquitt looked at which providers had infrastructure on our system. We wanted to incentivize other providers, such as Windsteam, but not own the facilities."

In Ohio, Buckeye Rural Electric Cooperative (BREC) has partnered with Cincinnati Bell. The partnership aligns with Ohio's goal to expand broadband internet access to underserved areas, Jason Praeter, president of Cincinnati Bell's entertainment and communications business, told Broadband Communities.

"If we established a partnership, we thought we could deliver services in rural areas that are too cost-prohibitive to serve with fiber in the current state," he explained. "The BREC and Cincinnati Bell teams were able to come up with something that would provide a fiber-to-the-home footprint in areas that probably would not have that opportunity for a couple of years."

Sheryl Riggs, CEO of the Utilities Technology Council (UTC), told attendees at last fall's Broadband Communities Virtual Summit that more of her members are providing broadband.

"Hundreds of utilities are leveraging existing infrastructure to provide wholesale and retail broadband access," she said. "We're also seeing investor-owned utilities bringing broadband to underserved and unserved areas."

Working collaboratively with a partner is all about sharing assets and labor. While installation partnerships vary, cooperatives and public utilities will collaborate with their private-sector partners on three main issues: pole attachments, make ready and installation. The utility partner can greatly ease the access to utility poles and rights of way. The service partner provides the fiber and in many cases also provides the hardware and the materials to install the fiber.

"There are a lot of companies that will design a fiber network and build it and a few companies that will operate it, but there are very few that do all of that in one turnkey solution," said Ami Rodriguez, vice president of sales/marketing and business development for TWN Communications, which is partnering with Mohave Electric Cooperative (MEC) to expand FTTH services.

"Investing alongside the cooperatives mitigates the risk, reduces project costs and ensures that both of us have skin in the game," she said.

A spate of new laws enabling electric co-ops to enter the broadband race has made it easier for utilities and their partners to extend broadband. Georgia, Mississippi, Indiana, Tennessee and Virginia have all lifted legal hurdles.

In Mississippi, for example, the state's Broadband Enabling Act removed a 1942 regulation that prevented electric cooperatives from offering anything other than electricity.

A 2019 change in Virginia law clarified that fiber can be hung by electric co-ops in an existing electric easement, even beyond their service territories. The new law says that providing communications services is in the public interest.

Also in the public interest is the economic development that expanding broadband brings to communities.

"BREC can drive up property values with FTTH service," Praeter noted. "We are seeing people move out from the big cities and to rural areas that are eligible for fiber."

MEC is seeing new homebuyers asking for broadband. "We want to make sure our customers have access to what's considered the fourth utility," said Patty Nowlin, vice president of corporate communications for the Arizona co-op. "People should be able to choose the rural market and access everything their urban counterparts have."

Gaining that access is a strong incentive to choosing a public/private partnership.

Tips for American Communities Struggling to Beat the Digital Inequity Game

By Joshua Edmonds
Director of Digital Inclusion
City of Detroit, MI

Flashback to 1997, I'm huddled in front of a dimly lit TV playing Super Mario Bros. The game's colorful landscape and spirited soundtrack have captivated me and millions of others for decades. While I've grown to love the game, my first time playing was marred with irritation and the sinking feeling one gets when playing a perceivably rigged game. For those unfamiliar with the story, the protagonist, (Mario) embarks on a mission to find and rescue the princess (Peach), from a dragon (Bowser) and the dragon's various minions. During my first play through, I remember completing the initial three levels and found myself at the castle, ready to rescue the princess, and presumably, beat the game. I defeated the boss on my first try and triumphantly muttered to myself, "that was easy". Seconds after the boss fades from the screen, a message appears, "Thank you Mario! But our princess is in another castle!" the game then transports you to another world comprised of four more levels, with the same message appearing after beating the boss in that world. Eight worlds later, the game concludes with the true rescue occurring.

Fast forward to 2021, I'm sitting in front of my dimly lit laptop, typing my thoughts – frustrated, yet captivated by the perceived intangibility of "beating the game" of digital inequity. My goal for writing this is not to trivialize the vicious effects of digital exclusion by comparing them to losing a game; instead, I want to establish a new way of looking at a historic issue and showcase a few tips digital inclusion practitioners and broadband advocates are using to beat the game. In this instance, beating the game is achieving and sustaining digital equity in our respective communities.

01 ADOPT A GAMER'S MINDSET

Most video games have difficulty settings that grant players access to modifying the game's difficulty based on personal skill level. For digital inclusion, this is not the case. As the nation's first municipal Director of Digital Inclusion for the City of Detroit, I am honored to represent one of America's most storied and culturally diverse cities. That said, the difficulty level for achieving digital equity in a city where over 40% of residents do not have a wired, high-speed internet connection is seemingly impossible.

Contextually speaking, most cities do not have a budget line item for digital inclusion. Since municipalities are primarily an aggregate of federal spending allocated from the State, if no federal funding has been made available for providing tech support, marketing low-cost internet services, facilitating digital literacy training and providing funding for computer labs, there is little municipal Directors of Digital Inclusion can do to meaningfully counteract the negative effects of prolonged underconnectivity on our communities.

02 DON'T JUST PLAY THE GAME - DESIGN THE GAME

I remember my first day at the City. I attended the Mayor's weekly Cabinet meeting and introduced myself to senior and executive staff. One hour later, I was placed in front of a news camera and asked what my mission and vision were for bridging Detroit's digital divide. I was terrified. I stared directly in the camera and stated, "I am going to make Detroit the national model for digital inclusion" – Game on. In lieu of over 30% of Detroiters living in poverty, with over a quarter of our population without internet access, in that moment, I was not just speaking for myself. I was speaking for all unconnected and underconnected communities that will one day have a Director of Digital Inclusion, tasked with empowering the ecosystem. I was speaking for the kids camped out at fast food locations searching for Wi-Fi to complete homework, the resident in need of telehealth services, but is unable to afford a persistent internet connection, and the unemployed job seeker, disempowered by the lack of digital skilling support needed to upload a resume to a job portal.

To beat the digital divide, you must be bold. In the words of the late James Baldwin, "Not everything that is faced can be changed. But nothing can be changed until it is faced". The divide thrives when we, public officials, are too afraid to

take a nuanced stance in addressing the issue. I commend every practitioner and public official that has articulated a position on eradicating the divide. That level of boldness is a necessary ingredient for the collective empowerment of American communities.

03 BE BOLD, BUT AUTHENTIC

I remember a close friend lost $100 over the span of five minutes playing a carnival game. The game was simple, toss a ball into a propped up bucket. If you missed, or the ball bounced out of the bucket, you lost. The game was $25 per toss. My friend initially tried softly tossing the ball, he missed the bucket completely. He then tried tossing with more force, the ball hit the bottom of the bucket and bounced out into the grass. His next two tries were equally unsuccessful. $100 later, my friend accepts defeat and slowly walks away. My friend thought if he just tossed the ball a certain way, he'd win the game. In reality, he lost before even tossing the ball because he oversimplified the game. The digital divide is a rigged game and the parallel between my friend's losses and the divide manifests within the minds of countless stakeholders who believe if we just deploy broadband infrastructure to every household, we will have effectively bridged the digital divide. No mention of digital literacy support, or the strangling role poverty plays in forcing residents to choose between paying for food or internet service.

To effectively beat the digital divide game you must embrace the nuance. Communities are complex ecosystems

and digital inclusion is not a simple ball toss. It is the state-of-the-art clone of the same socioeconomic poverty rural, tribal, and urban communities have been facing for decades. Before we toss another metaphorical broadband ball, we need to ask ourselves if we are approaching the issue with the level of skill needed to win the broadband community empowerment game. We need to understand what we are wagering and losing every time one of our efforts fails. Every unconnected household is one less online shopper that can support small businesses, one less high-paying tech-skilled worker whose taxes can help grow and sustain a community, and one less student majoring in computer science. America is not just losing the broadband game, America is losing its future.

04 EMBRACE THE NUANCE AND HONOR THE COMPLEXITIES

"Just because the game is rigged, doesn't mean you can't win." These sagely words from my mentor keep me grounded in the fight for digital equity. I remember when the mobile game, Candy Crush Saga first debuted. I spent hours playing the Bejeweled-esque game. As the game progressed, the margin for error decreased. Eventually, if I made one wrong move, the game would end. After remaining stuck at one of the higher levels for weeks, I succumbed to Googling the strategy on how to beat the level. The final tip, consult the guides.

Among many others, between Next Century Cities, US Ignite, the National Digital Inclusion Alliance, and the Benton Institute for Broadband & Society, the wisdom and experience exuded by those

organizations can significantly accelerate broadband adoption efforts – effectively, making the digital inequity game "beatable". None of the aforementioned organizations will bridge the digital divide alone; however, each one of those organizations are comprised of leaders with significant broadband battles under their belts who can advise and advocate on behalf of cities and larger geographies on how to effectively build and mobilize communities committed to bridging the technology access gap.

05 CONSULT, CONNECT AND COLLABORATE

The digital divide is a paradigm of inequity. The tips I've shared are rooted in my experience as a local practitioner, obsessively desiring to see my community "win" at all costs. For any practitioner, to successfully bridge the divide, we need to articulate bold visions rooted in the perpetual desire to build sustained impact that extends far beyond our current conceptualizations of the issues at hand. Simultaneously, it is critical we embrace the nuance and remain cognizant of what we have lost, are losing, and will lose by our inability to equitably connect America. And more importantly, we need to ensure we are building and sustaining relationships with experts who can guide and support our communities. The current iteration of the digital divide is beatable. We need to ask ourselves, is our commitment to empowering our communities greater than the digital divide's commitment to disempowering us.

About the Author

Joshua Edmonds is the City of Detroit's inaugural Director of Digital Inclusion and is America's first municipal Director of Digital Inclusion. He is responsible for the creation of Connect 313 – Detroit's sustainable digital inclusion strategy designed to bridge the digital divide. While appointed at the City, Joshua has testified in front of Congress on the matter of digital equity, hosted Detroit's first Digital Inclusion Summit, Established the City's first Digital Equity Fund, and most recently, helped raise a combined $30 million for distance learning and telehealth initiatives for Detroit residents. Joshua also chairs the telehealth workgroup within the Federal Communications Commission's Intergovernmental Advisory Committee.
Prior to his current role, Joshua served as a Digital Inclusion Policy

Fellow for the University of Michigan's Poverty Solutions Initiative, a Digital Innovation Fellow at The Cleveland Foundation, and a Public Service Fellow at the Cuyahoga Metropolitan Housing Authority working on President Obama's ConnectHome initiative. Among others, Joshua has been recognized by Forbes, the Federal Communications Commission, Next Century Cities, Government Technology, and the National Digital Inclusion Alliance for his contributions to the field.

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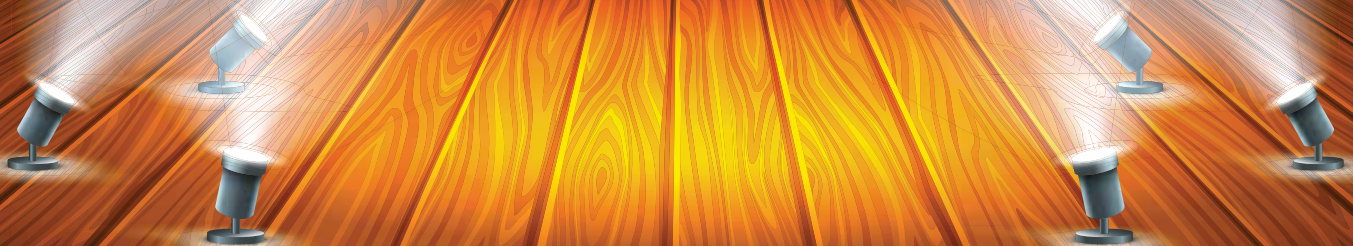
Bringing Broadband Home to Rural America

By Ami Rodriquez
VP - Sales, Marketing & Business Development
TWN Communications

It's been almost a year since those jarring days last March when COVID-19 appeared, and the world stopped. For many of us who live and work in major metropolitan areas, the thought of heading home to work didn't affect us very much. We simply closed our laptop at the office, drove home, and opened it back up. The daily video calls we now dread were novel at first, even a bit fun. These calls quickly became our lifeline to the outside world. Most of us dialed in for work, and then realized we could also keep in touch with friends and family this way. Virtual happy hours, baby showers and family game nights via video conference soon became routine.

At the same time, our kids, from college on down to kindergarten, were also sent home to continue schoolwork. Now, four people or more were all using one broadband connection. Parents and kids are on video calls, streaming TV shows, and playing games – at the same time. Those of us in more densely populated areas, notionally well served by internet providers, felt the strain on our internet service, so we called our provider and upgraded service. Sometimes it fixed the problem, sometimes it didn't. And this was in the so-called well- served "urban" areas throughout the country.

For people who live and work in rural America, the broadband struggle has already existed for decades, but it is now even worse. These are the communities that often get overlooked by large communication providers because broadband deployment in areas with low population density are just not deemed profitable enough for them. One of the ironic results of the pandemic is that these small towns lost many members of the younger generation to big cities for better jobs. Communities could now entice these individuals back home to work remotely. If only there was reliable broadband access.

Let's face facts - it's very expensive to design, build, and operate a fiber-optic broadband network in a highly populated area. It becomes even more expensive when population density is between

> *"These are the communities that often get overlooked by large communication providers because broadband deployment in areas with low population density are just not deemed profitable enough for them."*

2 and 10 people per square mile. How can this ever be financially viable?

Grants and federal funding programs such as ReConnect and Rural Digital Opportunity Fund (RDOF) are helpful, but the dollar amounts awarded are a drop in the bucket, and not nearly enough to truly bring the same level of service to these areas.

WHAT'S THE ANSWER?

Now is the time for creativity and innovation. Uniquely designed public/private partnerships between electric cooperatives and privately held ISPs can help bring carrier-grade, reliable broadband services to rural underserved areas. The desire for available and reliable broadband in rural America has always been there, but the onset of COVID accelerated the demand to an urgent level. When rural electric cooperatives can partner with a trusted provider to share costs and infrastructure, everyone wins. The shared cost approach mitigates risk for both entities while utilizing each of their strengths – the cooperative's unique infrastructure and long-term financial goals alongside the provider's scale and broadband expertise. This approach allows rural electric cooperatives to focus on providing power, and for the provider to do what they do best; operate broadband networks.

WISPs Use 5.9 GHz to Combat COVID-19, Provide Blueprint for Bridging Digital Divide

By Louis Peraertz,
VP of Policy
WISPA

COVID put a spell on the way we use the Internet. With most of us locked down, we used the heck out of it to teach our kids at home, telework, communicate with loved ones and friends via webinars, and stay safe. Needless to say, all networks were pushed to their capacity, including those operated by wireless Internet service providers (WISPs).

WISPs provide evolutionary broadband services to more than 6 million Americans. There are about 2,800 of them in the U.S., being run by innovative entrepreneurs who primarily use unlicensed radio spectrum to quickly and affordably deliver critical communications to Americans in unserved and underserved areas of the country.

As with others in the broadband ecosystem, WISP networks got hit hard by the new use dynamics brought about by the lockdown orders. They saw an average change of download traffic at peak from pre to present COVID of 43%; and an average change of upload traffic at peak from pre to present COVID of 70%, causing nearly 82% of WISPs to upgrade their delivery networks to meet those challenges.

Not surprisingly for WISPs, the Top 5 uses during COVID were (in order), virtual meetings/webinars; distance learning; HD movie streaming; telemedicine; and web browsing. To accommodate these uses, the Top 5 "speed" packages chosen by consumers during COVID were (in order) 25/3mbps; 10/1; 50/5; 100/20; and 100/100. The new demand meant that 83% of WISPs added new subscribers, with this growth 33% more than usual.

WISPs have played a leading role in keeping Americans online during the pandemic. A significant majority of WISPA's members provided some sort of free connectivity or publicly available Wi-Fi to their communities at their own cost, averaging about $4,500 apiece. Many also signed the FCC's Keep Americans Connected pledge, which kept those most affected by the pandemic – such as individuals who lost jobs or saw lower wages – connected and safe.

frequency to complement its unlicensed offerings, making it able to provide a better Internet experience to its customers by expanding the throughput, reducing latency, and providing better modulation.

"WISP networks . . . saw an average change of download traffic at peak from pre to present COVID of 43%; and an average change of upload traffic at peak from pre to present COVID of 70%, causing nearly 82% of WISPs to upgrade their delivery networks to meet those challenges."

The 5.9 GHz band – an underutilized slice of spectrum dedicated to the auto industry for the past twenty years – was a critical asset that helped WISPs meet the dramatic surge in demand during COVID, too.

WISPA has long advocated that the FCC put the 75-megahertz in this band to better use by allocating a portion of it for unlicensed uses. When the pandemic hit, the Commission found new impetus to see this through. In March 2020, in order to help WISPs satisfy surging network demand, the FCC began granting applications from WISPA members for Special Temporary Authority (STA) for unlicensed use of 45-megahertz of spectrum in the lower portion of the band.

Some examples of this were:

- MetaLINK Technologies, Inc. in Defiance, OH, used the additional

- Nextlink, based in Hudson Oaks, TX, found tremendous success moving a portion of its gear to the 5.9 GHz band where it could operate with less interference. As a result of the higher signal-to-noise floor utilizing the 5.9 GHz band, over 2,000 of Nextlink's subscribers were able to upgrade their speed plans to higher levels than possible before. The change had interesting ancillary benefits, too. Nextlink notes that its departure from the usual unlicensed frequencies in the lower portion of the 5 GHz band provided a similar boost for other WISPs in the marketplace by allowing them to operate with less frequency congestion and interference.

- ZIRKEL Wireless, operating in Steamboat Springs, CO, says that when the state's stay-at-home orders were imposed, many of its

access points (APs) were suddenly saturated at 100% utilization since everyone was now at home working and schooling, among other uses. With the new 5.9 GHz spectrum, ZIRKEL was able to mitigate that strain, bringing utilization back down to the 80% range by increasing capacity and thus helping all of its customers remain connected with fast speeds. The STA also enabled the company to give other adjacent APs larger channel sizes, alleviating pressure network-wide.

The success of the STA grants demonstrated how vital it was for the FCC to proceed with its proposal to allocate more unlicensed spectrum in the 5.9 GHz band. Subsequent to these events, late in 2020 the FCC opened up the lower 45-megahertz of the band to indoor unlicensed use; and is in the process to determine the permanent rules for full power outdoor use akin to what was achieved by WISPs with the STAs.

WISPs that received an FCC STA certainly made the effects of COVID-19 on their networks less devastating for their communities. Interestingly, the rapid application of the new spectrum to help combat the effects of COVID also showed off the strengths of the WISP model of deployment, revealing important implications for bridging the digital divide.

WISPs, through their flexible network architecture, are meeting the needs of the markets they serve. Sometimes that means using primarily unlicensed spectrum to reach customers. Other times, it may mean rolling fiber to the home. The market – its geography, terrain, access to infrastructure, etc. – is the primary factor that determines network design, not a preference for any given technology. Such flexibility has greatly fostered WISP deployment into the digital divide.

This technologically agnostic approach makes sense. Yet, many today are calling for billions in federal and private support for primarily wired/fiber connectivity to close the divide. Indeed, a significant number of WISPs operate these fiber facilities. The speeds are fast. The service is robust. The pipes are capacious. But building fiber networks is fraught with a number of practical challenges that do not make it an automatic choice to bridge the digital divide.

The first of which is time. Through wireless technology, WISPs can extend robust and evolving broadband networks in a matter of days, not months or years. Deployment is not hampered by time-consuming placement of fiber, permitting for rights-of-way, utility poles or aerials, or the shear physical complexity of establishing a working fiber network. Consequently, fiber-only networks are inapt to meet the immediate challenges presented by COVID. Expansive geography, tough terrain and low population densities, among other matters, also mean that even beyond COVID, it could take years before Internet access could be extended through fiber to all unserved Americans.

Cost is another challenge to fiber deployment. WISP networks can bring broadband to customers at about 15% of that of fiber. Running or trenching fiber can cost up to $30,000 per mile to install. In contrast, unlicensed spectrum – such as the 5.9 GHz band, and licensed-by-rule spectrum, such as Citizens Broadband Radio Service spectrum in the 3.55 to 3.70 GHz band – offers dramatically lower-cost ways to provide Internet service. On the equipment side, too, fixed wireless hardware is relatively inexpensive compared to wired/fiber solutions, the latter of which can incur extensive capital costs for installation, maintenance, and repairs.

Finally, the investment might be overkill. Sort of like buying a Ferrari to drive on your neighborhood streets when a Ford will do. Yes, consumers perennially yelp about more speed/capacity for their data-hungry activities. But for the foreseeable future, they'll likely never be able to use all that fiber has to offer, if at all. Current adoption statistics underscore this. During the height of the COVID lockdowns, WISP customers primarily chose or modified their access packages to 25/3 Mbps services, even where they could purchase broadband service with Gigabit per second download speeds. Recent FCC analysis seemingly confirms similar adoption preferences, too, showing that in an era with Netflix HD streaming, gaming and telework being popular uses of network technology, only 9% of Americans chose packages of 250/25 Mbps, a speed which is significantly less than what can be achieved by Gigabit fiber. Marketers are wont to inflate the need for speed to justify their pricey packages, but actual use statistics suggest most of America is doing fine with what they have right now. That may change. But, fixed wireless networks have proven that they can be deployed faster, at lower costs, and can evolve more rapidly. These characteristics should obviate policies such as "fiber favoritism" which distort broad investment and lock in an expensive technological "solution" that is not universally warranted.

The WISP model of deployment brings broadband home and focuses on employing the right tool for the right job – quickly, cost-effectively, and competitively. Though unlicensed spectrum is the predominant carrier of WISP access, for a growing array of WISPs, all tools are on the table, including fiber. COVID-19 certainly has caused a global calamity, but as STA access to the 5.9 GHz band reveals, WISP deployments can be exceedingly flexible, responsive and evolutionary. Not just to meet the challenges of COVID, but well beyond, such as the nation's longstanding efforts to eradicate the digital divide.

ABOUT WISPA

WISPA represents the interests of the evolving wireless Internet service provider (WISP) ecosystem: small innovative entrepreneurs who provide fixed wireless and other broadband solutions to consumers, businesses, first responders and community anchor institutions. WISPs bring critical Internet access to millions of Americans in unserved and underserved rural, suburban and urban areas of the country, quickly and affordably, offering cost-effective, competitive and innovative service options where they did not previously exist.

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Following Through on Connecting Communities

By Alan Fitzpatrick
CEO
Open Broadband, LLC

Improving adoption of broadband internet access is critical in reaching the goals of connected communities. Broadband enables work from home, remote education, telehealth, helps businesses reach their customers and employees, and improves how local government and organizations keep citizens informed. However, the benefits of a connected community are lost when segments of the population lack affordable broadband access.

The two barriers we most often see are 1) Lack of affordability, and 2) Lack of availability. Both of these problems can be solved with today's technology, assuming there is a will to do so, and funding to support it. This article will highlight successes we've had in North Carolina in 2020 working with partners and leaders in various parts of the state.

Success Stories in Wayne County
HACG, The Housing Authority of the City of Goldsboro, has long been a champion for addressing the digital divide. When grant funding became available last year, we partnered with them to design and implement a free public Wi-Fi network for all their residential communities. This approach makes it easy for residents to get online by simply selecting a Wi-Fi SSID on their device. Over 1100 residential units now have free access to high-speed internet, and none of the residents had to file paperwork or prove income level. Simply put, if you live in the community, you automatically get free Wi-Fi. We implemented the solution with a 60 GHz fixed-wireless gigabit internet feed from our local fiber hub, and then deployed low-cost wireless technology across the neighborhood.

City of Goldsboro: When we entered a lease agreement with the City of Goldsboro for water tower access for our fixed-wireless equipment, a key component was providing service to underserved areas of the city. Our partnership achieved successful implementation of free public Wi-Fi at four sites at the end of the year. The city IT Department led the charge in both originating the project and working in partnership with Open Broadband to make this happen. Look for bigger things in 2021!

Dudley Community Center: A third example in Wayne County in 2020 was working as a member of the partnership with the Public Library to bring high-speed internet and digital resources to the Dudley community. As part of this project, free high-speed public Wi-Fi is being made available inside and outside of the new Steve and Susan Parr Family Learning Center. This enables library staff to provide comprehensive technical training to families in the Dudley community. In addition to the Learning Center, we are now offering low-cost fixed-wireless broadband service in the community to resident homes. A big Thank You goes to Wayne County for their support and leadership in making this happen.

Success Stories in Mecklenburg County
Grier Heights Community in Charlotte: CrossRoads Corporation is a faith-based, nonprofit organization that works with the Grier Height neighbors to positively impact social and economic mobility. This community had low levels of broadband adoption due to affordability for the residents, and we worked with CrossRoads to apply for a digital inclusion grant. In the fall we implemented free public Wi-Fi in two apartment communities and the community center. A third apartment complex will be added to the network in 2021 thanks to additional support from the City of Charlotte. CrossRoads estimates over 1,200 Grier Heights residents will benefit from this project.

City of Charlotte: When CARES funding became available, the city funded the Access Charlotte initiative, which includes free public Wi-Fi in 11 residential complexes and 5 public spaces. We worked with the landlords and the city to design a Wi-Fi solution to provide high-speed internet to over 1700 residential units. Similar to the HACG example above, our low-cost wireless technology is being made available to everyone in these communities, without having to prove income level or file an application for service. Select the Wi-Fi SSID on your device and receive unlimited usage internet access. In parallel with the city's efforts, another initiative, Tech Rising, was launched and spearheaded by the AvidXchange Foundation that aims to remove barriers to technology education and resources for youth and young adults. One of the 2021 initiatives we are partnering on is expansion of additional free public Wi-Fi in the north end communities.

City Startup Labs: Another CARES Act funding initiative involved providing returning citizens with entrepreneurship education and design and development training. Open Broadband was selected as their partner to hire and train 5 individuals to install public Wi-Fi networks in Charlotte. The program has been a hit, accomplishing the goals of talent development while helping the community achieve the results of affordable internet access. They also work closely with Digital Charlotte to train digital navigators—troubleshooters who provide basic helpdesk assistance.

Other Examples Across North Carolina
There is no shortage of opportunities to improve the connectivity within our communities. A partnership with Stanly County and the Stanly County Airport last year resulted in gigabit fixed-wireless service to the airport and surrounding community. A partnership with Alexander County resulted in bringing many residents 50-100 Mbps internet service for the very first time, and lighting up free public Wi-Fi spots at various churches. The Warren County Recreation Complex now has free public Wi-Fi. So do various parks and community centers in Franklin, Vance, and Granville Counties. It's hard to beat the rewarding feeling in bringing 100 Mbps service to residents in White Level (rural Franklin County).

These are just a few examples of improvements last year, and there is so much more to do in 2021. The technology exists to solve the broadband affordability and access problems. We all need to demonstrate the will to do it, put the right partnerships in place, seed it with a little capital, and then have the resolve to follow through on our commitment to better connect our communities. Let's make it happen.

BROADBAND PARTNERSHIPS
FOR SOME CO-OPS, GETTING A FIBER PROJECT TO WORK MEANS SHARING THE LOAD

By Cathy Cash
Senior Writer/Editor
NRECA
Reprinted by permission from Aug. 2020 issue of RE Magazine © NRECA

For months, the team at Appalachian Electric Cooperative (AEC) explored options for deploying broadband to its members but couldn't get the project to pencil out.

Then their board weighed in: Find a partner.

Would-be broadband providers have several models to choose from, but observers say the course AEC chose is becoming more common as unserved communities clamor for connectivity and turn to their co-ops for relief.

"Our board didn't like the idea of biting off the whole piece of pie," says Greg Williams, general manager/executive vice president of the New Market, Tennessee-based co-op. "We looked at the do-it-yourself option, but there is a lot of risk in that model."

Broadband partnerships can take many forms:

- In Minnesota, Arrowhead Electric Cooperative teamed with a regional telecommunications company.
- Orcas Power & Light Cooperative in Washington is working with a multinational telecom giant.
- Virginia's Prince George Electric Cooperative joined with the state's largest investor-owned utility.

"These arrangements truly embody the saying, 'There's no one-size-fits-all,'" says Kelly Wismer, NRECA's legislative affairs director. "It's exciting to see how creative electric cooperatives are getting in their work to find broadband solutions that best serve their members."

Partnerships can be the answer for electric cooperatives who want to meet members' needs but also minimize risk, reduce operational costs, and potentially limit legal and regulatory obligations.

"A partnership strategy can also save time and money by dividing the tasks, staffing requirements, and financialrisk of a new business," Wismer says.

> ## "We felt we'd be quicker to market if we just partnered with someone who really knew the business."
> ### Greg Williams, AEC

TELCO PARTNER: 'THEY SPOKE THE SAME LANGUAGE'

AEC began exploring its broadband options in 2017, immediately after the state of Tennessee acted to allow electric cooperatives to indirectly enter the market. The team analyzed a subsidiary model wherein the co-op would run everything from broadband build-out to day-to-day service, but wasn't comfortable with the risk.

AEC directors sent them back to the drawing board a couple of times before asking them to explore partnership options.

The co-op put out requests for information and heard back from seven companies. They then asked those respondents for specific details on what a joint effort would entail.

"Four came back and gave us a proposal," says Blake McNew, AEC director of fiber services. "We evaluated those over a year, brought the companies in, and, with the board, interviewed everyone multiple times."

They landed on a conglomerate of three Tennessee telephone co-ops doing business as Foursight Communications. Foursight created a subsidiary called Trilight for the partnership with AEC.

What gave them the edge?

"It's made up of co-ops. They spoke the same language we did," McNew says. "They had membership very similar to ours. There were a lot of commonalities."

"They share our value system," Williams adds. "Other folks were more profit driven."

The telephone co-ops also knew how to operate in a market competing with for-profit providers.

"They already had the bumps and bruises, so we don't have to incur those along the way," McNew says. "In this business, you can get millions of dollars in debt very quickly and not know it until it's too late. We're not perfect, but we do avoid those pitfalls by having them a phone call away."

AEC has a fiber backbone for substation communications and fiber throughout its system, which it leases to Trilight. It also provides the structure where Trilight maintains transport nodes and electronics.

For its part, Trilight provides front office service reps, electronics, and home and business installations, and it takes the trouble calls. Trilight logos and service

windows are in AEC's lobby.

"Our members become their customers," Williams says. "Otherwise, we would have had to start from scratch. We felt we'd be quicker to market if we just partnered with someone who really knew the business."

To continue the project, AEC has applied for state funds, while Trilight plans to bid in the $20.4 billion Rural Digital Opportunity Fund, the Federal Communications Commission's largest reverse auction for rural broadband.

AEC in east Tennessee and Trilight's phone co-ops in the middle of the state may not share a boundary or overlap in members, but "in the world of fiber, distance doesn't matter," Williams says.

In fact, it may open doors to a greater customer base.

"They can build fiber outside our service territory," he says. "They are not bound to serve a territory like our electric co-op."

WORKING WITH AN IOU

Waverly, Virginia's Prince George Electric Cooperative (PGEC) had been building broadband fiber to-the-home from the ground up since 2017. Then came an offer it couldn't refuse.

Dominion Virginia Power, the state's largest investor-owned utility (IOU), was installing fiber-optic cable to improve the resiliency of the grid when it asked PGEC if it would be interested in leasing access to Dominion's fiber to bring broadband to unserved communities in Surry County.
The agreement, signed in early 2020, is

the first of its kind in Virginia.

"We're here to serve our communities, no matter if they are a customer of Dominion Energy or a member of the cooperative," PGEC President Casey Logan says.

Under the agreement, Dominion provides the middle-mile fiber, which significantly reduces the cost and time to connect Surry County residents, he adds.

"Dominion is putting up fiber infrastructure for their electric grid; we are leveraging that fiber to make [the project] happen," Logan says. "It's hard to put a number on it, [but] it would make serving the county a lot more costly and time consuming to do if Dominion was not willing to partner with us."

The co-op, through its RURALBAND subsidiary, plans to offer highspeed internet and telephone service to Surry County's 3,600 residents by summer 2021.

Logan advises co-ops to "keep an open mind and do your homework" when looking at broadband partnerships.

"Many co-ops and IOUs don't have good relationships," he says. "However, we've had a great relationship with Dominion over the years. Now, we're coming together because it's a cause we can all get behind."

LEASING FIBER TO THE PROVIDER

Ninety minutes south of AEC's headquarters, Volunteer Energy Cooperative (VEC) also found a partnership that worked.

"We were looking for the best way to get internet and the quickest way to respond

to the membership," says Rody Blevins, president of the Decatur, Tennessee-based co-op that serves 17 counties.

"We were concerned about doing all the contracts and legal work," he says. "We thought a partnership would work."

VEC gets phone service from Twin Lakes Telephone Cooperative at a district office and holds a joint contract for pole attachments in four counties they both serve. Twin Lakes, one of the phone co-ops that formed Trilight, had already started running broadband fiber to its members' homes.

"Their manager and board were very interested in working with Volunteer to expand their footprint," Blevins says. "They were very receptive to working together."

VEC, which built a fiber backbone years ago, has not formed a broadband subsidiary but owns and leases fiber to Twin Lakes. Members sign up with the phone co-op for broadband, phone, or television service.

"Twin Lakes is the content provider," Blevins says. "We don't have to negotiate contracts with ESPN or legal issues with the FCC."

As for getting service quickly to its members? VEC has 118,000 meters, and Blevins anticipates half will subscribe to the broadband service over time.

"We're just getting cranked up."

CULLMAN ELECTRIC MARKS LIFE-CHANGING BROADBAND WITH HISTORIC MARKER

January 19, 2021
Cullman, AL

Community leaders gathered Monday, January 18, 2021 with Cullman Electric Cooperative staff to celebrate the first co-op members becoming subscribers of Sprout Fiber Internet.

"This truly is a historic moment, much like when the first residents in the region received electricity," Cullman Electric Cooperative CEO Tim Culpepper says. "This technology carries the same potential to improve the quality of life for our members."

The event was held outside the Simcoe Community Center on Highway 69 where Cullman EC's historic marker is located, celebrating the co-op role in rural electrification of Cullman County in 1936. A stone marker was placed next to the plaque, noting that residents in the Berlin and Simcoe areas are the first co-op members to be connected to Sprout Fiber Internet.

Sprout Fiber Internet is the fastest, most reliable internet technology in the world, and Cullman Electric will begin connecting members to this life-changing technology.

"The impact of rural electrification was one of the most significant events in the history of Cullman County," Culpepper said. "Making reliable, high-speed fiber internet service available to the communities we serve will be just as significant today and into the future."

Cullman Electric has started building a fiber network that will connect all of the co-op's substations and offices to further enhance the quality of its electrical service. In the process,
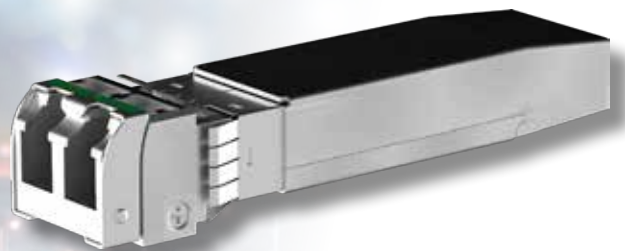
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Maximizing The Value Of Metro Fibers

By Ulrich Kohn
ADVA

Mobile, fixed and cable networks all need continuous expansion to meet growing demand. But there are also competing requirements and a range of architectural choices with different benefits and costs.

- Bandwidth: 5G cell sites, major business customers, or DOCSIS 3.1 remote PHY devices are moving rapidly from 1Gbit/s to 10Gbit/s interfaces.
- Topology: Choices include ring, star, and tree, meeting different availability requirements.
- Cost: This includes first-in costs as well as ongoing costs for maintenance and repair.
- Efficiency: Resource-sharing can improve profitability but limit scalability.
- Synchronization: There are stringent synchronization requirements for radio base stations and other applications such as substations in energy networks.

What are the benefits and tradeoffs of these choices? What are the best practices? Here's our view.

TOPOLOGY OPTIONS AT THE METRO EDGE

At the edge of the network, the number of sites is significantly higher than in the core. Site visits must be avoided to minimize operational costs, and that means fully automated solutions. The number of active sites should be minimized, and intermediate aggregation sites should not include active components. But there's also a need for scale and upgradability that might interfere with this requirement. Let's take a look at different network options and identify the most cost-efficient solution from a first-in but also operational cost perspective.

RING VERSUS STAR ARCHITECTURE

A ring topology can resiliently connect sites to a hub, while a star architecture suffers from single point of failures. A truly redundant ring architecture, however, requires disjoint fiber paths and might be found at high-value business sites but less likely at cell sites or at remote PHY devices. The demarcation equipment at those sites is more expensive as it needs to support two network ports and high-capacity switching to support pass-through traffic.
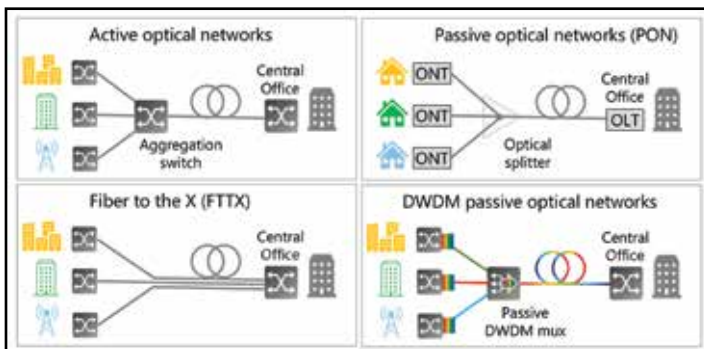
TREE AS ACTIVE OR PASSIVE NETWORK

A tree architecture is a variant of a star architecture with a remote distribution point. This distribution point can be active or passive. If TDM-PONs are implemented, a simple splitter is deployed at the distribution point avoiding a need for power and space. This kind of architecture is favorably applied for residential access. It's less suitable for high-bandwidth services for business and mobile as scalability is limited because bandwidth is shared among several users. In addition, a malicious endpoint can disturb the entire access network.

In contrast, a DWDM PON isolates users by allocating different wavelengths. This improves the security and also simplifies network growth. However, DWDM PON does require multiple interfaces at the OLT, so it comes in at higher cost.

What about synchronization and low-latency transport? TDM PONs have some disadvantage as endpoints are separated by means of TDM multiplexing. In consequence, high-priority data might need to wait for the next time slot, increasing latency as well as delay jitter. DWDM PONs provide point-to-point connections without any negative impact on delay characteristics. This is important for delivery of timing using SyncE and PTP. And DWDM PONs can be easily deployed in a ring architecture protecting against fiber breaks in a very efficient way.

BEST PRACTICES

The metro edge architecture depends on the availability of fiber. In fiber-rich scenarios, no fiber sharing with PONs is required. FTTX with direct fiber to the premises, cell site or remote PHY devices might be the most efficient and future-proof solution, especially when traffic need not be aggregated.

If fiber must be shared between a distribution hub and the central office, DWDM PON is a future-proof and efficient solution. This is especially true if the optical interfaces are tunable and automated activation procedures eliminate manual configuration. Suitable optical components are becoming available, and SFP-based solutions can effectively enrich existing packet network solutions.

If significant multiplexing gains are required at the metro edge, active aggregation devices at the distribution hub can be a cost-efficient alternative. Compared to multiple DWDM lines all the way to the central office, a significant lower number of optical links is needed in such an active configuration.

Architecture	Bandwidth and scalability	Equipment cost	Fiber sharing
Active optical	Medium	Medium	yes
Passive optical (PON)	Medium	Low	yes
Fiber to the X (FTTX)	High	Medium	No
DWDM PON	High	High	Yes

In real-world networks, different regional requirements need to be met. A flexible solution is required that supports FTTX but also pre-aggregation as well as DWDM PON. ADVA is addressing this need with our high-bandwidth 100Gbit/s product family, the FSP 150-XG400. This family includes the most compact high-bandwidth edge devices, with high-port count, environmentally hardened pre-aggregation solutions, comprehensive synchronization capabilities as well as the most powerful aggregation nodes featuring DWDM PON with full auto-activation. Walker Associates and ADVA can help provide you with application-optimized solutions aligned with any need for scale and flexibility.

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- More resilient network - Eliminates points of failure associated with CEx, related cabling and fiber connections.
- Seamless brownfield upgrades:
  - Migrate to XGS-PON at any time, not as subscribers upgrade their services.
  - Reuse existing GPON cards anywhere in the network on day one.
- Future-proof greenfield network
  - Start with cost-effective GPON and migrate to XGS-PON based on capacity needs or business case.

2

3

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Aiming Higher and Doing Better

By Shirley Bloomfield
CEO
NTCA

This time last year, none of us could have predicted how the COVID-19 pandemic would drastically change our way of life. Broadband access was already critical to conduct business in the 21st century online world. But when the pandemic hit, it became clear just how essential having access to the internet is.

For many customers, the switch to working, studying and doing everything from home was fairly seamless, thanks to the good service they were already receiving from their internet provider. For others, while they may not have had the best service (or any at all), providers in their area stepped up to expand access and increase speeds. Members of NTCA– The Rural Broadband Association led this charge. We had providers dropping off "broadband in a box" to families and walking them through how to install their internet themselves over the phone. NTCA member providers went above and beyond to ensure their local schools and hospitals were hooked up and that service was uninterrupted. And despite the pandemic, NTCA members found ways to deliver even faster, better service. According to our annual survey, 68% of customers served by NTCA members have access to 100 Mbps service or better, and 45% of customers have access to gigabit service, up from 57% and 23.4% in 2018, respectively.

This level of service can and should be the norm for all Americans, but federal standards and support are lagging behind. The FCC defines broadband as 25/3 Mbps, which barely cut it before the pandemic. Now, even the most basic use of the internet requires higher speeds. Internet use at home no longer means watching Netflix while catching up on emails in the evening. Even when things return to normal, we need to be prepared for life to be fundamentally changed—along with how we define regular internet use.

At NTCA, we are pleased that the Biden administration has made broadband access for all a top priority. With the COVID-19 pandemic still ongoing, there is no time to waste to get Americans connected and to make sure they can stay connected. But as Congress and the administration continue to direct funding towards broadband, it is important to ensure that support goes to the right places and is invested in future-proof networks. We need to aim higher and do better than the current standards.

How do we do ensure that the networks of today are the networks of tomorrow? We must figure out exactly where service is needed. The most recent joint government funding and COVID-19 stimulus bill, which includes funding for broadband mapping, will kick start this effort. Current broadband maps are outdated and inaccurate. In some cases, the map might indicate that a ZIP code has broadband service, but that does not mean that all residences in that ZIP code have service. More accurate maps will help determine how to direct federal funding, so that resources are being used judiciously and to prevent overbuilding. The last thing we need is for deployment efforts to be doubled in an area that already has access to broadband, versus an area that desperately needs help.

In addition to making sure that funding is directed appropriately based on more accurate maps, we must also help customers adopt the broadband services available to them. It is one thing to have access to broadband. It is another thing entirely to be able to afford it. Better targeting of solutions for both availability and adoption will be crucial to help ensure that all Americans have affordable access to the internet.

In striving for greater availability and adoption of broadband, we must also ensure that these services are the best possible for both today and tomorrow. Broadband is the critical infrastructure of the 21st century, and we must invest in sustainable networks rather than patching things together in ways that require starting the effort all over again just a few years later. When we build traditional infrastructure like roads or bridges, we certainly don't build only to re-build a few years later. Unfortunately, the same cannot be said about broadband infrastructure currently. Too many programs end up delivering broadband that becomes irrelevant and unhelpful for customers in short order.

We believe that the federal broadband standard should be at least 100/100 Mbps, and that any federally funded broadband deployment effort should aim to deliver higher speeds using sustainable, fiber-based networks. Anything short of this standard is just kicking the can down the road and providing sub-par service in the meantime.

Finally, in order to deliver better service to all Americans, we must address clouds on the horizon for the supply chain. When asked about barriers to deployment in our recent broadband survey, 90% of our member respondents cited the cost of fiber, and more than a quarter cited fiber order fulfillment delays related to the pandemic. To build robust, future-proof networks, fiber is absolutely essential, and we must ensure that it is available when providers need it.

Access to the internet means access to opportunity. The pandemic has shined a bright spotlight on the fact that we still need to connect all Americans with the best possible broadband, no matter where they live. I believe the way to do this is by aiming higher and doing better so that all Americans have the connectivity they need now and well into the future.

Shirley Bloomfield is chief executive officer of NTCA– The Rural Broadband Association, the premier association representing nearly 850 independent telecommunications companies that are leading innovation in rural and small-town America. With more than 30 years of experience representing the country's smallest telecom operators, Bloomfield is an expert on the role of federal communications policies in sustaining the vitality of rural and remote communities and the benefits rural broadband networks bring to millions of American families, businesses and the national economy.

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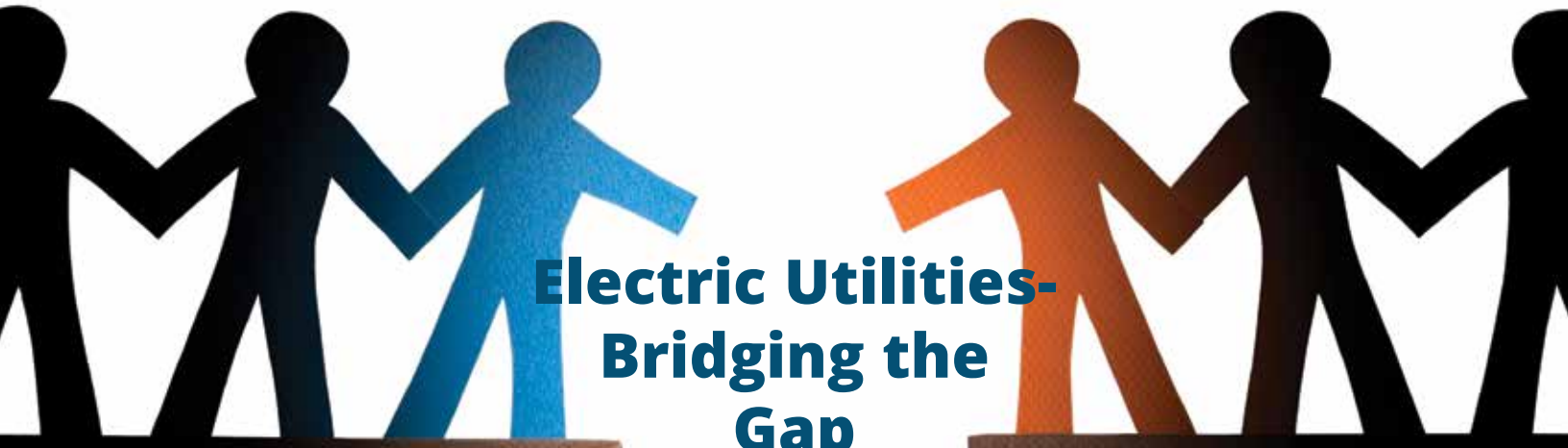
Electric Utilities- Bridging the Gap for Broadband

By Mitch Simcoe
Director of Industry Marketing
Ciena

Historically, the deployment of broadband services has been limited in rural communities as it is difficult for traditional providers to build a broadband business case in more sparsely populated areas. Consequently, the use of internet services and lack of adequate bandwidth present a challenge to residents—from work, retail, and entertainment services to accessing critical healthcare and advanced education services. The COVID-19 pandemic has only accelerated these trends, propelling high-speed, reliable broadband into the essential category rather than simply optional.

Rural utilities are in the unique position of having physical infrastructure in place that can be leveraged to fill the void. However, their core business remains the supply of electrical power, which needs to be delivered more cost-effectively, and often with fewer staff who are covering multiple roles. This fuels a need to emulate the larger utilities in modernizing their grid—along with automating their operations and billing.

Managing the significantly increased volume of broadband traffic, while allowing critical teleprotection traffic to be prioritized, demands a modern combined packet optical network. For rural utilities, this is a key driver when considering investing in a multi-service substation backbone that can address both the core utility operations challenges and leverage new opportunities for the provision of rural broadband in the communities they serve.

Utilities have an existing core business justification, and a consequent business case, for investment in high-capacity packet-optical transport between their substations. It makes sense for utilities to leverage this infrastructure to aggregate internet traffic from broadband services to meet the needs of their new residential and business customers. Not only does it create a new revenue stream, but also provides an essential service for their rural communities.

Developing a rollout plan for a modernized substation WAN

A change of this magnitude in the network, combined with the introduction of completely new service types at the same time, may be viewed as high risk. There are also cultural factors to consider when merging the traditionally separate OT and IT network and teams. However, this can be mitigated with a plan that

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Last Mile	Middle Mile	Backbone

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divides the transition into three steps.

The first step is to build the optical backbone to support smart grid traffic. This provides confidence that the solution performance meets the needs of mission-critical telecontrol traffic and other high-volume traffic such as surveillance cameras and smart meters.

A second step is to offer wholesale and business connectivity services. For example, in regions with 5G rollout in progress, mobile carriers will be looking for a significant amount of additional capacity. Similarly, in both the business and public sectors there are opportunities for capacity to support business applications, telemedicine, or remote learning. These are all credible services that a utility can provide through their modern backbone.

The third and final step is to offer true residential broadband services in rural communities. This is now all provided through the same network. The utility network can be viewed as a multi-service network that starts with smart grid, adds business services, and then finishes off with residential broadband services.

Ciena can help with products that are specifically designed to support the modernization of the substation WAN. Ciena's 5171 Platform is a universal aggregation device for the backbone that meets the modernization requirements of utilities.

Modernizing the network requires investment, so it is critical that utilities make sure that the new backbone is fit and ready for all the services that it must carry. They must also ensure that it can scale to support not just smart grid traffic, but also residential broadband and business services—bringing benefits to rural communities to support work at home, enable business growth, and support health and educational services.

> *" . . . it is critical that utilities make sure that the new backbone is fit and ready for all the services that it must carry."*

Mitch Simcoe *is Director of Industry Marketing for Ciena, where he is responsible for supporting Utilities to modernize and automate their networks.*

Mitch has over 30 years of experience in the telecommunications industry, starting with Bell Canada and later with Nortel in numerous roles in Marketing and Product Management in product groups including voice switching, broadband access and optical networking. He later joined GENBAND as Director of Application Marketing and built an application showcase for communication-enabled IT applications.

A graduate of McGill University in Montreal, Canada, Mitch holds a Bachelor of Engineering (Electrical) and an MBA (Marketing)

Walker And Associates, Inc. Awarded Spot On $13B Enterprise IT Software Contract

By Randy Turner
Director, Marketing Communications
Walker and Associates

Welcome, NC, December 9, 2020 - Earlier this fall the U.S. Army awarded Walker and Associates, Inc. a position on the potential 10-year, $13B Information Technology Enterprise Solutions follow-on contract for commercial-off-the-shelf software. Jane Brightwell, VP of Federal Sales for Walker states "We are pleased to be part of the CHESS ITES team with our recent win of the ITES-SW2 contract vehicle. This enhanced version of the Software contract will bring new procurement opportunities to the Federal marketplace as this contract earns its place as a Best-in-Class Contract. With Software as a Service becoming more vital in the network, we see this being a key contract in our portfolio." Lisa Smiley, Director of Enterprise OEM Development at Walker added "The Walker team and our partners worked together to submit a compelling response. We will add new software manufacturer partners to our comprehensive list to bring new technology solutions to the ARMY."

Army Contracting Command received 32 bids for the ITES – Software 2 firm-fixed-price contract, which seeks to provide COTS software and maintenance support to help the service, Department of Defense and other federal agencies meet their infrastructure and infostructure goals, DoD said Monday.

The service will determine work locations and obligate funds upon award of each task order and expects work to run through Aug. 30, 2030.

The contract award came a year after the Army issued a solicitation for ITES-SW2. The contract has a five-year base period and a five-year option term and covers the provision of COTS software and maintenance services in 14 product categories: audio and visual; business and finance; communication; database; education; internet; modeling and simulation; multimedia and design; NetOps; office suite; operating systems; programming and development; specialized; and IT utility and security.

Chrystie Brown, CEO of Walker, observed that "2020 marks Walker and Associates 50th year in business as a vital partner to our valued customers. We stand ready with a streamlined approach for bringing the best suited, best in class products and solutions together to equip, enhance and modernize technology. We look forward to working with the DoD and other federal agencies as a trusted, reliable partner and guide to strengthen today's capabilities while preparing the way for the fast approach of the future."

Bringing Broadband Home: Removing Barriers

By Jeffrey Sural
Director
North Carolina Department of Information Technology's Broadband Infrastructure Office (BIO)
Mary-Alice Warren
Information & Communications Specialist
Broadband Infrastructure Office, North Carolina Department of Information Technology

When the pandemic hit in March, it shone a bright light on the digital divide, in our communities, in our state and in our country.

It highlighted just how important broadband is for North Carolina residents trying to work remotely, learn, visit with health care providers, and connect with family and friends.

As we continue to navigate the repercussions of this pandemic for North Carolinians both personally and professionally, we are seeing that expanding affordable, high-speed internet access across the state and removing barriers to adoption is more urgent than ever. This pandemic has irrefutably proved what we already knew: broadband is no longer a luxury. Broadband is a necessity and is perhaps our most critical infrastructure as we look toward the future and our recovery.

While North Carolina is a broadband leader, and we are leading the way expanding connectivity and promoting adoption, the digital divide is still stark.

More than 500,000 North Carolinians don't have access to broadband because of a lack of population density or geographic barriers that prevent internet service providers from connecting to them.

Roughly 40 percent of households don't adopt, or subscribe to, broadband in their homes because it's either too expensive, the devices needed to access and use the internet are too expensive, they don't have the skills to use the internet or computers, or they don't see how it can impact their daily life in a positive way.

The digital divide can impact everyone. However, its impacts are most pronounced and felt amongst the historically marginalized, vulnerable and oppressed. Rural communities, communities of color, and low-income communities are disproportionately impacted by the digital divide which leads to an exacerbation

"More than 500,000 North Carolinians don't have access to broadband because of a lack of population density or geographic barriers that prevent internet service providers from connecting to them."

of other systemic injustices. These residents are not going to be left behind—they already have been.

However, the N.C. Department of Information Technology (NCDIT) Broadband Infrastructure Office (BIO) is working to lessen the disparity of access and bring the necessary infrastructure, connectivity, resources, and digital literacy skills to communities and residents who desperately need it, now more than ever. The office works collaboratively with state, local, federal, private and non-profit partners to both draw attention to the digital divide in the state and work to close the gap.

First, BIO is growing a grant program that incentivizes deployment of last-mile broadband infrastructure in unserved rural parts of the state. Expanding infrastructure creates long-term, sustainable access. The Growing Rural Economies with Access to Technology (GREAT) Grant program awards funding to internet providers or electric or telephone cooperatives for projects in unserved or underserved areas, increasing access and increasing competition.

In the first two rounds of the program, launched in 2018, the state invested nearly $26 million in 26 Tier 1 counties, connecting more than 21,000 house-

> ## "Rural communities, communities of color, and low-income communities are disproportionately impacted by the digital divide which leads to an exacerbation of other systemic injustices. These residents are not going to be left behind—they already have been."

holds, businesses and agricultural operations to high-speed internet. The state funding has been matched by more than $20 million in private investment.

In direct response to the pandemic, Gov. Roy Cooper signed House Bill 1105 that allocated funding for the 2020 Special Supplementary Round of the program. Through this round, nearly $30 million was awarded to fund 18 broadband infrastructure projects by 11 providers with a goal of connecting an additional15,965 households and 703 businesses in rural North Carolina to high-speed internet.

As the GREAT grant program continues to grow, BIO is focusing on getting better data to inform policy and funding recommendations. Better data on access and adoption is critical to expanding access and working on digital inclusion. In April of 2020, BIO published the NC Farm Survey that found that broadband was critical to agricultural operations in the state. Following the farm survey, BIO launched the North Carolina Broadband Survey with the goal of getting more granular data and a clearer, more accurate picture of broadband access, availability and quality across the state. The five-minute survey, available at ncbroadband.gov/survey, created in collaboration with the Friday Institute at North Carolina State University, can be taken online for users with internet access and by phone for users without service and will be available in both English and Spanish.

In addition to working to expand infrastructure and gather better data, BIO is a national leader in digital inclusion work, with projects and partnerships addressing digital equity, the learning gap, digital skills for workforce development and telehealth.

BIO leads NC Digital Equity and Inclusion Collaborative, a group of leaders from digital equity and inclusion-focused organizations and efforts, that coordinates to tackle the digital divide collaboratively in N.C.

Notably, BIO, in partnership with the N.C. Department of Health and Human Services Office of Rural Health (ORH), was awarded $633,940 by the Appalachian Regional Commission (ARC) and a matching award of $97,200 from the Dogwood Health Trust to run a robust digital inclusion and telehealth project, the Healthy and Connected Workforce Initiative, to increase digital literacy and expand access to health care for disadvantaged and vulnerable residents in Macon, Madison and Mitchell counties.

The office also partners with State Library to teach digital literacy trainings, work with nonprofits to help get computers to students and families in need, promote telehealth, conduct research and make policy recommendations.

Closing the digital divide is a necessary and an urgent task and will require substantial financial investments, sustained dedicated leadership, smart data-driven policies, innovative and diverse strategies, and partnerships.

Broadband remains a top priority for Governor Cooper and BIO. We see the wide-reaching implications of this pandemic and the importance of high-speed connectivity for our residents.

ABOUT NCDIT'S BROADBAND INFRASTRUCTURE OFFICE
NCDIT's Broadband Infrastructure Office leads the statewide initiatives to expand high-speed internet access, adoption and use for all North Carolinians and serves as a statewide resource for broadband access, first responder communications and state-led classroom connectivity initiatives. In 2019, Gov. Roy Cooper issued Executive Order 91 (EO91), which lays out clear directives to expand broadband across the state through a task force comprised of cabinet agencies, which the office facilitates and supports. In partnership with the Friday Institute, the office is currently conducting a survey to gather better data on broadband availability and quality in the state. To learn more and to take the survey, visit ncbroadband.gov/survey.

JEFF SURAL *is the Director of the North Carolina Department of Information Technology's Broadband Infrastructure Office (BIO). BIO was established in 2014 as a statewide resource for broadband access, first responder communication and student connectivity initiatives. BIO provides policy and strategy guidance and recommendations to community and state leaders on ways to enhance high-speed internet access for global competitiveness, education, public safety, healthcare, and government efficiency*

Electric Utilities Bring Broadband Home

By Sheryl Osiene-Riggs
CEO
Utilities Technology Council

Early in the COVID-19 pandemic, UTC conducted a survey of its members to understand how they were dealing with COVID-induced telecommunications issues. While the utility industry has, not surprisingly, performed admirably throughout the pandemic, numerous utility employees faced some initial challenges in working remotely due to a lack of broadband access where many of them lived.

Among the survey findings, some utilities had employees in locations with little or no broadband service, unable to telework. Beyond their inability to access telemedicine or remote schooling, those employees could only remain on the job if they physically went into the office each day. Thus, they faced the increased health risk of continuing to work in an office, simply due to lack of broadband service.

Broadband, therefore, is much more than gaming or binge-watching TV series. For many citizens and their communities, it is a life-changer.

Many Utilities Can Deliver Broadband Now

When most people think of electric utilities, they think of the poles, power lines, and steel towers that dot the landscape, bringing electricity to all corners of the world. But in addition to those poles, towers, and lines, electric utilities deploy highly resilient private communications networks to monitor their critical infrastructure.

Utility networks' resiliency enables communication among workers and systems – critical for personnel safety and for timely service restoration after natural disasters. Day in and day out, those same networks enable management of ever more complex electricity grids, as residential solar and other distributed energy resources (DERS) increasingly appear on those grids. Where there is electricity, there is utility infrastructure.

Much of that utility infrastructure is located in underserved areas of the U.S. As a result, policymakers across the country are looking to utilities to help bridge this digital gap. Utility infrastructure is already in place and can be ready to support broadband delivery to underserved areas.

Creative Solutions to Deploy Broadband Quickly

While every utility is different, they can use their existing infrastructure in several ways to deliver broadband service to their constituencies, should they so choose. First, utilities own or operate most of the utility distribution poles found along most streets, cities, and neighborhoods. In addition to electricity lines, these poles carry voice, data, and cable services as well. Without using existing utility poles, delivering broadband and other services would be much more costly, require much longer to implement, and be far less reliable. Therefore, any utility that owns distribution poles is already empowering broadband deployment by sharing its infrastructure with voice, data, and television service providers.

However, several utilities are doing much more. Already, approximately 100 electric cooperatives in several states have used their existing infrastructure to provide broadband service directly to their customers. Many of these utilities have created standalone subsidiaries to provide broadband service. As an example, Mid-Carolina Electric Cooperative, based outside Columbia, S.C., created CarolinaConnect and other electric

cooperatives in the state are partnering together to provide broadband service to customers in South Carolina. Similarly, United Electric Cooperative in Missouri has created United Fiber to serve broadband to its customers.

In addition, several public power utilities, through their municipalities, also provide internet services. Many electric cooperatives and public power utilities are located in unserved and underserved areas, and already have in-house the resources and staff engineering expertise to build and operate communications networks. Providing broadband service is a natural extension of their commitment to serve their customers.

Collaboration Is the Key

Broadband connectivity is not limited only to public power and cooperative utilities. Indeed, a few of the larger investor-owned utilities (IOUs) are taking the "middle mile" of broadband delivery as far as they can, and then collaborating with local or regional internet-service providers or even fellow utilities that take broadband the last mile, to the consumer. This is an increasing trend as large IOUs are partnering with utilities and ISPs to deliver broadband to underserved areas. Those utilities and ISPs delivering the last mile of broadband already have in-house expertise to deploy, inspect, and troubleshoot the fiber optic cable necessary for broadband delivery – because fiber is already a key component of the resilient utility networks mentioned earlier.

Collaboration can take multiple forms. In Virginia, Dominion Energy and Appalachian Power worked within

"Broadband . . . is much more than gaming or binge-watching TV series. For many citizens and their communities, it is a life-changer."

Virginia state laws to allow the utilities to invest in grid modernization communication devices, including fiber that can be leveraged to provide middle-mile broadband connectivity in unserved areas of the state. Similarly, Appalachian Power is also providing middle mile fiber in West Virginia to provide broadband connectivity to unserved areas.

In Mississippi, the state's largest utility, Entergy, reached a deal with a regional internet service provider (ISP), CSpire, to deploy smart meters to homes and businesses in unserved parts of Entergy's territory. Entergy signed a long-term deal with CSpire to be its service provider for its metering initiative, thereby giving CSpire access to the utility's customers along the way. This model is different from Virginia, yet still uses utility infrastructure to deliver broadband service. Mississippi's project was spearheaded by the state's Public Service Commission. UTC's Utilities Broadband Committee enables collaboration by bringing together utilities of different types and sizes to share information and promote opportunities to deploy broadband for unserved and underserved communities. UTC hosts events, such as Broadband Workshops and a Broadband Summit, in which members discuss the challenges and solutions to providing broadband in unserved and underserved areas.

A frequent theme of these events is how broadband access promotes economic growth, better health care and improved education to communities that lack access to robust, affordable and reliable broadband service. A second regular feature of UTC broadband events is the willingness of experienced utilities to help those utilities just beginning their broadband voyage.

Funding Is Available

The U.S. Federal Communications Commission (FCC) and other agencies continue to make broadband funding available. Recent experience shows that utilities can be successful in their applications:

During the CAF II Broadband auction, electric utilities were awarded over $260 million for broadband deployment to unserved areas.

The first awards of the Rural Digital Opportunity Fund were recently announced by the Federal Communications Commission. In this round, electric utilities received over $1.5 billion for the rollout of broadband to underserved areas.

The recently passed second COVID stimulus bill includes over $7 billion to support a range of broadband affordabil-

In June 2020, Sheryl Ovie Riggs was named president and CEO of the Utilities Technology Council (UTC). UTC is a Washington, D.C.-based global trade association that represents electric, gas and water utilities on their mission-critical information and communications technologies. Sheryl joined UTC in 2017 and rose through its senior management ranks, serving previously as interim president and CEO, senior vice president of finance and operations, and director of accounting and administration.

Sheryl's professional journey spans more than 20 years and began with an interest in financial sciences that expanded into a passion for the broad spectrum of operations. Prior to joining UTC, Sheryl held roles of progressive responsibility in the areas of finance, accounting, human resources, compliance and overall operations. She served in organizations in the banking/finance, education, and health and social services industries, as well as federal and state government entities and nonprofits. Among her previous positions are auditor for the University of Texas System; senior accountant for a public accounting firm; controller for the

Salvation Army and CFO for the largest mental health provider in Maryland.

Demonstrating not only acumen with numbers, but more importantly, connection with people, Sheryl prioritizes service to others. She is certified as a registered IRS tax professional and partners with colleagues to provide volunteer tax preparation services and financial literacy education. Sheryl developed her community commitment at Howard University, where she earned a Bachelor of Science in International Business with a Minor in Accounting. In addition, she obtained two post-graduate degrees -- a Master of Science in Accounting and a Master of Science in Human Resource Management.

The Brooklyn, New York native has cultural roots that spread to Alabama and Nigeria. She is married and enjoys spending time with three daughters and a precocious canine member of the family, Hershey.

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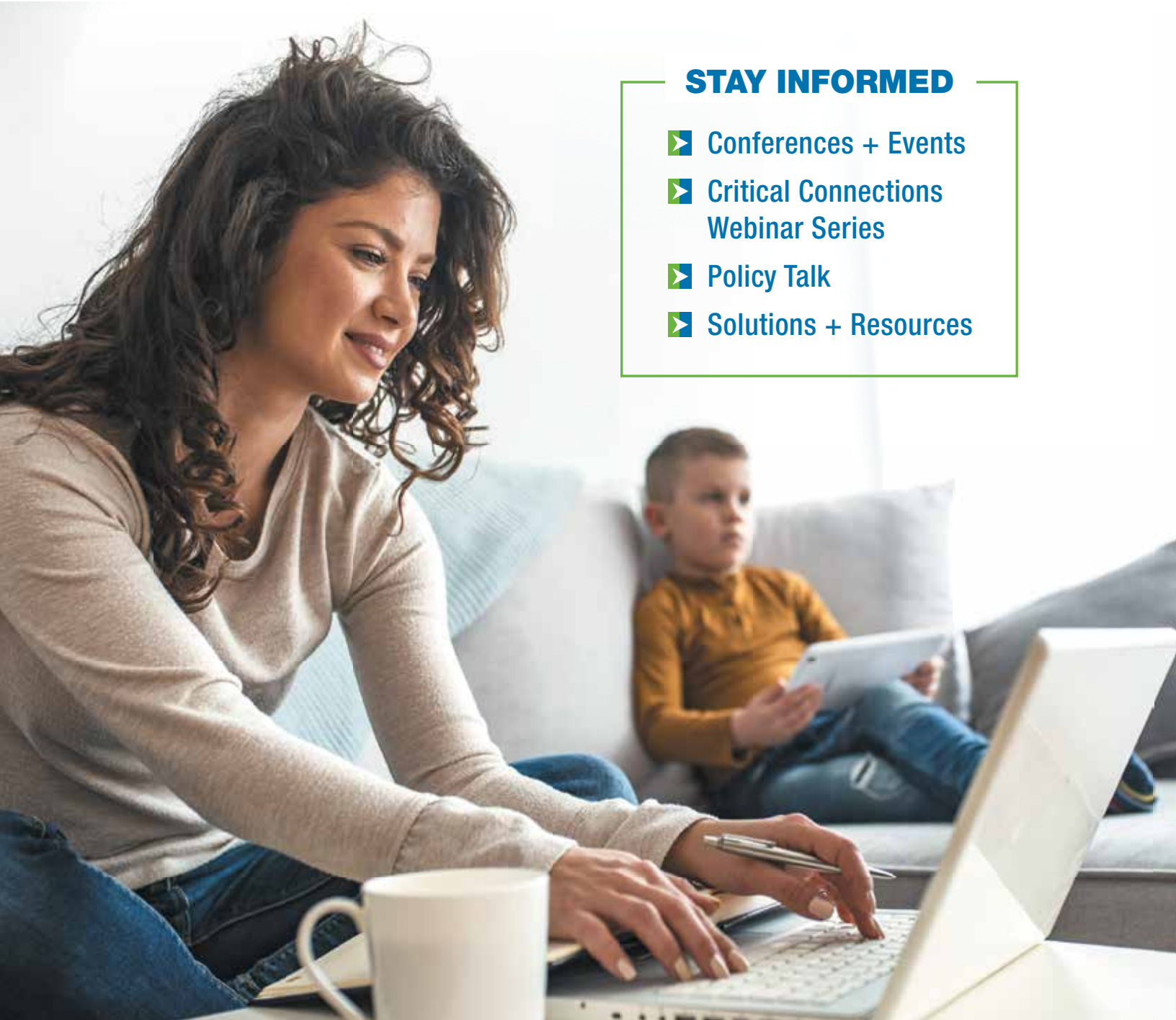
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Reasons Why Wifi 6 Is Essential For Your Subscribers

By Staff Writers
Zyxel Communications

Service providers face an ever-increasing demand for bandwidth as advancements in technology drive the requirements for services to support in-home applications such as online gaming, video streaming, and 8K TV. However, work-from-home initiatives driven by the COVID-19 pandemic have turned homes into centers for business and learning, adding the need to support applications such as high-definition video conferencing and large file transfers with business-class reliability and performance. These applications have created drastic changes in network traffic patterns and exponentially increase the pressure on service providers to deliver the connectivity needed to meet these new subscriber expectations.

While the 11ac standard greatly advanced the capabilities of internet service through the introduction of advanced beamforming and MU-MIMO technologies, 11ac only applies to the 5 GHz band. 11ac Wave 2 technology is unable to meet the needs of service providers who are facing the increasing pressure to deliver faster speeds to support advanced consumer and business applications being used in the home today.

Better Performance Without Widening the Channel
802.11ax (11ax), also known as WiFi 6, delivers faster speeds and greater network capacities enabling service providers to meet their subscribers' ever-increasing requirements for high-performance WiFi. Offering speeds that challenge 10G-class rates, WiFi 6 delivers increases in performance through higher efficiency of spectrum usage without widening the channel or increasing the MIMO number.

Support More Client Devices
WiFi 6 features 1024-QAM which provides high throughput in both 2.4 GHz and 5 GHz bands. In addition, support for MU-MIMO and Orthogonal Frequency Division Multiple Access (OFDMA) improve channel capacity and efficiency which enables a greater number of clients to access the wireless network.

Deliver Faster Speeds to Support Cutting-Edge Applications
11ax features innovative 1024-QAM technology that provides up to a 25% increase in data rate to achieve speeds up to 10 Gbps. Deploying 11ax enables service providers to support 4K/8K video, AR/VR gaming requirements, and enables home and business subscribers to implement the latest cutting-edge, high-bandwidth and low-latency applications.

Increase Capacity in High-Density Environments
OFDMA enables service providers to increase service capacity and provide subscribers with low-latency, high-speed connections. OFDMA creates low-bandwidth channels to support simultaneous connections from parallel clients including the newest Smart Home devices, video and industrial applications

Increase Service Efficiency
WiFi 6 reduces the size of resource units (RU) to support the simultaneous transmission of data to different devices. Using RU scheduling, service providers can rationalize the usage of the transmission channels and allocate and schedule the resource units enabling the transmission channel to be reused and the network can support more simultaneous communications.

5G And Connected Communities

By Prayson Pate
SVP Solutions Marketing and CTO Edge Cloud
ADVA

5G is much more than a new generation of technology for smart phones. It will power a transformation of the access network, including for private wireless networks and fixed wireless access (FWA). The 5G revolution provides both challenges and opportunities for independent and competitive service providers, as well as for enterprises likes utilities and commercial properties. 5G requires new architectures and technologies, and that means a lot of decisions. Let's take a closer look.

5G REVENUE OPPORTUNITIES

First, the good news. 5G will drive revenue for facilities-based operators that provide wholesale services to mobile network operators, as well as retail opportunities. These include:

- **Mobile backhaul:** Mobile operators will need connectivity for new cells – and lots of them. That opens the door for facilities-based operators to drive new revenue on their existing fiber, as well as a business case to pull new fiber where they have right-of-way or other access.
- **Sync as a service:** New radio cells will also need synchronization, and they can't rely on GPS alone. Independent and competitive service providers can offer a resilient timing service to enhance the value of simple connectivity.
- **Edge compute as a service:** 5G is based on architecture that is open and multi-vendor. Software functions will run on "white box" servers, which is similar in concept to existing platform-as-a-service (PaaS) offerings from the cloud operators. The distributed servers could be used for 5G, but that is just a start. IoT, augmented and virtual reality, gaming, and edge cloud are all likely candidates for hosting on distributed compute in the network.
- **5G FWA:** In many suburban and rural communities the density of subscribers will be too low to justify fiber access, and existing copper infrastructure does not provide the needed bandwidth. 5G FWA has the potential to revolutionize access in these markets. It can provide high capacity over short distances, without the need for firing up the trencher. And it opens the door to true broadband access for many underserved markets.
- **Private 5G:** 5G technology can also be deployed in private networks to give users the benefits of high bandwidth and low latency in licensed spectrum, but at a lower cost than subscribed 5G. Think of manufacturing plants, shopping centers and other large buildings. But where's the opportunity for independent and competitive service providers? They can provide design and installation services for these networks, and then provide ongoing connectivity for backhaul.

MORE BANDWIDTH TO MORE LOCATIONS MEANS MORE FIBER

And now for the bad news: Those opportunities require investment.

You know that 5G means more bandwidth. What you may not know is how that is achieved. 5G spectrum and cell sites are shared resources. That means the way to increase bandwidth per user is to decrease the number of users leveraging mid-band and highband spectrum, and we do that by having more and smaller cells, i.e., microcells. In turn, microcells mean more locations, each of which needs more fiber capacity than do 3G or 4G macro towers.

Fortunately, there are options such as passive optical networks that can help increase the available capacity without breaking the bank. And using FWA for the final hop can help to limit how far the fiber is pushed out into the access network.

SYNCHRONIZATION IS ESSENTIAL

It isn't just more fiber that is needed. Synchronization is an essential requirement for 5G and utilities. And because of the threats of spoofing and interference, reliance on GPS is not sufficient.

Any new network buildout should incorporate an advanced synchronization architecture, and be able to deliver assured timing to end nodes. Furthermore, it should be able to combine timing inputs from GPS with network timing to provide the maximum in resilience. Finally, the implementation must be cost effective and meet the latest timing standards.

A DISTRIBUTED AND OPEN ACCESS NETWORK

Finally, the access network must evolve. We need more fiber, and more bandwidth per fiber. And we need advanced monitoring capabilities to accelerate fault isolation and repair, while minimizing truck rolls. Plus distributed and low-cost aggregation to ensure that high-bandwidth services can be commissioned quickly and operated profitably. And it must be in an open and multi-vendor environment to ensure the right features and performance at the best cost. That means utilizing the latest in generic or "white box" switches. The diagram below shows at a high level what this next generation network might look like (see illustration below).
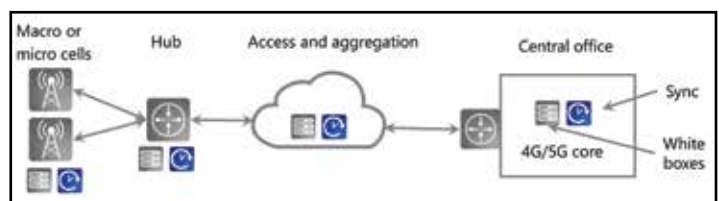
WE ARE HERE TO HELP

New fiber buildouts must be accompanied by next generation optical transport gear along with white box switches and servers, all coordinated by advanced sync and timing services. This might seem complicated. But it's not when you can call on Walker and ADVA to help you design, install, and activate a next-generation access network. You can then support 5G and bring the latest services to your connected communities.

Virginia Walker Recognized by Fiber Broadband Association

By Randy Turner
Director, Marketing Communications
Walker and Associates

Each year at its annual Fiber Connect conference, the Fiber Broadband Association also celebrates the outstanding contributions of individuals in the industry who have advanced the fiber-to-the-home (FTTH) industry. One of the awards, the Chairman's Award, singles out an individual or company that has shown tremendous effort to promote, educate, or accelerate fiber-to-the-home. Virginia Walker was announced the recipient of this prestigious award during Fiber Connect 2020.

The awards committee stated "The Fiber Broadband Association was honored to present this award to Virginia Walker, Former CEO, Walker and Associates. Virginia co-founded Walker and Associates in 1970, and she built the business into a multi-million dollar international technology company at a time when women in telecom were not acknowledged or celebrated. Virginia has paved the way for women in business and technology to succeed, pursue leadership roles, and push gender-based boundaries.

"I was proud to present this year's Chairman's Award during our annual Women in Fiber Luncheon," said Katie Espeseth, Vice President of New Products, EPB and Fiber Broadband Association Board Chair. "Virginia's leadership and determination are an inspiration to all women, and it was my pleasure to honor her at this forum."

The board of Walker and Associates, on behalf of Virginia, expressed its appreciation for the award: "Thank you for honoring Virginia with the FBA Chairman's Award. We appreciate the work of the association to facilitate fiber technology and all the successes the industry is enjoying because of it. Fiber holds within it the incredible power of light and importantly, the incredible power of contained light, as a superhighway for data."

Walker is a women-owned company, co-founded in 1970 by the husband and wife team Chris and Virginia Walker. They launched their family owned business from their kitchen table, while weighing the sacrifices required of them and their four young children. As Chris worked in the field selling, meeting customers, prospecting, marketing and more, Virginia worked as Chris's inside sales staff, bookkeeper, inventory manger, and customer service staff while also managing the home. It was only in 1978 when the company relocated headquarters to NC that additional resources offloaded some of these responsibilities from Virginia.

When Chris passed away in 2000, Virginia maintained her position as CEO, leading the company through the telecom winter of that decade. Her determination, along with that of her children, brought the company through difficult times, renewed in its original commitment to service the industry through integrity and innovation. Virginia retired from her CEO position in 2014, passing the torch to her younger daughter, Chrystie Brown.

Congratulations to Virginia Walker. Her legacy is carried forward by her children and grandchildren who hold active roles in the company.

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ity and accessibility programs, including $3.2 billion for an Emergency Broadband Connectivity Fund and $300 million for broadband rollout.

There remain challenges to ensure that funds awarded via these programs actually result in high-speed Internet for currently unserved areas. UTC's public policy advocacy, collaborating with other trade associations, has stepped up its efforts to ensure that funds are used as intended to provide broadband speeds at prices that people can afford in these unserved areas. UTC also advocates to ensure that publicly funded broadband deployments meet regulatory performance and build-out requirements.

Conclusion: There Is a Solution for Every Problem

Bringing broadband to unserved or underserved homes is one of the most challenging problems to reduce the Digital Divide. Some environments' isolation can discourage traditional ISPs and telecommunications suppliers from making the significant investment necessary to extend their networks to those areas. Thankfully, utilities have already made that investment, they already have delivery infrastructures and skilled workforce in place to serve isolated areas, ready to accept the incremental changes necessary to deliver broadband services to their customers.

Collaboration unlocks creative solutions toward the goal that no one is left unserved. Utilities can collaborate with each other, with ISPs, with telecommunications providers, even with state regulators, to cover that last mile. Trade associations like UTC enable the knowledge and information sharing that generate creative solutions, and that allow utilities just starting out on broadband to benefit from those more experienced.

The will and the means to conquer the Digital Divide are there. Utilities continue to make broadband access a reality and affordable for communities throughout underserved parts of America.

Helping Veterans Leverage Military Skills To Build a Civilian Cybersecurity Career

Case Study
Fortinet
Walker and Associates, Inc.

It should come as no surprise to anyone in the tech sector that skilled cybersecurity professionals are hard to find. Colleges and universities are trying to educate the next generation of IT leaders, but many struggle to balance holistic general education and effectively training students with real-world challenges they will face in a live security operations center (SOC) or production environment. For experienced cybersecurity professionals, the unemployment rate remains 0%, and filling security positions is typically one of the CISO's most difficult tasks.

Within this challenging landscape, cybersecurity vendor Fortinet identified an opportunity many companies overlook when hiring for technology positions: the hundreds of thousands of U.S. military veterans who exit from the armed services every year. "There are strong synergies between what a service member goes through in the military and what a cybersecurity operator does out here in the civilian world," explains Jay Garcia, who served 20 years in the military and is now the Global Veterans Program Manager for Fortinet.

Military veterans are, by nature, problem-solvers who understand the importance of maintaining a strong defense posture and following the chain of command when dealing with an active threat. They are also practiced in understanding the mindset of their enemies. Every branch of the military is becoming increasingly digital and these digital skills translate well to cybersecurity. Discipline, confidence, courage, and adaptability are traits that come naturally to many veterans and are crucial to success in the cybersecurity sector. The fact that a full 13% of Fortinet's U.S. staff are veterans demonstrates the degree of overlap in skill sets between the military and cybersecurity communities.

Fortinet created the Fortinet Veterans Program (FortiVet) when it saw an opportunity to help veterans launch civilian careers that capitalize on their unique capabilities. The program's purpose is to fill the cybersecurity skills gap by creating talent and connecting former military members with appropriate jobs. For up to six months, each FortiVet participant has access to Fortinet resources that can provide the training, mentoring, and networking they need to launch a cybersecurity career.

FORTIVET PROVIDES SUPPORT TO LAUNCH A CYBERSECURITY CAREER

The program is entirely free of charge, for both participants and hiring companies. Any honorably discharged veteran may apply, as well as reservists, National Guard members, and military spouses. Applicants who are accepted into the program specify which area of cybersecurity they would like to pursue. Fortinet then provides support to help them prepare for their desired careers.

"We put military veterans and their spouses on a pathway that aligns to their goals," Garcia says. "For example, if a FortiVet participant wants to pursue a SOC analyst role, we provide career path information to help them become a SOC analyst. We let them know what certifications they need and what experience they should seek. We provide Fortinet resources, as well as outside resources, that they can connect with for additional training and certifications."

The program offers resources in three areas; the first is training. Each FortiVet participant has access to self-paced modules within the Fortinet Network Security Expert (NSE) Training Institute. At the end of the six-month program, participants may have NSE certifications that give them a head start down their career path of choice.

The second prong of the FortiVet program is peer-to-peer, relatable coaching. "We offer participants a one-on-one mentorship experience with another veteran who works for Fortinet," Garcia explains.

"If the FortiVet participant is looking for a technical role, we will connect them with an engineer. If they are looking for a sales role, we will connect them with a mentor in our sales organization." The mentors help participants understand what education and skills their desired career paths require. Mentors also help FortiVet participants polish their resumes, hone their LinkedIn profiles, and prepare for job interviews.

Finally, the program provides unique networking opportunities that help veterans find cybersecurity jobs. When a participant enters the program, Fortinet creates a "battle card," a condensed resume that includes the individual's clearances, commendations, and certifications. The FortiVet team provides battle cards to Fortinet's HR team, which distributes them internally, in case there are appropriate positions available within the company.

The FortiVet program also delivers battle cards to over 300 external organizations. Every three weeks, organizations receive an updated candidate feed customized to their needs.Fortinet makes information about FortiVet jobseekers available on its community forum, as well. Each of these organizations is dedicated to helping defend the United States' critical infrastructure, including managed security service providers (MSSPs), cybersecurity consultants, and systems integrators. Unlike other programs designed to support veterans' transition from the military into a new career, the FortiVet program focuses specifically on helping veterans

"Working with the FortiVet program was one of the best hiring experiences I have had. We have found that military veterans can learn our systems and the nuances of federal government policies and federal acquisition regulations much more easily than non-veterans."

– Jane Brightwell, Vice President of Federal International and RBOC Sales, Walker and Associates, Inc.

establish themselves as cybersecurity professionals.

A FORTIVET SUCCESS STORY
More than 200 military veterans have completed the FortiVet program so far. One Fortinet partner and reseller that has benefited from the FortiVet program is Walker and Associates, Inc., a North Carolina value-added distributor that specializes in the telecommunications and government sectors.

"Within Walker, our goal is to always hire the best person for each role, based on specific criteria," says Jane Brightwell, Vice President of Federal International and RBOC Sales. "Veterans come with excellent qualifications and education, so naturally they are a great fit for many of the roles we have, particularly in our federal program."

A couple of years ago, Walker was having difficulty finding the perfect candidate for a position in the Southeast United States. When Brightwell received information from Fortinet on prospective applicants, she immediately noticed Michael Beckham. He had served for 21 years as a Cryptologic Technician Communications Operator for the U.S. Navy and had recently graduated from the FortiVet program with a Fortinet NSE-3 certification.
"At the time, we were working on starting our security practice, but it was not yet running," Brightwell says. "We could see that Michael was an excellent engineer, and that we should not let him get away. When you find an individual of this qual-

ity, you have to figure out how to make a place for them in the organization. So, I worked with our VP of Operations to find a role for Michael. We brought him on board in an engineering role, with the expectation that he could transfer to the security practice."

Beckham proved an excellent hire. He is now a sales engineer who coordinates activities of Walker's federal account managers, and he has been with the company for more than two years. Brightwell credits the FortiVet program with helping her find him, as well as streamlining the process of vetting him as a candidate.

"I really like how Fortinet has done so much of the background work with applicants," she says. "They have not only trained and certified candidates, but also worked with the candidates on their strengths and weaknesses. I was very confident that Michael could carry our message to customers as a field sales engineer because the FortiVet program recommended him to us."

In addition to the technical skills demonstrated by his certifications, Beckham has proved capable in communications, strategy, and other soft skills. "Michael serves as a thought leader and trusted adviser to our customers," Brightwell says. "We are also able to do a lot more webinars now because of his leadership and presentation skills. He is extremely well-versed in security products, and he is a charismatic speaker. Fortunately for us, the military gave him a lot of experience presenting to senior leadership.

When he speaks, people listen."

From Beckham's perspective, military veterans are a good fit for cybersecurity teams because "in the military, successfully achieving mission goals is paramount." He adds, "Companies can rely on the fact that these men and women will apply themselves to achieve the organization's mission. In the Navy, the core values are honor, courage, and commitment. Each military service has instilled core values into veterans that can help them to become major contributors and make an immediate impact in the corporate world."

The positive experience with Beckham has motivated Walker and Associates to bring additional veterans on board. "Working with the FortiVet program was one of the best hiring experiences I have had," Brightwell says. "We have found that typically military veterans can learn our systems and the nuances of federal government policies and federal acquisition regulations much more easily than nonveterans. In fact, we just hired another veteran last week."

F⊟RTINET. ®

If you're interested in learning more about the Veterans Program, please email: veterans@fortinet.com

Access the complete Case Study file at https://www.fortinet.com/content/dam/fortinet/assets/partners/cs-walker-associates.pdf

Fiber Monitoring: Assuring The Foundation For Broadband Buildouts

By Tom Coburn
Director Solutions Marketing
ADVA

The last year has seen increased demand for bandwidth due to remote education and "working from home" challenges presented by the pandemic. Established service providers such as Tier 2/3 regional service providers, MSOs, mobile operators, and carriers are upgrading and expanding their existing networks. Building out any communications network requires an investment in fiber optic cabling and associated infrastructure to enable new transport and application services.

Streamlining installation tasks such as testing, validation, documentation, and activation reduces the time required to turn up services and provides a faster return on investment in the new fiber assets. Quickly identifying faults shortens downtime, reduces opex, and improves customer satisfaction.

FIBER MONITORING SOLUTIONS
Proactive fiber monitoring provides 24x7 assurance of fiber-based infrastructures using automated OTDR technology to provide network health information. The monitoring can be performed on dark fiber networks as well as active fiber networks. Active network monitoring allows identification of incremental changes to the fiber over time that could result in larger issues in the future, all while the network is active and passing user traffic. With active monitoring there is no need for "maintenance" windows to gain insight into the operation and health of the fiber optic network.

FIBER MONITORING BENEFITS
- Reduces opex and capex while ensuring maximum network availability
- Shortens time to revenue for new services, improves SLA performance and reduces customer churn
- Localizes failures and shortens repair cycles
- Network transport and topology independent monitoring solution can be deployed in any environment
- Fiber degradations and disruptions are identified before services are affected

SIMPLE AND EFFICIENT OPERATION
Enabling link monitoring is simple and involves coupling an optical measurement signal into the fiber. There is no interaction between the measurement signal and the user data as the signal operates at a wavelength outside the traditional C band and L band wavelengths. Fiber monitoring presence and operation is fully transparent to user services and traffic.

OPERATION AND MANAGEMENT
Proactive fiber monitoring is completely agnostic to the transport protocols and speeds that utilize the fiber network, allowing it to deploy in any network type such as a PON- or DWDM-based network. Detailed fiber optic characteristics and faults can be measured up to 80km even with active DWDM traffic present. Specific loss and fault information is provided typically to within a few meters and even centimeters on shorter links. Fiber monitoring solutions using passive demarcation reflectors at the end of the link provide an even higher resolution of link information, further easing troubleshooting tasks and network management. A fiber monitoring solution adds real-time health information to location information, and can instantly notify GIS, NOC management, and trouble ticketing systems via open APIs and similar methods such as email and SNMP.

APPLICATION: PASSIVE OPTICAL NETWORK (PON) MONITORING SOLUTION
Broadband services based on PON networks feature a number of technical challenges for monitoring and troubleshooting. For example, due to additional loss experienced after the splitter, it becomes more difficult to monitor individual customer locations as the signal level drops. An advanced fiber monitoring solution provides end-to-end PON coverage from the feeder fiber links all the way to the end user ONT, improving availability, reducing down time, and reducing opex.

APPLICATION: 5G INTERNET ACCESS
The improved bandwidth support in 5G allows an internet experience that rivals traditional cable-based speeds and easily surpasses older DSL-based services. The rollout of 5G is changing the landscape of network infrastructure rapidly and, like any build-out, relies on fiber optic infrastructure.

The architecture for 5G is a more distributed architecture with more antenna locations and requires a larger number of devices to provide the range and coverage to enable faster access speeds. The additional devices require connections to the fronthaul and backhaul networks directly or indirectly via fiber optics where a fiber monitoring solution helps to ensure network availability and the ability to respond quickly to changes and faults.

APPLICATION: UTILITIES
Utilities have begun participating in the service provider market, moving into dark fiber leasing services and offering wholesale, residential, and business services. Power utilities have long used fiber optic cabling to monitor their existing infrastructure in support of their electrical transmission systems. A fiber cable is included in the optical power ground wire (OPGW) utilized in aerial fiber and provides the data path for managing a utility's electrical assets and infrastructure.

A fiber monitoring system can be used to manage the fiber of the traditional utility operations as well as new service-provider-designed networks, providing a common tool and interface for the network infrastructure and operations staff to improve overall operational efficiency.

ADVA's ALM fiber assurance solution provides 24x7 automated fiber monitoring that can be implemented in any fiber-based infrastructure and ADVA, together with Walker and Associates, can provide a comprehensive monitoring solution across many network types and sizes to provide a high level of availability of fiber assets.

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Corning Optical Communications Joins IEI Band-NC Broadband Initiative To Bridge Digital Divide

By Greg Hedgepeth
Newswire, Press

RALEIGH, NC — The Institute for Emerging Issues (IEI) announces a new investment from Corning Incorporated to extend digital inclusion grants to communities across North Carolina. The $10,000 contribution will support BAND-NC, a grant program designed to increase the number of North Carolinians with internet in their homes, with the goal of making the state "first in digital inclusion."

Building a New Digital Economy in NC (BAND-NC), in partnership with the NC Broadband Infrastructure Office (BIO), has supported 29 $5,000 "rapid response community innovation grants" covering 39 counties since the program's inception, plus a series of workshops led by IEI and BIO to help communities develop digital inclusion plans. Another 30 "implementation" grants of $5,000 each will be awarded in 2021.

"As we move forward through the pandemic, communities are developing creative strategies to get broadband access to those who need it most," said IEI director Leslie Boney. "This funding from Corning will build on that work, helping set the stage for long-term broadband fixes that make education, work and health care from home possible."

"Corning is delighted to support initiatives aimed at closing the Digital Divide, because we believe a broadband connection is as essential as electricity, water and gas," said Michael Bell, senior vice president and general manager of Corning's Optical Communications business. "We're especially proud to join BAND-NC in its work to advance digital inclusion in North Carolina — where Corning's highly skilled workforce manufactures the optical fiber and cable that bring broadband connections to life."

IEI announced BAND-NC at its Emerging Issues Forum, ReCONNECT to Technological Opportunity, in February 2020. The program outlined four challenges communities have in including all families in broadband services:

- **ACCESS**—getting broadband into homes
- **SUBSCRIPTIONS**—helping families afford broadband services. In all, just 59% of North Carolina families subscribe to broadband services
- **DEVICES**—ensuring that children and adults have the equipment they need to take classes, work from home, or access health care
- **TECHNICAL ASSISTANCE**—assisting families in learning how to effectively use high-speed access

BAND-NC asks communities to develop solutions that address each of these issues. Data from the NC Broadband Infrastructure Office shows wide disparities in adoption of broadband services, with both a rural-urban and an income divide. The ultimate goal of the program is to make North Carolina the first state in the nation where every county has a digital inclusion plan in place.

As part of the BAND-NC effort, IEI has already partnered with the North Carolina Broadband Infrastructure Office, the NC Electric Cooperatives, Roanoke Electric Cooperative, the Duke Energy Foundation, John M. Belk Endowment, and ATMC.

To learn more and apply you can visit iei.ncsu.edu/band-nc

"This funding from Corning will build on that work, helping set the stage for long-term broadband fixes that make education, work and health care from home possible."

NC STATE UNIVERSITY
Institute for Emerging Issues

ABOUT INSTITUTE FOR EMERGING ISSUES

The Institute for Emerging Issues (IEI) at North Carolina State University is a nonpartisan public policy organization focused on the state's vibrancy and economic competitiveness. Since 1986, the Emerging Issues Forum has attracted leaders in business, education and public policy to discuss issues with profound implications for North Carolina's future prosperity. For more than three decades, the Forum has helped catalyze the policy reforms, public investments and other proactive responses required to build an enduring capacity for progress in North Carolina.

ABOUT CORNING INCORPORATED

Corning (www.corning.com) is one of the world's leading innovators in materials science, with a 169-year track record of life-changing inventions. Corning applies its unparalleled expertise in glass science, ceramic science, and optical physics along with its deep manufacturing and engineering capabilities to develop category-defining products that transform industries and enhance people's lives. Corning succeeds through sustained investment in RD&E, a unique combination of material and process innovation, and deep, trust-based relationships with customers who are global leaders in their industries. Corning's capabilities are versatile and synergistic, which allows the company to evolve to meet changing market needs, while also helping our customers capture new opportunities in dynamic industries. Today, Corning's markets include optical communications, mobile consumer electronics, display, automotive, and life sciences.

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End-to-End Network Simplicity: The Power of Combining Broadband Access, Connected Home Solutions, and Centralized Management

By Ravi Hichkad
Marketing Manager
ADTRAN

One of the biggest takeaways of the pandemic from a technology standpoint has been a realization of just how critical broadband connectivity is for every community across the nation. Now more than ever, it is incumbent upon service providers to focus on connecting their communities for the long term and structuring their business for cost-effective broadband service delivery. What they cannot afford to do is waste scarce resources on managing network problems and coping with unforeseen subscriber demands.

To more easily manage their evolving network demands, operators would do well to focus on implementing the right broadband access, connected home, and cloud-based management tools. Working in concert, this right mix of solutions can empower service providers with a single platform to deploy and manage their subscribers' Gigabit experience end-to-end.

Why Combo PON for Next-gen Fiber Access?

Amid the surge in residential network traffic over the last year, it became clear that broadband networks must be able to scale effectively in order to meet higher bandwidth demands. For this and other reasons, scalable Gigabit Passive Optical Networking (GPON) technologies, and specifically 10G symmetric (XGS-PON) deployment, have been on the rise. Perhaps the most ideal solution operators have available is Combo PON, through which they can capitalize on next-gen fiber access technology that simultaneously delivers both the value of GPON and the capacity of XGS-PON. Combo PON technology offers the highest density 10G PON solution on the US market, providing operators with an optimal path to build new fiber networks or modernize existing ones to support the communities they serve.

Combo PON simply delivers more—more subscribers, more bandwidth (delivery of gigabit or multigigabit service over the same Optical Distribution Network), more network resilience and XGS-PON migration at any time. The right Combo PON56 solution also simplifies the migration to XGS-PON, with an easy swap of Optical Line Terminal cards, use of the same splitters, the same optical budget, requiring no truck rolls, and involving zero disruption to the customer. Lastly Combo PON offers significantly better return on investment compared to a GPON/XGS-PON coexistence approach, resulting in 50% less capital expense, 75% less space needed and 66% less power required.

Want to Deliver the Ultimate In-home Experience?

Another major consideration around delivering the ideal Gigabit experience centers on leveraging suitable residential gateways. For an optimal subscriber experience, service providers should deploy gateways that serve as fully integrated service delivery platforms, reducing complexity in the home network.

Wi-Fi 6 enabled residential gateways are designed to offer consistent, high-speed performance combined with low latency in congested networks, providing operators an ideal solution for residential service delivery in the communities they serve. High-performance Wi-Fi 6 enabled residential gateways provide multigigabit per second speeds, additional spectrum and reduced latency, and allow service providers to extend Gigabit service and enhanced subscriber solutions and experience throughout the home. Additionally, operators should consider residential solutions that offer self-install capability, which provides greater value and self-service in shipping hardware direct to customers, while also reducing costly truck rolls.

Keys to Simplifying the End-to-End Gigabit Experience

Combo PON

Capitalize on next-gen fiber access technology that delivers both GPON and XGS-PON

Residential Gateways

Leverage Wi-Fi 6-enabled residential gateways to extend Gigabit service in the home

Cloud Management

Manage all devices, operations and subscriber solutions with a powerful cloud-based platform

Want to Simplify Your Network?

Perhaps one of the most important considerations service providers need to keep in mind for their network revolves around centralized management. Network management can be a complex undertaking, but there are tools available to simplify it. Ideally, operators should look to manage all devices, operations and subscriber solutions with a single, powerful, cloud-based network and service optimization platform.

By managing all network operations and subscriber experiences in the same place, operators can not only save time and reduce errors, but one solution will also streamline management for Network Operation Center (NOC) customer support. In addition, using such a platform provides operators more speed and efficiency through automation, giving them bandwidth gains for data analysis, network-implementation decisions, and continuous improvement. Lastly, the right centralized management solution should offer service providers third-party hardware integration capability and technology support, enabling quick installation and integration with their existing network.

ADTRAN's Mosaic One is a powerful, cloud-based solution that enables operators to experience the benefits of end-to-end network management, including improved remote monitoring, greater scale and efficiency, and the ability to deliver exceptional subscriber experience from a single platform. Our solution portfolio includes best of breed solutions for Combo PON and Wi-Fi 6 enabled service delivery gateways which work in concert with Mosaic One to give service providers a single platform to easily manage the complete Gigabit experience. Need a complete and seamless solution for broadband deployment? Better ask ADTRAN.

Ravi Hichkad is ADTRAN's Market Manager for the Americas. He has over 15 years of experience in the information and communications technology sector, primarily focused on public policy in the aerospace and defense industry. Earlier in his career Ravi served as an analyst at the Congressional Research Service and was employed by the governments of Japan and the Republic of Korea. Ravi holds a master's degree in national security studies from Georgetown University and a bachelor's degree in anthropology from the University of North Carolina at Chapel Hill. He can be reached at ravi.hichkad@adtran.com

Sprout Fiber Internet will make gigabit speeds available to more than 12,000 co-op members. So far, 120 miles of the main-line fiber ring have been constructed, completing the first of five steps in the construction process for approximately 2,400 co-op members.

Fiber optic technology is the fastest, most advanced internet technology available, and Cullman Electric Cooperative is the only provider in the region building a state-of-the-art, utility-grade fiber network for its members. Culpepper said the co-op anticipates having approximately 200 subscribers in the Berlin area active by the end of February, with plans to increase the pace of subscriber connections throughout the spring and summer.

Fiber internet improves opportunities in education, health care, economic development, entertainment and much more.

"Sprout is an important project, and all of us on the board are very excited to see it come to fruition," says Robert Tidwell, chairperson for the Cullman Electric board of trustees. "It's amazing to see how much progress has been made since the board approved this project in December 2019. The reality of how big and important this project is starts to sink in now that we've reached the point of having co-op members with Sprout Fiber Internet service in their home."

Sprout Fiber Internet will offer Cullman Electric members upload and down-

> ## "Sprout Fiber Internet will offer Cullman Electric members upload and download speeds starting at 300 Mbps and going as high as a gigabit per second."

load speeds starting at 300 Mbps and going as high as a gigabit per second. Cooperative members are encouraged to take an online speed test at speedtest.net to check their current internet speed and learn how much of a difference Sprout Fiber Internet can make for their home or business.

Cullman Electric Cooperative was founded 85 years ago by local farmers to make sure rural residents had the same opportunities as those living in urban areas. Culpepper said this project is in line with the co-op's mission to power communities and empower members.

Visit cullmanec.com/sprout or call 256-737-3200 for more information.

Expediting Broadband Deployment: Creating Incentives for Investor-Owned Utilities

By: Heather Burnett Gold
CEO
HBG Strategies
Karen Jackson
President
Apogee Strategic Partners, LLC

There is no argument that increased broadband is desperately needed, particularly in rural areas. This need was evident before the onset of the novel Coronavirus but has only become more acute since. So how do we find the best way to get more broadband to those areas that need it most?

First and foremost, there needs to be a national recognition and acceptance that broadband is the essential utility of the 21st century. Like electricity, water and sewage, federal, state and local governments, private investors and communities all have parts to play in ensuring that broadband is deployed throughout the United States. And it is not just the last mile connection to a home that must be undertaken. There needs to be planning for middle-mile expansion -- those critical links between the large internet pipes and the communities themselves. And as discussed below, this critical middle-mile infrastructure is fundamental to decreasing the overall cost of deployment, particularly in those areas captive today to only one or in some cases no middle-mile provider. Federal and state governments must also recognize that more fiber deployment must be in place to ensure ubiquitous deployment of 5G wireless. Without this, we will be simply building further digital divides between urban and rural areas.

Second, to ensure that any investment is both sufficient and sustainable, the minimal speed requirements and long-term viability of any investment in network facilities must be refocused on the long term. For example, any investment in such dismal speeds as 25/3 today locks communities into many additional years of outmoded and insufficient broadband requirements. "Future-proof" needs to become a key mantra for investment, not the current chant of "technology neutrality" and least expensive deployment per capita that only meets some minimal standard. It is not enough to get a community up to speed, we must ensure that they remain able to grow as their demands grow without continuous additional investments required.

Third, we must stop the land grab for broadband funding that dictates that the most organized, well financed and perhaps politically connected communities get the funding first. This creates pockets of broadband islands around a state with those areas with the resources necessary to organize getting their needs met prior to assessing whether they were in fact the most in need. In a fundamental shift of state (and federal) funding evaluations, states must create better assessments that review economic development data, student broadband data and the capacity of an area to support telemedicine. Once this information is known and indexed, areas requiring broadband can be rank ordered and a plan for achieving universal coverage created.

States should prioritize (funding, policy, strategy) the development of an open access, IOU-centric, 5G ready, competitive statewide middle-mile fiber network to:
- Reduce cost of monopoly middle-mile,
- Provide broadband where it is needed most,
- Empower a new generation of "smart" applications (energy, healthcare, autonomous systems, IoT),
- Serve as a platform for private "LTE" networks for utility industry transformation.

We should be encouraging IOUs to build these essential middle mile networks by permitting them the following flexibility:
- Allow additional infrastructure placement in existing easements without the need to obtain rights-of-way owner approval and additional costs
- Require that all infrastructure constructed with state funds be "open access" or at a minimum multi-vendor (5G equipment)
- Allow for recovery of net buildout and operating costs through IOU rate base with corresponding rate changes including spectrum acquisition/rental as recoverable cost
- Incentivize collaboration between IOUs and Telecoms and other last mile providers.

Fourth, communities need to be engaged and supportive in the process of any broadband deployment, even if they do not initially fully recognize the value that such deployment will bring. Financing for such public private partnerships between communities, last mile and middle-mile providers is key and communities need to impact the ultimate build investment parameters. This includes coming to the table with demand aggregation that details the who and what needs of a given area. They should also understand what assets they currently possess to reduce investments costs of both middle and last mile buildout, such as regional fiber networks that can be tapped and then used to "buy down" the cost of a new build out. We also need to recognize the importance of community cost reductions from protecting critical infrastructure such as gas pipelines and the electric grid. These cost reductions need to be factored into state efforts to determine final funding needs and whether it will be achieved through grants/loans or

rate increases.

And it is not just funding for initial deployment that needs to be considered by state and federal sources. It is also the need for expansion capital as communities grow and need more facilities. We do not want to choke off broadband expansion by not properly reserving and encouraging such financing either through public financing or loan guarantees.

In its recent report, the Benton Institute[1] points out that middle-mile services create some of the greatest cost impediments for critical last mile broadband deployment particularly in rural areas with only one provider. In areas where new middle-mile facilities, particularly open access facilities, have become available, costs for transport have declined on the order of 600%. The Pew Charitable Trust[2] concludes that "investment in middle-mile infrastructure facilitates last-mile deployment.

In another example, the Benton reports cites the importance of the middle-mile network MassBroadband 123 in enabling a buildout in a community of only 350 residents. The cost to build last mile fiber to the entire community was budgeted at $1.5M which without MassBroadband

1 https://www.benton.org/publications/middle-mile

2 https://www.pewtrusts.org/-/media/assets/2020/03/broadband_report0320_final.pdf

123 would not have even covered the cost of building fiber to the nearest Internet point of presence.

So how do we create incentives to unlock the value of broadband investment by large investor-owned utilities – the entities with the most extensive reach and assets into rural areas that could be utilized for this critical middle-mile deployment?

While unfortunate, it does appear that the states most likely to be amenable to regulatory and legislative actions to speed broadband deployment are those that already have established state broadband infrastructure in place such as offices, staff, and funding. As discussed above we would recommend focusing on getting those states (and all states) to develop statewide plans that focus on the areas that are most in need rather than the first come, first served basis used today.

Given that, we would recommend that the IOUs continue to focus on states such as Virginia that have broadband staffing and funding infrastructure and have already enacted incentive legislation and then try to influence other states to enact legislation that would further the incentives for middle-mile deployment by IOUS.

This legislation (and the need to get Virginia to move beyond the pilot stage to the permanent stage) should include the following:

1. Elimination of requiring IOUS to return to rights of way owners to request permission to deploy communications facilities in the allocated electric easements. These facilities might need to be expanded to include additional poles (perhaps monopoles) that will accommodate both the fiber and antenna needs of 5G

2. Encouragement of state personnel to prioritize geographic areas where broadband deficiencies are at their worst and assist in funding those areas, including assisting IOUs in finding last mile partners.

3. Loosening of restrictions on municipal owned utilities to expand the potential number of last mile providers.

4. Allowance for cost recovery for these competitive open-access middle-mile buildouts. Allowing IOUs to place net costs for their build outs into their rate base builds upon the recognition that broadband is an essential utility and cost recovery should be borne by all as a public good. It also recognizes the role that the addition of fiber and advanced wireless to the utility's assets play in support of the public policy goal for grid modernization

IOUs bring tremendous critical potential assets to the table needed for middle-mile deployment and federal, state, and local governments should all be encouraging their active participation in participation in meeting our country's needs.

ABOUT THE AUTHORS

Heather Burnett Gold is the CEO of HBG Strategies, a consultancy engaged in broadband education targeted at enabling fiber deployment among underserved communities. A thirty-year plus industry veteran, Gold most recently served as the President/CEO of the Fiber Broadband Association. Prior to that, she was the SVP of External Affairs and Access Management for XO Communications. Gold holds a BA (magna cum laude) and MA degrees in Economics from Tufts University and an MBA in Finance and Marketing from Washington University in St. Louis. Gold also completed the General Management Program of the Harvard Business School. She was honored by the Washington Business Journal as one of its 2010 Women Who Mean Business and was recognized by Fierce Telecom as one of its Women in Wireline for 2013. in Wireline for 2013.

Karen Jackson serves as President of Apogee Strategic Partners, LLC a Virginia firm specializing in the development and implement of technology and innovation strategies in information technology, cyber security, autonomous systems, education, and smart communities. Ms. Jackson formerly served as Virginia's Secretary of Technology from 2014 – 2018 serving as senior innovation and technology advisor to Governor McAuliffe on matters including innovation, data analytics, telecommunications (broadband), cybersecurity, unmanned systems (autonomy) and smart communities. She also oversaw the Commonwealth's IT infrastructure.

Ms. Jackson also serves as the Interim Executive Director of the New College Institute (NCI). In this capacity she serves as NCI's senior executive and is responsible for positioning NCI as a premier rural innovation and training center in Southern Virginia. She is also charged with building industry and academic partnerships to enhance the quality of life and employment in cutting edge industries in Southern Virginia.
During her tenure as interim director, she has been recognized for positioning NCI as a premier training site for cutting edge industries such as on/offshore wind and cloud computing and for securing more than $1.5m in external funding for NCI programs.

Maximizing Your Fiber Network ROI

By Kara Mullaley
Community Broadband Market Development Manager
Corning Optical Communications

The questions about the critical nature and essential need for broadband everywhere have been answered. The COVID-19 pandemic has helped unify the call for universal broadband to ensure that no child, frontline worker, small business, or community is ever left behind without connectivity again. The question going forward for communications service providers (CSPs) and communities is which long-term broadband network strategy ensures ubiquitous high-speed broadband is available to everyone.

Fiber broadband networks provide the best answer. An underlying fiber broadband network empowers CSPs and communities to meet the challenge of bringing ultra-broadband capability for both fixed and mobile networks. Significant investment is required to achieve this goal. With proper planning, CSPs and communities can maximize the return on this investment, giving their customers and constituents the broadband network that best prepares them for whatever the future may hold.

BUILD IT ONCE

As CSPs and communities plot their technology future for the next 50 years or more, a lot can be learned from the previous 50 years. A key lesson learned is to take the build-it-once approach. The last thing any CSP wants to do is make an investment in an underlying communications network, only to find out 3, 5, or 20 years later that a significant network investment is required to keep pace with innovation and customer demand.

Considering the total cost of a build is heavily influenced by installation labor, building a network that requires little to no new outside plant construction after initial build to expand or upgrade will minimize the total cost of ownership. To realize a better ROI, implementing a strategy to build one underlying fiber broadband network enabling various applications is prudent. As fiber technologies advance throughout, think XGS-PON or NG-PON2, the fiber infrastructure they ride on largely remains unchanged. Building an all-fiber network gives CSPs the ability to converge customer demands – residential, small- to medium-size businesses (SMBs), enterprise/wholesale, and mobile – on a single unified network. Revenue models multiply as a result, delivering an enhanced ROI.

The build-it-once approach also extends to mobile demand and smart cities. If communities want to ensure they participate in a 5G future, an underlying fiber-rich network is required. Fiber-fed small cells will power both 5G and Wi-Fi, making a wireless ultra-broadband experience possible. Tangentially, the thousands, or even millions, of sensors needed to deliver on the promise of the smart city will need fiber connectivity to function properly.

Build it once and leverage it several times over. Whether it's utilizing wave-division multiplexing (WDM) on an optical transport network (OTN) segment for 5G transport or employing NG-PON2 to meet increasing residential, SMB, or enterprise demands, CSPs can truly maximize their revenue opportunity from a foundational fiber-based network.

KEY ROI FACTORS

There are several factors that can improve ROI. Among all key strategies, noteworthy options include leveraging existing network assets and considering all network design options. If minimizing CapEx is a primary concern, considering "lean fiber" architectures may also be an option to explore.

LEVERAGING EXISTING NETWORK ASSETS

All CSPs share a common characteristic – existing network assets that can be leveraged for fiber network builds. Traditional TELCOs and cable companies have network assets that they've learned

> *"The last thing any CSP wants to do is make an investment in an underlying communications network, only to find out 3, 5, or 20 years later that a significant network investment is required to keep pace with innovation and customer demand."*

to leverage for decades allowing these CSPs to bring fiber deeper into their networks. Newer CSP entrants, such as electric cooperatives and municipalities, are fortunate to have similar network assets that traditionally were used for delivering electricity that can be easily repurposed for a fiber network. Technology enhancements that shrink fiber terminals and drops may allow existing handholes or pedestals to be leveraged, reducing upfront costs even further.

FIBER NETWORK DESIGN STRATEGIES

Important decisions and upfront planning made during the design phase have lasting implications for fiber network ROI. Funding programs target specific unserved and underserved territories, and through proper design and planning, CSPs can build networks that are conducive to future expansion into neighbor-

ing markets, creating additional revenue opportunities and contributing to a better ROI.

Additionally, if smart city or 5G-capable future is a part of the vision, network designs should consider higher fiber counts than what current conditions may indicate. More fiber capacity from the beginning creates potential for dark fiber leasing and other wholesale opportunities, as well as for taking advantage of unforeseen future demand to generate additional revenue opportunities. Designing a network with these factors in mind is critical for maximizing fiber broadband ROI.

LEAN FIBER ARCHITECTURE

For certain CSPs serving remote and very rural territories, turning to a lean fiber architecture strategy can positively impact a fiber network ROI by lowering upfront CapEx and splice labor during construction. A lean fiber strategy relies on distributed split architectures, also referred to as distributed split or optical tap. Adopting these architectures lessens feeder and distribution fiber cable requirements, thus lowering fiber management material and fiber splicing construction costs. This can improve the ROI calculations for less dense markets.

The lean fiber approach can make sense in certain applications. Some of the downside risk can be mitigated by using a higher-capacity main distribution fiber cable that serves as surplus dark fiber. This approach takes advantage of the lower-cost lean architecture strategy, while including additional capacity in the network for future growth.

THE BEST ROI PATH

Any good broadband business strategy should aim to utilize an underlying technology that can best enable any and all applications. With proper planning and a build-it-once vision, CSPs are not only positioning their companies and the communities they serve for the next 50 years, they are also maximizing their ROI opportunity. This is where fiber broadband excels. No other technology can more easily handle the bandwidth and latency requirements of not only today's applications, but tomorrow's as well.

Kara Mullaley is the community broadband market development manager for Corning Optical Communications. Connect with her on Twitter @KaraMullaley or on LinkedIn at www.linkedin.com/in/kara-mullaley.

2021: What's Next for O Wireless Networks?

By Michael Wolfe
VP, Wireless Network Engineering
CommScope

As an eventful 2020 draws to a close, the telecommunications industry is looking forward to building a future in which connectivity is truly ubiquitous and accessible for all. To help achieve this goal, operators will continue to accelerate their rollouts of 5G networks across the globe in 2021, while governments clear additional spectrum to accommodate more users and data. Concurrently, disaggregation of the RAN will continue as Open RAN deployments gain serious traction and usher in a new generation of products and innovative technology.

Let's take a closer look at these three trends.

5G & Massive MIMO

Although the COVID-19 pandemic and resulting shutdowns have noticeably impacted the global deployment of 5G networks in certain countries and regions, rollouts will continue apace in 2021 as 5G smartphones like Samsung's Galaxy S20 and Apple's iPhone 12 hit the market. To support these new devices, we expect operators to focus on pragmatic implementations of 5G networks by assessing which deployments can benefit from active massive MIMO (multiple input/ multiple output) deployments.

Massive MIMO substantially increases spectral efficiency to deliver more network capacity and wider coverage. However, operators will have to determine if the extra costs and real-world power requirements associated with active MIMO deployments are justified, or if a passive antenna configuration will suffice. Indeed, initial higher-end massive MIMO deployments in certain geographic locations have reportedly struggled to keep up with power demands and are routinely shut down for hours at a time to conserve energy.

From our perspective, massive MIMO deployments are optimally suited for dense urban deployments, while suburban deployments can benefit from passive antenna solutions. However, massive MIMO deployments face challenges even in urban environments, where upper floors of tall buildings may not be adequately covered if the most appropriate solution isn't selected.

Choosing the optimal antenna technology for each deployment will therefore be a priority for MNOs in 2021. For high data traffic, operators will look toward 64T64R for dense urban high-rises, 32T32R for urban low-rise structures, 32T32R or 16T16R for suburban locations, and 32T32R (FWA) for rural areas. For sites with moderate traffic requirements, MNOs will deploy 8T8R solutions to adequately cover urban low-rise buildings, as well as suburban and rural areas.

Clearing the Spectrum

Clearing the spectrum to accommodate more users and data is essential to building a future in which connectivity is truly ubiquitous and accessible for all. However, most of the low and mid-band spectrum across the globe has historically been used by the military, commercial satellite operators, wireless internet service providers (WISPs), and utilities. Efforts to repurpose or share these bands for next-generation services typically require the active involvement of incumbent users and government regulators, as well as extensive discussions about mitigating the impact to existing services.

Despite the above-mentioned challenges, we expect governments in 2021 to continue taking the initiative to clear the spectrum for 5G and beyond. In the United States, for example, the Federal Communications Commission (FCC) recently finished auctioning Priority Access Licenses (PAL) in the 3.5 GHz band and is poised to begin the auction of 280 MHz of mid-band (C-band) spectrum for flexible use (including 5G) within the 3.7–3.98 GHz portion of the band. With regards to the latter, operators will continue scoping out sites during 2021, with the first use of C-band slated to begin in late 2021 or early 2022 in urban areas. For many suburban locales, C-band won't be accessible to MNOs and their subscribers until June 2023. In addition to CBRS and C-band, 100 MHz of contiguous mid-band spectrum in the 3.45-3.55 GHz band is planned to be made available for 5G over the next 18 months.

In CALA, Colombia and Puerto Rico recently completed a number of spectrum auctions. In 2021 and beyond, Colombia will be rolling out a low-band LTE network to serve rural areas, while the CBRS auction in Puerto Rico will enable MNOs and WISPs to deploy additional LTE networks. As well, Chile recently announced the start of a new 5G spectrum auction—with a total of 1800 MHz distributed across four bands: 700 MHz, AWS, 3.5 GHz, and millimeter-wave (in 26 GHz).

utdoor

Additional auctions across CALA may kick off faster than initially anticipated in 2021. This is because spectrum auctions are a lucrative source of revenue for governments struggling with the economic fallout of COVID-19. However, there are also countries that have postponed planned auctions, such as Brazil, which is eyeing a May or June 2021 end date for an auction that includes 5G spectrum in four different bands: 700 MHz, 2.3 GHz, 3.5 GHz and 26 GHz. 3.5 GHz is also gaining interest with various CALA MNOs, while the 600 MHz band has already been announced by Mexico and Uruguay. In terms of the former, Mexico is slated to auction this band, bundled with 3.5 GHz in the second half of 2021 (both for 5G), with other countries likely to follow.

In Europe, the European Union (EU) is working to open new bands and bandwidths for 5G across all EU countries. These include the following bands: 700 MHz–30 MHz, 3.5 GHz–400 MHz and 26 GHz ~3 GHz. As well, a number of European operators are already leveraging 1800 MHz or 2100 MHz for 5G in Dynamic Spectrum Sharing mode. In the Middle East and Africa, multiple operators have been allocated spectrum within the C-band, including in the UAE, Saudi Arabia, Qatar, Oman, and South Africa.
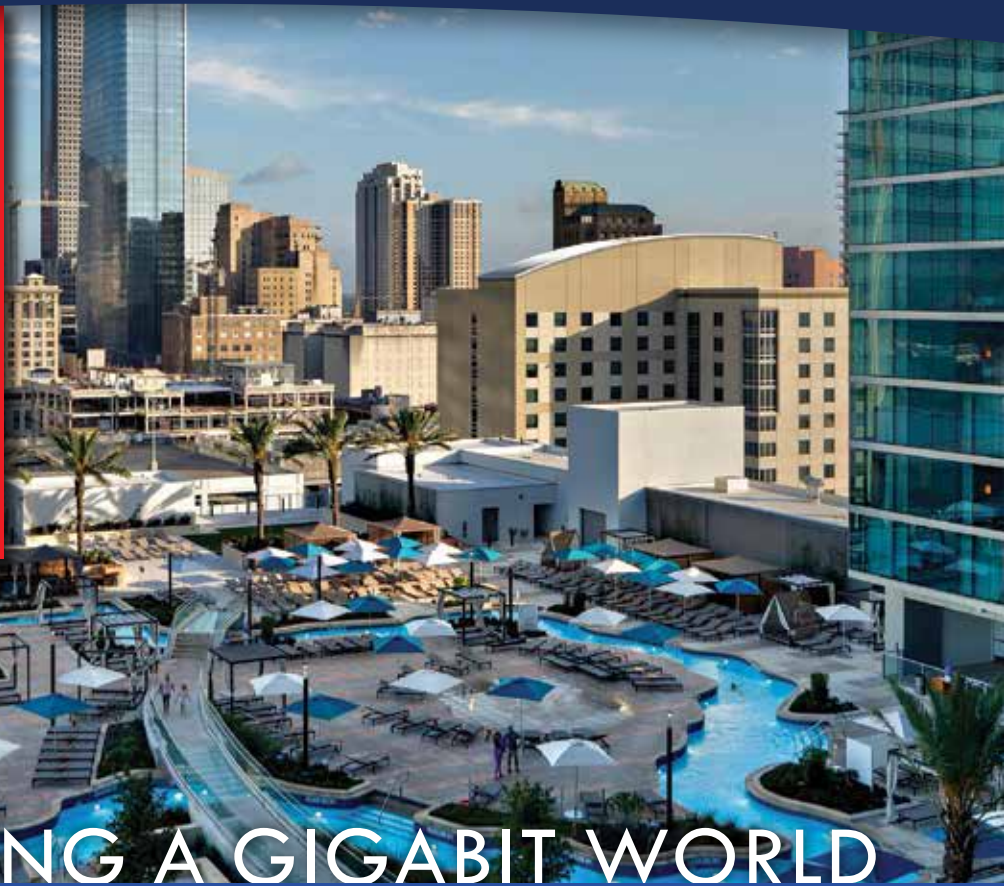
The ongoing clearing of the spectrum for

5G and beyond is a global trend that we expect to accelerate in 2021.

Open RAN
In 2021, Open RAN deployments will gain serious traction and usher in a new generation of products and innovative technology. This is because Open RAN supports truly open and interoperable interfaces within and between the various subcomponents of the RAN: the radio, hardware, or baseband unit and software. This paradigm drives innovation by encouraging the growth of an expanded supply ecosystem—while reducing capital costs and single vendor "lock-in" through open interfaces and commodity hardware platforms.

According to Mobile Experts chief analyst Joe Madden, almost every company in the Radio Access market is "looking into" Open RAN, which he expects will be the "choice solution" for coverage issues. As Madden notes, Open RAN hardware and software can be cheaper while still achieving coverage similar to traditional architectures.

Open RAN offers several advantages for mobile operators. Firstly, Open RAN helps lower costs with commercial off-the-shelf (COTS) processing equipment for the baseband unit (BBU) and commoditization of the RU hardware. In addition, Open RAN supports the disaggregation of software from proprietary hardware, thereby facilitating the creation and rapid deployment of new services and operational solutions. As we note above, Open RAN supports a more robust supply chain ecosystem as new vendors enter the market. We therefore see disaggregation of the RAN continuing in 2021 as Open RAN deployments gain significant traction and usher in a new generation of products and innovation such as the tighter integration of radios and antennas.
Moreover, Open RAN will continue to

play a significant role in accelerating the rollout of 5G infrastructure by enabling equipment interoperability. Indeed, DISH has selected Open RAN technology for its 5G rollout across the United States—and has committed to covering 70 percent of the population by June 2023 with its 5G network. In Japan, Rakuten's 5G network is based on Open RAN architecture, which allows for mixing and matching of the most appropriate technology for subscribers. Meanwhile, Vodafone has confirmed plans to start Open RAN trials in Europe and Africa, with initial trials expected to focus on mobile calls and data services across 2G, 3G and 4G. Additional Vodafone Open RAN trials involving 5G are expected in the future. It should be noted that Vodafone recently became the first mobile operator to activate a live Open RAN 4G site in the U.K.

Conclusion
As the final weeks of an eventful 2020 draw to a close, the telecommunications industry is looking forward to 2021 and building a better future in which connectivity is truly ubiquitous and accessible for all. Although the COVID-19 pandemic has impacted the global deployment of 5G networks, rollouts will continue apace in 2021 as 5G smartphones like Apple's iPhone 12 hit the market. To support these new devices, MNOs will focus on pragmatic implementations of 5G networks by assessing which deployments can benefit from active massive MIMO deployments. Governments across the globe will also continue to clear additional spectrum to accommodate more users and data, while Open RAN deployments will gain serious traction—ushering in a new generation of products and accelerating 5G rollouts.

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Clarity in the Midst of Organizational Chaos

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Have you ever felt overwhelmed - wrestling hundreds of issues, managing difficult people, feeling out of control? You are not alone. All business leaders find themselves in the fog of organizational chaos. The good news is that you can find clarity.

The solution to organizational chaos is all about where you focus your attention. Truth be told - those hundreds of issues are mere symptoms of root causes. Clarity comes when you can identify and focus on the roots. Healthy roots produce healthy fruit.

Ready for some root work? The way out of the fog begins when you work to strengthen The Six Key Components™ of your business:

The Vision Component™
Great organizations are crystal clear when it comes to vision. They are on the same page with where they are going AND how they are going to get there. Many companies claim a clear vision. They may even have it printed on their office walls. While we need to celebrate this, the "AND" emphasis is essential because strength in the vision component means that the entire organization not only knows the destination, but also the plan that is in place to enable them to arrive.

The People Component™
If your business employs people then you need to be strong in this component. Great organizations are made of great people. Jim Collins, in his book Good to Great, says that all great organizations have the "Right People" in the "Right Seats." Simply put, you need people who fit your core values (right people) and who are excellent at their jobs (in the right seat). You gotta have both! Don't settle. Great people are essential to be able to execute your vision.

The Data Component™
Strength in the data component means running your business on objective facts and figures. Weakness in this area is evident when decisions are made with subjective emotions, egos, and feelings. The truth is that not just any ole' data will do. Accurate AND relevant data is a must to run a great organization! Clarity creates impact.

The Issues Component™
Good news: you are not alone! Everyone has issues! Whether you call them "problems" or "opportunities," you have them and you need to solve them. Great companies recognize the issues facing them, identify the root cause(s), and know how to solve them once and for all!

Strengthening the Issues Component by learning to identify, prioritize, and solve each issue is a critical part of lifting the fog of organizational chaos.

The Process Component™
Although this component is the least exciting, process matters. Great companies have identified the core processes of their business - the most important stuff that must get done to be successful. Strength in this component will ensure that these things are done the right way, and the best way, every time. Once identified, these processes need to be documented and followed by everyone involved. This will help your business become more consistent - allowing you to scale and grow your business exponentially.

The Traction Component™
Traction is all about discipline and accountability. The visions of many great leaders have died due to weakness in this area. Gino Wickman, author of Traction, said it best, "Vision without traction is hallucination." All great organizations need to live in the real world by developing and nurturing a culture of discipline and accountability - executing really well - seeing the vision happen day in and day out.

Clarity in the midst of organizational chaos is possible. There is hope. Set your sights on strengthening each of these six components of your business and those hundreds of issues will fall into place.

1 The Six Key Components™ are part of the Entrepreneurial Operating System®
(www.eosworldwide.com)

Josh is Co-Founder of All Forward Group and is passionate about helping businesses move forward by teaching, facilitating, and implementing the Entrepreneurial Operating System® (EOS).

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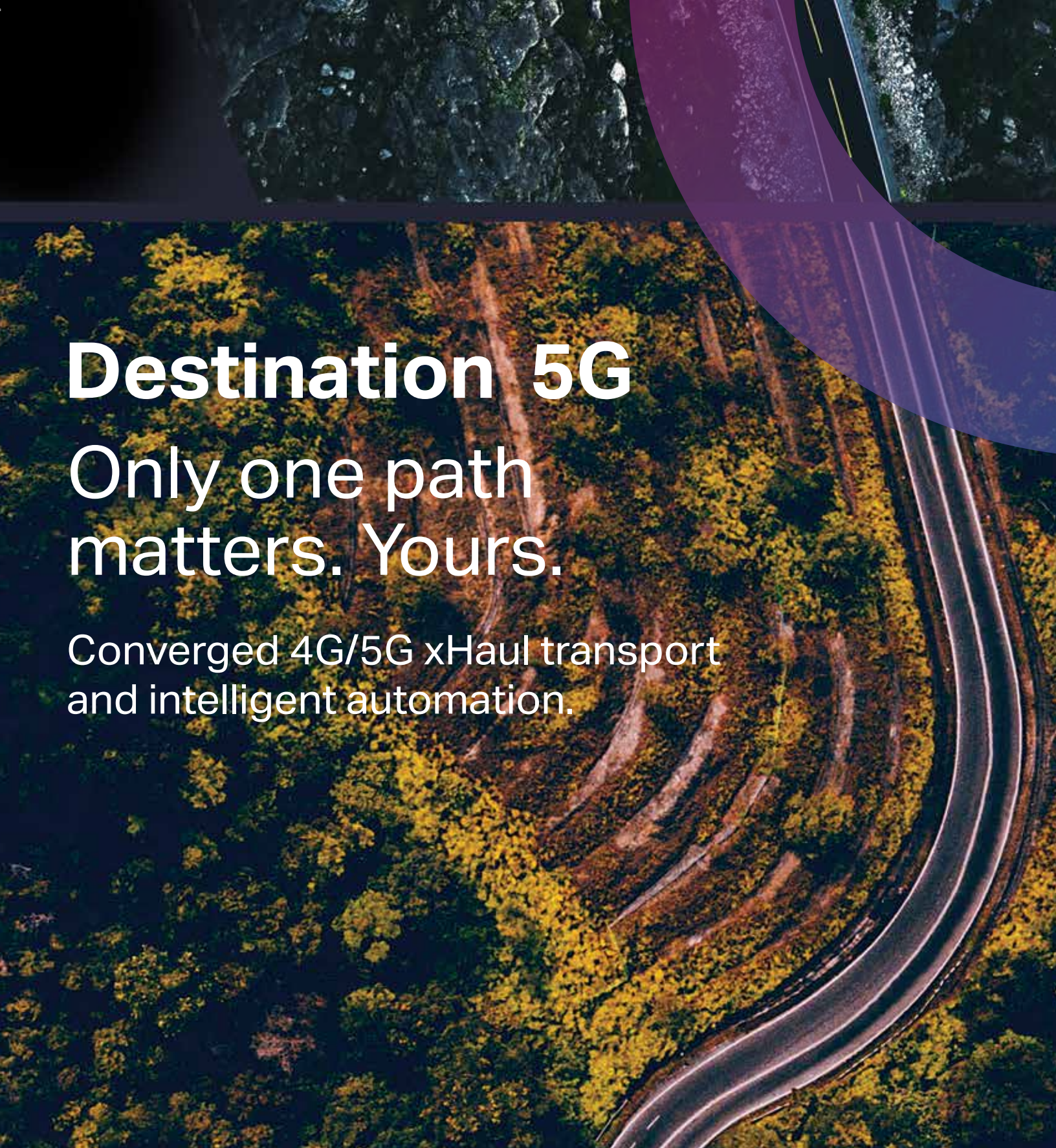NRECA
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