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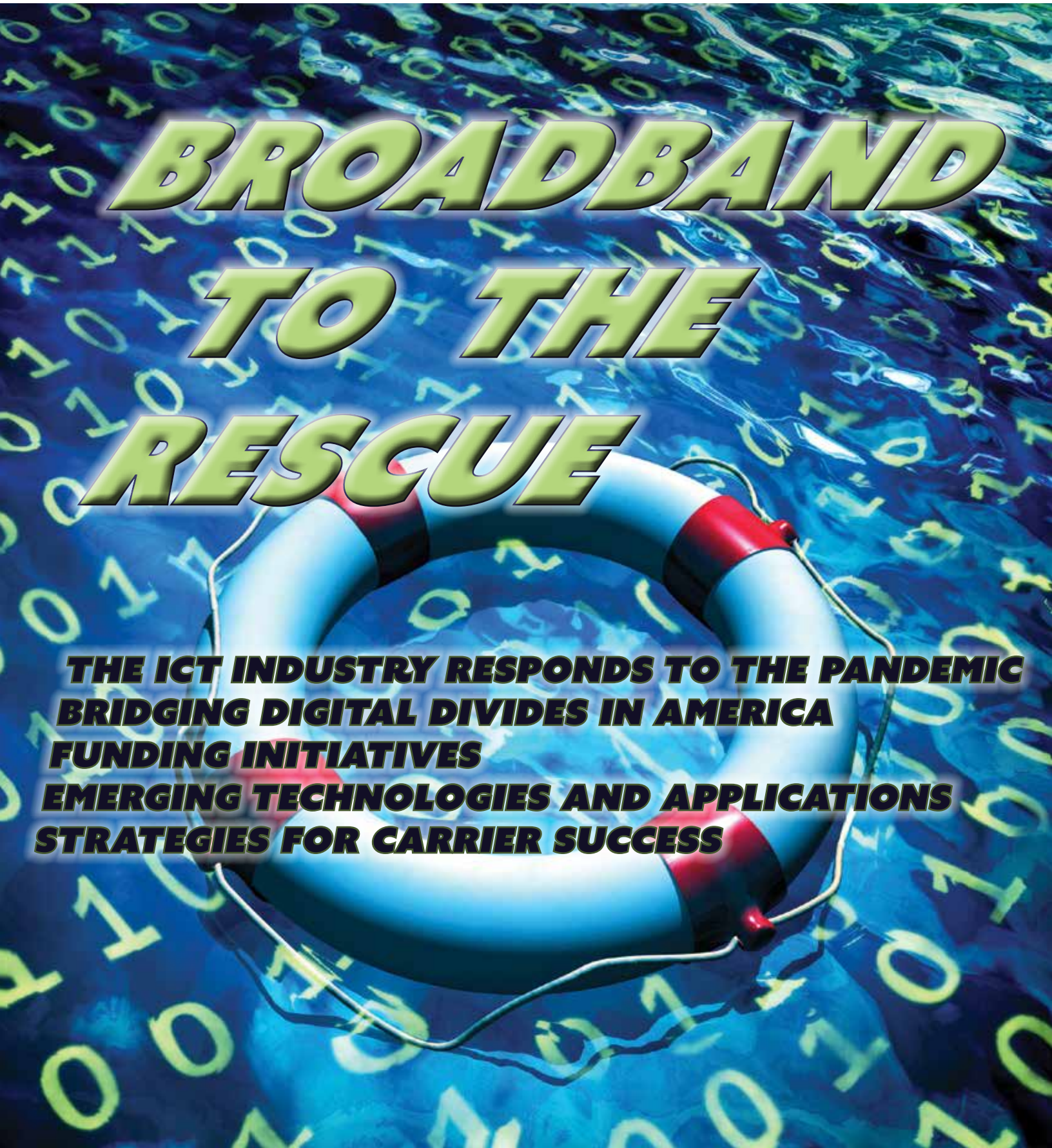
Insights for ICT Professionals



BROADBAND TO THE RESCUE

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Editor's Letter

It is interesting to consider that interruption actually presents value. Research on the human brain indicates we can become distracted by the power of human memory. Normalcy, routine, patterns can work to our advantage, but they also carry the risk of creating comfort zones that serve as barriers to innovation. It is safe to say that our industry is asking new questions, pursuing new business models, investing in research in new ways, tapping into new insights and addressing old problems with new vision precisely because of this current state of interruption.

It's been a year no one could have anticipated. Normalcy at this point seems a distant memory, and planning ahead seems nearly futile. Still, we know that this is temporary and setting our sights on a future filled with even more technological advances is the right thing to do. It is, after all, what the ICT industry does.

This issue highlights not even a tip of the proverbial iceberg in telling the story of how broadband, these networks of fiber, copper, coax and wireless technologies, came together when we needed them most. We also explore challenges yet ahead of us regarding defining, funding, accessing, and delivering broadband across rural America. These are stories still being uncovered, still being written, still without an ending, still in a state of interruption.

Our industry has risen to the occasion on every front. We are enabling medical diagnosis and treatment, minimizing supply chain interruptions, maintaining the education process for teachers and students, connecting a new work-from-home workforce, creating opportunities for entrepreneurs forced to recreate their business models, and providing congregations of faith ways to stay connected during required social distancing. Smart grids remain strong, communities are connected, municipalities still function, information flow continues and innovation abounds. As difficult as the year has been, I am unable to wrap my mind around a world when a pandemic exists in absence of the technology broadband delivers. Yes, it is indeed broadband to the rescue!

In the spirit of "figuring it out" we hope this issue of Skinny Wire challenges with new ideas, new applications of technologies, new conversations, new beginnings, new interruptions.

Randy Turner

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A Broadband Case Study: Heartland Rural Electric Membership Cooperative

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

COOPERATIVE PROFILE

Heartland REMC started as three distribution cooperatives in 1936: Huntington County REMC, Wabash County REMC, and Wells County REMC. In 1964, Huntington County REMC consolidated with Wells County REMC and rebranded as United REMC. In 2014, United REMC and Wabash County REMC consolidated to form Heartland REMC.

Heartland REMC serves approximately 17,600 meters across parts of nine north-central Indiana counties. Its service territory encompasses 2,292 square miles of distribution lines. The area is rural in character with 7.65 meters per mile of distribution line. Sixty percent of co-op revenues are composed of commercial customers.

BUSINESS DRIVER OF BROADBAND INVESTMENT

Pursuit of a broadband project was driven by members' interest in faster and more available broadband. The co-op was already providing fixed wireless internet service to some members, but not all. Additionally, the available speeds of the current fixed wireless deployment were not adequate to meet the demand for large-bandwidth applications.

Heartland REMC approached current broadband partner TWN Communications to explore the feasibility of a network to serve all members with speeds of at least 25 Mbps.

The resulting project is a fiber optic and enhanced fixed wireless hybrid designed to ensure that all members desiring a broadband connection can receive it. Rob Pearson, CEO of Heartland REMC, stated, "Co-op members today need broadband much like members in the 1930s needed power. If electric cooperatives do not step in to bridge the divide, who will?"

PROJECT OVERVIEW

The goal was to serve members with broadband access speeds of at least 25 Mbps or more for a 30-year time horizon. This meant understanding the co-op's operating territory in terms of its projected population growth, its proximity to nearby metropolitan areas and the potential of Heartland REMC to serve out-of-territory nearby communities of interest, should those communities wish to participate.

BROADBAND BUSINESS CASE AND STRUCTURE

The business case was grounded in a granular assessment of the service area to determine what areas are served, underserved, and unserved. Data was entered into proprietary TWN automated design tools to create individual bill-of-materials costing for each area. A business plan was developed, integrating aspects of design, construction, certification, and operations.

The business plan was subjected to "stress tests," including potentially lower or higher take rates, changes in cost assumptions, etc. The result was two scenarios: one with the cooperative having all risks of funding the project, and with operations being the responsibility of the co-op. The second model, which was ultimately chosen, presented the idea of shared capital costs between the co-op and TWN with all operating costs being solely the responsibility of TWN Communications.

Structuring the project in a five-year contractual partnership with TWN reduced risk to the REMC and ensured future flexibility. It is expected that all project costs will be recouped within 17 years of the completion of the project. All operating costs are the responsibility of TWN as are all costs associated with installations, inventory, and rolling stock.

Relationships with equipment vendors can make all the difference to the bottom line of a project of this magnitude. Heartland REMC and TWN work closely with Walker and Associates, a national distributor of network products for broadband providers. "When a co-op is dealing with equipment that is this complex and expensive, it's imperative to have trusted vendors that will provide pricing and service metrics to keep things going on time and on budget," says Colin Wood, CEO of TWN Communications.

NETWORK ARCHITECTURE

The network architecture of the Heartland REMC project used high-performance equipment and operational frameworks. The access network provides members with symmetrical services at speeds up to 10Gb/s. The network supports commercial subscribers at speeds up to 100Gb/s. The core network provides redundancy with 5-nines (99.999%) availability, through its ring and sub-ring topology. A software-defined networking framework ensures that network operations are seamless and fault isolation processes are optimized for expedient resolution. The network architecture also accommodates Network Functions Virtualization, allowing the deployment of new applications and services without disruption of the network.

CHALLENGES AND SURPRISES

- Be prepared for red tape; state grant process can be unfair and time-consuming.
- National broadband maps are very unreliable and inconsistent. The only way to get accurate market data is to perform a granular-level

market assessment
- Permitting is more difficult, costly, and time consuming than expected. Working with government entities can take an inordinate amount of time.

WHY IS THIS CASE STUDY IMPORTANT?
Many rural customers will simply not be served by incumbent providers. Cooperatives have an opportunity to provide these services leveraging advantages such as existing rights-of-way and knowledge of member demand points.

This case is unique in the approach the co-op took for this project. Rather than deciding on a blanket deployment of fiber to all areas, the co-op decided to be strategic, and financially responsible, by investigating a hybrid fiber-wireless approach. This project is also important because Heartland REMC chose to partner with a solutions provider that will carry some of the financial risk and all the operational risk for the project.

A primary reason Heartland REMC engaged this project is that the co-op will own the infrastructure. The network will provide internet access to members and will also enhance the members' remote access to co-op devices and provide communication to downline devices. The co-op can assign a large portion of the capital to co-op plant without eroding their equity ratio.

Heartland REMC decided to move forward with this project well ahead of the COVID-19 crisis this past spring, but in hindsight, are happy they did. Co-op CEO Rob Pearson says, "The coronavirus crisis made it clear, almost overnight, how crucial reliable broadband is for our members. I heard stories every day about children in our community who were unable to complete their online classes because their internet connection was so slow. For that reason, we decided to accelerate our five-year project to be completed ASAP. If another crisis hits, we want to be ready."

Learn more about electric cooperative solutions at communication.walkerfirst.com/remagazine0820

"Co-op members today need broadband much like members in the 1930s needed power. If electric cooperatives do not step in to bridge the divide, who will?"
- Rob Pearson, CEO of Heartland REMC

Defining Broadband – The Debate Continues

By Doug Dawson
President
CCG Consulting

During the current pandemic, it has become obvious that millions of homes around the country have inadequate broadband that is unable to support students attending classes from home and employees working from home. Many families who thought they had good broadband found their connection was not great when multiple family members tried to connect to school and work servers at the same time.

This raises the question of how to define "good" broadband? This is fairly easy to define at the household level – good broadband provides enough bandwidth for a family to easily do everything they want to do online.

There is another way that we also must look at broadband because the federal government officially defines broadband – and that definition impacts communities that have poor broadband. The Federal Communications Commission (FCC) has maintained an official definition of broadband for many years. In 2015 the FCC established the current definition of broadband, which is a connection at 25 Mbps download and 3 Mbps upload. To the FCC, any Internet connection that meets or exceeds both of those speeds is considered to be broadband.

The official definition of broadband matters because federal and state broadband grants often rely on this definition of broadband when defining the areas that are eligible for grants. The definition of broadband speeds also matters in grants because speeds define the allowable technologies that will be funded by a grant. Due to the obvious broadband problems uncovered during the pandemic, state and federal policymakers are talking about making more grant money available to improve broadband in the country. One of the first steps in establishing a new grant is to determine the definition of broadband to be used for the grant. Most federal grants still default to the FCC's definition of broadband.

" . . . the FCC is awarding grants this year for over $16 billion, and the networks won't have to be fully completed until 2026. . . . networks should not be built to meet today's definition of broadband but should meet the expected broadband needs for 2026."

We now know that the FCC's definition of broadband is obsolete. A household with a 25/3 Mbps connection is struggling during the pandemic when multiple people try to work simultaneously from a home broadband connection. The biggest problem uncovered by the pandemic is the small upload speed allowance provided with most bandwidth products. Any time a connection is made to a school or work server, a slice of upload broadband is carved out and dedicated to that work session using a technology called VPN (virtual private network). Households are also using upload connections a lot more when people use video conference platforms like Zoom. It's become clear to many homes that the tiny upload allowance on their broadband connection is inadequate to support them during the pandemic.

There is much more evidence that the FCC definition of broadband is obsolete. Perhaps the best proof is that almost 60% of all broadband customers in the country now use broadband purchased from cable companies. The vast majority of homes served by cable companies now have broadband speeds somewhere between 100 - 200 Mbps download and 10 – 20 Mbps upload. I live in Asheville, North Carolina and a few years ago, Charter unilaterally upgraded my broadband speeds from 60/5 Mbps to 135/15 Mbps. Similar upgrades were made all across the country. Another 22% of national broadband customers are now served with fiber.

With millions of customers being upgraded to faster broadband, the average broadband speeds nationwide have become significantly faster in the past few years. We have numerical evidence of the speed increases from Cisco, which published a report earlier this year, the Cisco Annual Internet Report (2018 – 2023). That report looks back a few years and then forecasts broadband usage around the world through 2023. In that report, Cisco shows the following aver-

Cisco Annual Internet Report (2018 – 2023)

	2018	2019	2020	2021	2022	2023
Speed (Mbps)	56.6	70.1	92.7	106.8	126.0	141.8

age download broadband speeds for North America (that's the U.S. and Canada combined).

The table above shows that Cisco expects the average download speed this year in North America to be around 93 Mbps. That's almost four times faster than the FCC's definition of broadband at 25 Mbps. That number is easy to believe when accounting for the high percentage of households served by cable companies and fiber. The FCC's definition of broadband at 25/3 Mbps is irrelevant for the huge number of homes served by cable companies or fiber. Those homes have broadband speeds that are far in excess of the FCC's definition of broadband.

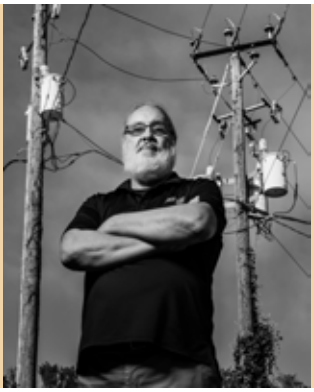
If the FCC sticks to the existing definition of broadband at 25/3 Mbps, the agency is only using the definition for homes not served by fiber or cable companies. That means homes served by DSL, by fixed wireless, by satellite broadband, or that use cellular broadband as a home Internet connection.

It seems unfair to set the official definition of broadband at a speed that is slower than what is available to the 80% of households that enjoy faster broadband. If you factor out the homes with slow connections from the Cisco numbers, the average speed in 2020 will be faster than 100 Mbps download.

To make things even more complicated, many grants give allowance for multiple years to build the network funded by the grant. For example, the FCC is awarding grants this year for over $16 billion, and the networks won't have to be fully completed until 2026. Those networks should not be built to meet today's definition of broadband but should meet the expected broadband needs for 2026. This begs the question, why are we funding tomorrow's solutions based on yesterday's technology.

The FCC already made the mistake in the past of funding obsolete technology. In 2015 the agency awarded over $9 billion to the big telephone companies to upgrade rural DSL to speeds of at least 10/1 Mbps. The construction from those grants is just being completed this year, and it's clear that 10/1 Mbps is far too slow today to be considered as adequate broadband in 2020. If you trend out the Cisco chart above, the expected broadband speeds by 2026 will be over 200 Mbps. A good argument can be made that grants awarded this year should not support any technology that is not capable of at least 200 Mbps broadband.

Unfortunately, the FCC is unlikely to be proactive in setting a new definition of broadband that ensures grants are only used to build future-proofed broadband. There is another regulatory use of the definition of broadband that comes into play. The FCC is required to annually report the number of homes that have broadband to Congress. Since 2015 the FCC has been reporting the number of homes that have less than 25/3 Mbps as not having adequate broadband. If the definition of broadband is increased to something reasonable, say 100/20 Mbps, then millions of homes would suddenly be classified as not having broadband. It's a shame that politics comes into play for something as mundane as defining good broadband. But no FCC or administration wants to be blamed for increasing the official count of homes without good broadband – even if such counts are true.



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.

" . . . why are we funding tomorrow's solutions based on yesterday's technology?"

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It's All About the Upload: COVID-19 and Consumer Broadband Demands

By Lisa R. Youngers
President and CEO
Fiber Broadband Association

Can you imagine having spent the past several months under a stay at home order without broadband? COVID-19 has shined a big spotlight on the fact that broadband access has never been more important for consumers. Overnight our paradigm shifted. Suddenly everyone was trying to work and study from their homes or remotely while attempting to maintain a semblance of normal life. For some, broadband is a literal lifeline, connecting patients to health professionals via telemedicine. And for most, it allows us to stay connected to loved ones, keep up with work or school and be entertained by everything from Zoom happy hours to the latest on Netflix or Hulu. These number of broadband uses we all have grown so dependent on during the pandemic have placed increased demand on our networks, but particularly on upload. The upload speeds that fiber can best deliver are making high-quality fiber broadband networks crucial.

Asymmetrical, one-way applications previously dominated all of our experiences with at-home bandwidth. This was the norm. This downstream activity included everything from streaming Spotify and Netflix to scrolling Facebook or downloading a Word document for work from an email. But in a massive and immediate shift of how we conduct our daily lives, and specifically with our recently increased reliance on two-way communications like video streaming, our need for symmetrical uploads and downloads has rapidly come into full view.

A recent study from the Fiber Broadband Association and RVA, LLC shows that the pandemic has dramatically increased use of advanced applications that require both strong upload and download capacity. They found that 46% of respondents used video conferencing for staying in touch with family, 24% for business, and 16% for educational purposes. Among those working remotely, 68% are using video conferencing. Additionally, video use for telemedicine is up 500% from last year, with 12% of respondents have used video conferencing for healthcare.

Video conferencing and other two-directional technologies require strong upload capabilities. Virginia-based fiber broadband provider LUMOS Networks, for instance, reports a 47% increase in upload traffic. And upload is where we have seen some older networks struggle. Last-mile networks still have a lot of asymmetric technologies and it is the upstream that gives out first. Wireless and satellite cannot keep up and some cable networks can only manage one or two megabits of upstream.

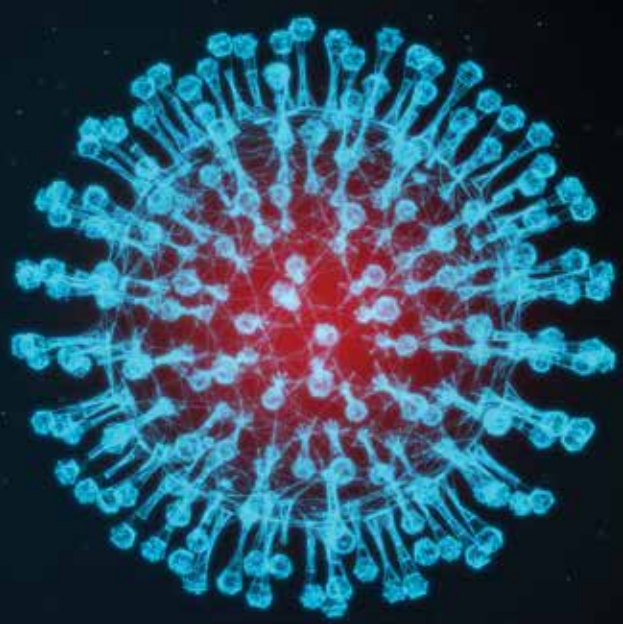
For those with low-quality broadband, this can mean video conferencing troubles and lag times for uploading to the cloud, resulting in lowered productivity. In the same recent study from the Fiber Broadband Association, researchers found that people with lower-performing broadband connections are rationing Internet use inside the home. Among users with the slowest bandwidth and highest latency, 49% reported doing things like asking family members to curtail Internet use during work video conference calls. They also reported lost time waiting for applications to load, both upstream and downstream.

The Internet did not "break" because of the pandemic, but it has shown us some weaknesses in our networks. Our new connectivity demands are not going to change, even as the pandemic transforms and stay at home orders are lifted. This is our new reality: consumers demanding the ability to keep working, learning and conducting social interactions from home. What these new usage demands have taught us during the COVID-19 emergency is it's all about the upload. We need upload speeds that are reliable and allow consumers at home to continue to work, go to school and conduct other necessary transactions including seeing family and friends. Health care workers relying on telemedicine applications more than ever before report: it's fiber networks that enable them to do their job and reliably see patients without bringing them into the office unnecessarily and avoid potential exposure to things like COVID. This all means the widespread and on-going deployment of fiber networks. That very investment in sustainable networks means investment in fiber broadband.

About the Author

Lisa R. Youngers currently leads the Fiber Broadband Association as its President & CEO — the largest trade association in the Americas dedicated to all-fiber-optic broadband. Youngers brings two decades of communications experience to the Association ranging from wireline/wireless telecommunications, satellite and broadcast to state infrastructure. Most recently, Youngers was CEO of Nextlink Wireless, where she drove all operational, technical and financial aspects of the business as well as M&A activity. Prior to leading Nextlink, Youngers was Vice President and Assistant General Counsel of Federal Advocacy and Strategy at XO Communications where she led the company's initiatives involving federal policy, operations and technology. Before that, she served as Federal Regulatory Counsel for General Communication, Inc. and MCI advocating on competition issues. Youngers also served as Assistant Attorney General for the state of Minnesota as counsel to the Public Utilities Commission and the Rail/Trucking Safety Board. Youngers is a member of the Minnesota and District of Columbia Bars. She earned her bachelor's degree from the University of Wisconsin-Madison and a JD from the Mitchell Hamline School of Law.

COVID-19: Broadband Response and Recovery



By Chip Pickering
CEO
INCOMPAS

Through distress, uncertainty and change, America's broadband networks have kept us connected during COVID-19. Uniting the nation to health, work and education resources, while giving our small businesses the ability to find new, creative ways to adapt and survive.

Rising to the challenge the entire INCOMPAS family of small, competitive local broadband and communications service providers stepped up to meet the moment and help their customers during the COVID-19 crisis.

Their response has been incredible. In a short time, we've seen our members building new telehealth virus screening apps, creating new work-at and learn-from home solutions, investing in medical research technology, expanding bandwidth and helping turn school buses into WiFi hotspots to make sure millions of students stay connected.

Americans need faster speeds, greater capacity and affordable broadband options now more than ever. That is why the competitive broadband and communications industry is proving once again that it's the leader in delivering next-generation services that connect communities.

Broadband has proven once again to be a critical, lifesaving service. Our local and regional providers serve schools, hospitals, health clinics, small businesses and families that depend on fast, reliable internet access and communications services. Our networks also boost other, larger ISPs' service and help ensure redundancy in case of emergency.

Our fiber builders – like FirstLight, C Spire, Sonic and dozens more in the heartland – are working around the clock to ensure America's internet infrastructure is fully operating and that their employees and customers stay healthy and safe. Dozens of our members signed the FCC's "Keep Americans Connected" Pledge to help ensure residential and small business customers don't get cut off or charged late fees due to circumstances arising from coronavirus and related economic disruption. Our members with WiFi hot spots are also committed to making them open and available for public use.

INCOMPAS also represents streamers like Netflix and Amazon, internet companies like Facebook, Google, Microsoft and Twitter, and competitive national providers like Dish and Granite. To help address the coronavirus crisis, these members are innovating and extending care to health workers, content creators and journalists reporting from the front lines.

NETWORK PERFORMANCE

During COVID-19, our member companies are seeing higher network demands as schools and businesses shift to educating and working remotely. But the crisis is impacting different networks in different ways.

In the first months of the crisis, our ISPs saw a 25% increase in residential use, where new gigabit speed fiber networks have helped families working and schooling from home. The key point: Fiber is not only faster, it's stronger.

However, we also saw a 35% to 40% decline in network usage that serves small and medium-sized business, hospitals, cell towers and government agencies, which is consistent with more employees working from home and children distance learning. Voice service also dropped between 10% and 25%, illustrating the important reliance on voice networks at work and the shifting of voice to mobile use at home.

Our streaming and internet edge service providers have seen large increases in demand. And good news to report here, because our internet companies were well prepared and have been engineered to handle increased network demands.

But it's important to note that no network is an island. Competitive networks play a critical role in the internet ecosystem. They are interconnected to other networks to provide seamless communications. Fiber networks are working well to serve the needs of their customers, including homes and hospitals. As are regional fiber networks that connect cell towers, boost other ISPs' services with connectivity, and enable faster streaming and cloud content have plenty of capacity.

THE BROADBAND RECOVERY

As the economy struggles, loss of revenue for providers could upset the balance, and harm network connectivity and deployment goals at the worst possible time. That is why Congress and policy makers at the federal and state level must take action to protect our networks, families, and small businesses.

Now is the time we should be investing in broadband networks and 5G infrastructure. Simply put, broadband provides more bang for the buck. Building new networks puts people to work in every local community. And the networks provide greater capacity and faster speeds at lower price points for consumers and small businesses that really need the help.

Congress should start by make broadband deployment central to any recovery

or stimulus effort. Also, it should enact the Critical Connectivity Fund and expand it to address the needs of residential customers and small businesses that cannot pay their communications service providers. Doing so will ensure that every customer stays connected to his or her provider and will help speed the recovery as businesses begin to open.

It's unclear how long COVID-19 disruptions and social distancing will last. But we do know that millions of restaurants and small shops on Main Street are depending on broadband, phone and other connectivity for delivery, curbside pick up and advanced reservations.

We also support additional efforts to assist low-income consumers and boost the connectivity for school children in need – 21% of teens don't have access to reliable broadband.

There is some positive action. Sen. Roger Wicker (R-MS) and Rep. Greg Walden (R-OR) introduced a framework for broadband legislation aimed at expanding access and digital opportunity to help close the digital divide and address COVID-19 issues. Their approach has been endorsed by FCC Chairman Pai as a means to address the nation's communications needs.

The principles for their "broadband connectivity and digital access framework" include key features such as funding to fix broken broadband maps, streamline and remove barriers for wired and wireless deployment, and provide support for broadband builders who saw significant economic harm by COVID-19 but remained committed to keeping their customers connected, even if they could not pay for services.

COVID-19 recovery will be a long road. But shoring up our communications networks, investing in broadband infrastructure, and ensuring competition keeps prices low is the best way to help our friends, neighbors and small businesses recover.

By taking action now, Congress has the ability to maintain connectivity for those struggling to pay their bills, and build a better foundation to a faster internet future.

About the Author
Chip Pickering is the CEO of INCOMPAS, the internet and competitive networks association. He is a former Member of Congress from Mississippi. INCOMPAS is the leading trade group advocating for competition policy across all networks. 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 2020 INCOMPAS Show, taking place September 14-16 at The Cosmopolitan in Las Vegas.

Accelerating Broadband Delivery

Todd Lattanzi
Director, Strategic Accounts
Siklu

In today's new normal with more people working from home than ever before, the ability to turn up subscribers quickly with highly reliable, cost-effective service has never been more critical. Without a doubt, fiber is the gold standard. But, does fiber always meet the business case or time-to-market requirements? Many operators approach the new normal with a hybrid architecture by combining fiber with Siklu's fiber-reliable fixed wireless millimeter wave (mmWave) solutions. Millimeter wave offers multi-gigabit capacity, lower latency and reliability equal to fiber. And it's quick to deploy. In a nutshell, you won't believe it's not fiber.

Since Siklu's inception in 2008, we have led the worldwide mmWave market with innovative solutions. Hundreds of thousands of radios deployed across the world in every imaginable climate - one reason why operators look to Siklu's carrier-grade mmWave for next generation wireless. In contrast, operators using legacy wireless technologies, like 5 GHz, know the limitations – it's slow, interference prone, challenging to deploy and often results in an inconsistent service experience for subscribers. Legacy wireless is the DSL of the wireless world. On the other hand, using Siklu's license-exempt 60 GHz mmWave MultiHaul radios enables you to mirror your fiber service – it's gigabit speed, interference-free, aesthetically pleasing and secure. Plan for gigabit and deliver. mmWave is wireless fiber.

Looking for ways to attract subscribers from competitors? Overbuild your competitor's footprint with mmWave. Some operators even employ a strategy of rapidly deploying mmWave in neighborhoods or to businesses in advance of a fiber build to start their flow of cash and prove the business case. In fact, even if your fiber is not nearby, you can backhaul the gigabit wireless access network with Siklu's full duplex 10 Gbps point-to-point EtherHaul radios to the nearest fiber PoP. Generate new revenue with mmWave.

Millimeter wave offers other advantages as well. A pay-as-you-grow deployment allows you to build out the network where you have demand instead of the entire network up front. As demand grows, continue building into the neighborhood. Because mmWave deploys quickly, you can build new hub sites within a couple of hours. mmWave conserves your capital.

Finally, looking forward, new opportunities for hybrid deployments and Siklu's mmWave innovation continue. With the approval to bid mmWave networks at the same tier as fiber for RDOF funding, the FCC opened new opportunities for operators to deploy gigabit capable wireless networks. A hybrid architecture provides a financial advantage versus a bidding competitor's all fiber design. On the technology front, Siklu's advances continue with the introduction of the most advanced Terragraph-based mmWave radio – our 5th generation 60 GHz product – providing self-organizing and self-healing capabilities built around an industry standard.

Why not take advantage of a hybrid mmWave wireless fiber architecture in your network? Beat the competition and speed the time to revenue while providing an ultra-reliable service that mirrors that of your fiber subscribers. Give us your neighborhood or main street business district and Siklu will give you a design.

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Capitalize on Edge and Telco Cloud Opportunities

Juniper Networks Collaborates in New IBM Edge Ecosystem & IBM Telco Network Cloud Ecosystem

By Jim Benson
Product Marketing Director
Juniper Networks

Today, in order to help make the promise of the edge a reality, IBM launched its edge computing offerings in the 5G era to help both service providers and businesses. Juniper is excited to be one of the initial collaborators in these vibrant edge and telco cloud ecosystems and will contribute its expertise, innovation and industry-leading offerings in software-defined networking (SDN) and next generation virtual security. These capabilities augment IBM Cloud platforms including IBM Edge Application Manager and Red Hat OpenShift and Red Hat OpenStack Platform by enabling the deployment of applications across multiple clouds, extending it to the edge.

The edge internet economy is forecasted to be worth over $4.1 trillion by 2030 and edge computing is the next frontier of digital transformation that will deliver real-time insights for businesses. The proliferation of big data coming from nearly everything, including sensors, devices, cameras and telemetry, enables a paradigm shift in business applications. These applications will use artificial intelligence (AI) and machine learning (ML) to derive real-time insights directly from data. Such applications will process an insurmountable amount of data that needs to be translated into insights in real time to provide business value. To optimize for low latency and available bandwidth, processing is moving closer to and on to the edge.

This paradigm shift in the 5G era is driving new business and use cases, including Industry 4.0 applications, connected cars and smart cities. Edge devices drive demand for complete solutions that deliver intelligent responses to data. Juniper's SDN offering (Contrail Solutions) and containerized virtual security offering (cSRX) are software-based solutions that are integrated and certified as part of the stack to bring higher degrees of automation, scalability and security-rich operations for our joint service provider and enterprise customers.

"The convergence of 5G and edge computing will spark a new level of innovation," says Evaristus Mainsah, general manager, IBM Cloud Pak Ecosystem, "This in turn will enable and fuel a broad ecosystem of providers to co-create for a growing set of edge opportunities. We are excited about the value that our collaboration with Juniper can bring to our joint clients needing software defined networking to support their Edge analytics and applications."

Regardless of the path taken, every service provider will need an edge and telco cloud and also support a seamless evolution from their existing operational model to one that embraces an NFV- and SDN-based infrastructure, which can be built with flexibility to support a variety of services with a much lower cost of delivery. 5G is the inflection point that will drive the investments required to fuel this transformation. Edge and telco clouds are about cloud principles applied to the telco network and its operation. With the variety of new services enabled by 5G in the coming years, service providers are in a prime position to seize new revenue by embracing the edge which is finally ready to deliver on years of promise.

Implementing edge and telco clouds that will power service provider transformation is complex. Many service providers realize that satisfying these requirements and delivering on the bigger promise of service provider transformation requires new expertise and tools.

Juniper is Uniquely Positioned to Accelerate Edge Transformation

To help simplify and accelerate service provider transformation to support a distributed telco cloud architecture, Juniper provides three offerings:

- Integrated Solution Offering – Juniper communicates a blueprint, with tested and documented reference architectures for common use cases.
- Fully-packaged Stack Offering – Customer purchases and deploys pre-packaged product and software.
- Telco Cloud Platform-as-a-Service Offering – Customer consumes the fully-packaged stack-as-a-service.

Juniper provides a complete solution built upon our Platform, Edge Services and Contrail Networking Portfolio in combination with solutions from our collaborators like IBM and Red Hat and is uniquely positioned to help service providers transform by:

- Offering a fully-packaged, tested and documented cloud stack, built upon best-of-breed components in order to accelerate time to market by reducing validation and integration.
- Being a "VNF neutral" vendor and offering a VNF inclusive horizontal cloud supporting a variety of use cases and deployment models while still optimized for VNFs.
- Leveraging open source to unlock the telco cloud stack and benefit from a dynamic ecosystem.
- Offering a pre-integrated edge platform that combines dynamic orchestration, automation, and scalable connectivity into a shrink-wrapped solution which allows service providers to deploy a stable, pre-tested telco cloud solution quickly and efficiently.
- Providing a security expertise that most of our edge and telco cloud competitors do not have. Security is embedded in the Juniper software stack.

With the promise of extremely high bandwidth and ultra-low latency capabilities, 5G and edge computing will enable many new and exciting revenue-generating applications. The good news for service providers is that they are in an excellent position to host these services by modernizing their highly-distributed infrastructures. Juniper and its best-in-breed partners are here to help support this network transformation.

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Network Funding in the COVID-19 Age

By Steven S. Ross
Editor-at-Large
Broadband Communities

Bandwidth use is up as jobs, education and health care enable at-home sheltering. And it's likely to stay high: Even if science conquers COVID-19 quickly, Homeland Security planners are nervous about the new potential for bioterrorism. How can network operators finance expansion to meet these new needs?

The money is there. The federal government alone has put more than $3 trillion in new cash into circulation as of late May. That's on top of about $22 trillion already in circulation or on demand deposit in March. But many investors are fleeing to cash or U.S. treasury bonds, and those fleeing to cash are usually loath to spend it on anything else. You'll need talking points to pry cash out of the hands of those who have it.

Misinformation among investors about technologies like 5G doesn't help. No, it does not spread COVID-19 and is unlikely to cause cancer. No, the spectrum-impervious nature of modern construction is a minor technical issue, not a game-stopper. No, 5G does not replace fiber; 5G requires fiber and improves its business case.

PUBLIC FUNDING

Public money is flowing, almost all toward regional and local carriers and new entrants who wish to build robust networks. The U.S. Department of Agriculture Rural Utilities Service (RUS) ReConnect Loan and Grant Program has handed out $700 million this year – mostly from $2.35 billion appropriated in 2018, but with an extra $100 million tucked into the COVID-inspired CARES Act.

A new round of $550 million is underway. ReConnect is restricted to areas where there is little service now. Almost all RUS funds have gone to small carriers (private companies, co-ops, and municipal systems) building new, fiber-rich networks.

The FCC vastly improved its rules for handing out Universal Service Fund receipts – a total of slightly more than $20 billion for the Rural Digital Opportunity Fund (RDOF). The money will be awarded to winners of reverse auctions – the lowest per-premises bid for 10-year operating subsidies wins.

Previous winners have been mainly major carriers and satellite providers. Now, the FCC is steering satellite and white space technologies only toward the most remote premises, and smaller wireline operators are in many ways better positioned financially and technically.

The big decision point for grant and loan applicants is that they can receive only FCC or USDA funding under current laws. They cannot get both. But more federal money may be coming. The House has passed a $3 trillion COVID-19 spending bill, HEROES, that includes $2 billion in direct $50 monthly subsidies to broadband customers (major carriers like it), and about $1.5 billion for deployers (smaller carriers like it). It is unclear what might survive a Senate vote.

Funding by states is evolving. In January, most states had announced plans – ranging from a modest few million dollars up to $200 million or more (Texas, in theory, can put $700 million on the table) to promote deployments in poor neighborhoods and rural districts, and for commercial or industrial development.

State spending on unemployment benefits, testing and other COVID-19 responses, along with huge shortfalls in state and local tax collection, have reduced state ability to fund even modest plans out of operating budgets. But many states want economic stimulus and see historically low interest rates, along with the historic expansion in the money supply, as a once-in-a-generation opportunity to fund infrastructure enhancement – including broadband – from their capital budgets.

PRIVATE FUNDS

Don't look for much from Wall Street. Regional banks have always been more flexible. They want to avoid stranding mortgaged assets, and they have cash. Federal Reserve Bank "overnight" deposits in regional banks – just one measure – rose from about $12 billion every three weeks last summer, to $30 billion by the start of 2020, and are now well over $100 billion.

Joint regional deployment ventures look promising. When spectrum owners can combine all usable bands into shared 5G microcells, deployment cost drops 20 percent or more. When multiple operators jointly operate a regional network, cash needs drop, technical and management risks decline, and aligning fiber trunk becomes easier. RDOF bidders have a special extra motivation. There's an anti-collusion rule to keep bidders honest. But the FCC allows joint bidding! Service providers will have to declare their partners early, however. The deadline for that is tentatively July 15, when bidders have to declare intention to participate.

Partners may be incumbent or competitive phone or cable carriers, public operators, co-ops, real estate developers, broadband-consuming businesses, health care providers and academic institutions. New entities without established credit will probably need letters of credit; local lenders can issue them.

Local deployers may want to try attracting major carriers to participate in their projects. These carriers have already borrowed to improve networks and to buy entertainment companies, 5G spectrum and their own stock. They may find new cash harder to get. If they lease fiber from local deployers, they would not have to put up much (if any) capital to build new facilities.

It is not that simple, of course. Long-term fiber leases are usually treated as capital expenses. Wireless cooperation, which expands available spectrum by reusing it from microcell to microcell, helps consumers (more spectrum, fewer annoying cell sites). But we need legal and accounting carve-outs for this circumstance. Spectrum bids come with FCC requirements for use, and the rules never envisioned sharing this way. Congress should allow the FCC to modify the rules, with oversight for consumer protection.

Government deployment loans usually demand mortgage lien priority. So when a deployer still paying public loans wants to raise more money or share operations, that priority can get in the way. CoBank and a few other specialized lenders can deal with this. Others will need to learn.

Steve Ross can be reached at steve@bbcmag.com.

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Optimizing Mobile Transport Networks for 5G

By Ulrich Kohn
Director Solutions Marketing
ADVA

MOBILE COMMUNICATION FOR PEOPLE AND THINGS

With 5G, mobile network operators will be able to address a wide range of new, highly attractive applications. The use of broad E-band spectrum significantly increases service capacity, and low-power radio technologies make 5G a perfect solution for the growing IoT and its billions of connected devices. In the industrial IoT space, networked sensors and industrial automation are becoming the main focus of service innovation.

As well as requiring innovate mobile access technologies, these new services will have a major impact on the underlying mobile transport network. It must become faster, more secure and able to provide higher availability. What's more, despite needing to be more agile, mobile networks must also become easier to operate.

So what are the best strategies for seamless mobile transport network evolution?

MEETING THE BANDWIDTH DEMAND IN 5G

The share of microwave-connected cell sites will further decrease, as base stations move from 1GbE to 10GbE and 25GbE uplink interfaces. In response to this, backhaul networks will rapidly grow to 100Gbit/s aggregated capacity. Mobile network operators need to design and operate these networks with proven technologies and established processes. As the first 100Gbit/s MEF 3.0-certified packet network product, ADVA has designed the FSP 150-XG400 family as an easy upgrade of lower-bandwidth systems using established Carrier Ethernet OAM methods. A compact design and low power consumption further simplify scaling the network to 100Gbit/s.

CONNECTING PEOPLE AND MACHINES

Up to now, mobile transport networks have provided largely static connections from a cell site to one or two edge sites of the mobile core network. In future, the mobile backhaul network will need to be operated in a much more agile way. Point-to-point backhaul connections will be replaced by VPN-style networks, creating connectivity among neighboring cell sites as well as multiple packet network gateways at the edge of the mobile core. There will be dynamically allocated network slices for customer segments, implemented as virtual networks in the backhaul domain.

The increasing focus on open SDN and central control will also impact the role of routing and signaling protocols. Today's MPLS-centric transport networks with operationally heavy distributed signaling protocols will be replaced by lighter segment routing technology leveraging central control for ease of service activation. This overlay technology provides a strong basis for the slicing of transport infrastructure into customer-specific virtual networks.

Hence, today's packet networks will need to be enhanced with overlay technologies such as EVPN and segment routing in combination with open control interfaces. That's why ADVA is focused on providing essential features today and backing up future demand with a strong roadmap.

FAST RESPONSE TIMES WITH EDGE COMPUTING

Industrial control services require very low latency. This can be achieved by processing data at base stations in close proximity to where it originates. By avoiding having to backhaul traffic into the cloud, latency is significantly reduced. With the FSP 150-XG118, ADVA is delivering a high-capacity cell site gateway with optional plug-in server. What's more, the Ensemble virtualization software suite is the most easy and open way for hosting of virtual network functions (VNFs) at the edge of the mobile network.

DISAGGREGATED PACKET NETWORKING

There is increasing interest in disaggregated networking with packet network devices implemented as white box switches and open network operating systems. ADVA is proactively supporting the Open Optical & Packet Transport project of the Telecom Infra Project (TIP) with Ensemble Activator as the first carrier-grade network operating system specifically designed for mobile backhaul networks.

SYNCHRONIZATION IS NOT AN AFTERTHOUGHT

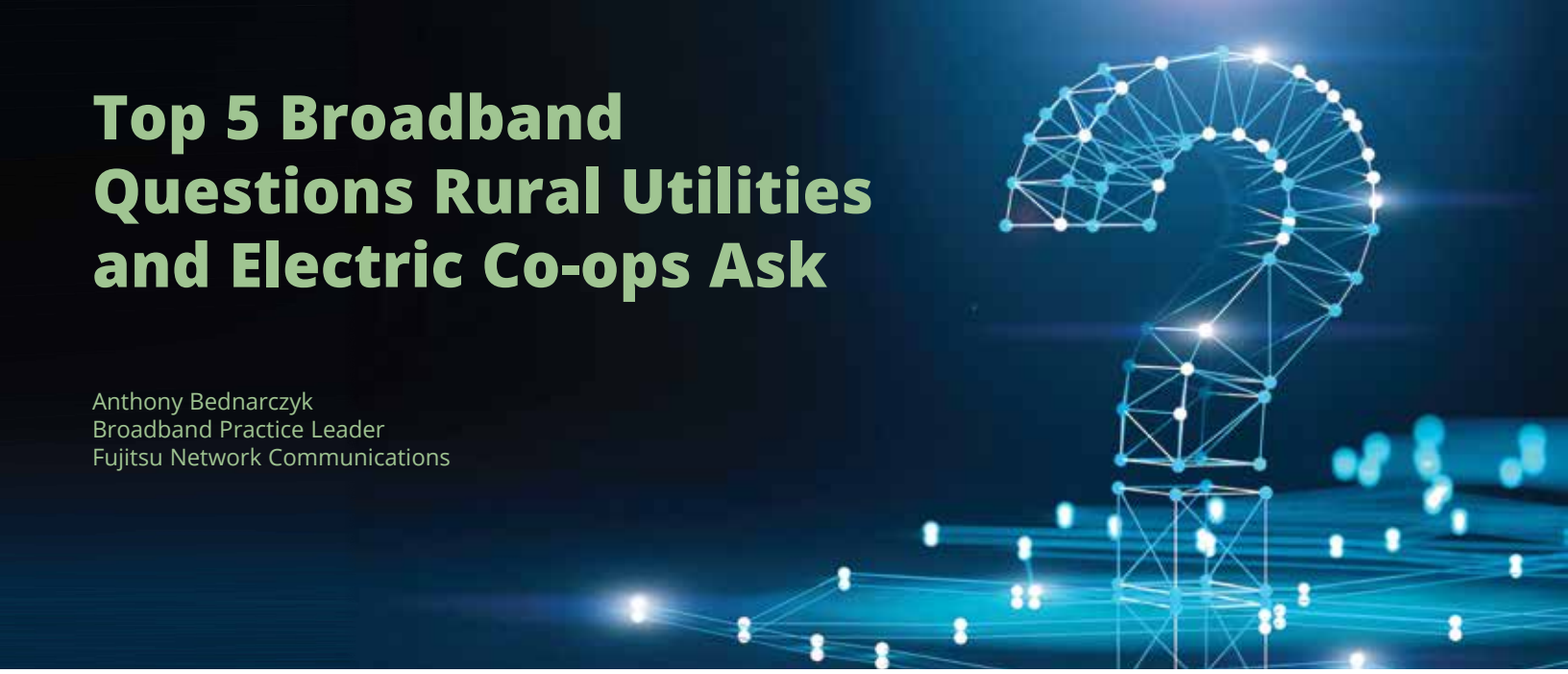
Advanced MIMO technologies, highly precise localization, and multi-carrier aggregation are adding significant value to mobile networks. However, those capabilities can only be supported with base stations being precisely synchronized. The required level of accuracy in time and phase synchronization exceed what is possible with present backhaul networks as well as currently applied clocks and time clocks in the core of mobile networks.

GNSS synchronization at the cell is one option, but it fails to meet the availability requirements of critical infrastructures in light of the increasing risk of spoofing and jamming attacks. The ITU has addressed the need for precise synchronization over packet networks by tightening the PTP accuracy requirements of boundary and transparent clocks in switches and routers. With class C and class D boundary/transparent clocks, packet forwarding devices can transport time information much more accurately, enabling nanosecond accuracy at the cell site. This however requires ultra-stable clocks in the core of the network. With even tighter specifications for enhanced primary reference time clock (ePRTC), ultra-stable and ultra-accurate timing at the core of the network can be achieved through a combination of the most advanced atomic clocks featuring optical technology and multi-band GNSS receivers with clock combiners.

NOW IS THE TIME

5G networking requires new approaches and new products. More bandwidth, better aggregation, distributed compute and reliable synchronization are all essential. And the network must be designed to meet the stringent requirements of 5G. Walker and ADVA have the products and expertise to help you get there.

Top 5 Broadband Questions Rural Utilities and Electric Co-ops Ask



Anthony Bednarczyk
Broadband Practice Leader
Fujitsu Network Communications

Every day, we learn more about the reasons behind America's growing digital divide. A major cause is that the needed investment to close the gap has not happened. As a result, a growing number of rural electric co-ops and municipal utilities are stepping in to provide the high-speed internet needed to spark community growth and bolster flat or declining electric revenues. As the Practice Leader of Fujitsu's rural broadband team, I'm proud to be part of this effort.

I often come into the picture before a "go/no-go" decision has been made. Much of what I do involves answering the questions that help a utility's leadership team decide if and how to proceed. Together with the other members of the rural broadband team, we've worked with communities to show them the path forward. The questions we field are as diverse as the individuals asking them, but a few topics crop up frequently.

HOW CAN I SHOW THAT BROADBAND IS RIGHT FOR MY COMMUNITY?

There are two parts to this question. The first part is knowing what your community needs, and the second is a general understanding of the expected benefits of a successful broadband network. One of the first steps in any local infrastructure project is to articulate what the community needs; no two communities have the same situation and available resources. That said, a "go/no-go" decision typically hinges on financial viability, the potential risks of such an investment, and having the right people at the table.

As for the benefits of broadband, there are a number of case studies that provide insight into what is possible and what is likely. Beyond the obvious benefits—economic development, additional non-electric revenues for your utility, and improved quality of life for residents—a broadband initiative is a long-term investment in infrastructure and the community. There is ample research to show that such investment affects the entire community just as a rising tide "raises all boats." Everyone in the area benefits from better and more affordable services, greater innovation, and a future-ready foundation for growth.

WHAT TECHNOLOGY IS BEST FOR BROADBAND NETWORK?

The simple answer: Selecting the right technology model depends entirely on your community's characteristics, needs and priorities, as well as the resources of your utility. Each technology requires choices to be made regarding cost, reliability, support and lifespan.

Many, if not most, broadband projects involve a hybrid approach involving a combination of fiber and wireless networks, depending on the objectives of the utility. For sure, you can expect increasing bandwidth demands from Internet video consumption, IoT devices, and smart grid applications, among others. When selecting the best networking

WHAT ARE YOU TRYING TO DO?

Demonstrating broadband's value requires a clear understanding of what is driving the project. Recently, a three-county regional collective in the Northeast engaged Fujitsu to help them build and implement their plan to reach the underserved community with an all-fiber broadband network. From the beginning, the planning board agreed that their job was to provide connectivity to the unserved and underserved in the region. They clearly articulated what that meant from a speed, price, and reliability standpoint. Remaining true to that vision is key to a successful project.

LET THE VISION GUIDE THE TECHNOLOGY

A Southeastern public power utility decided that, while fiber would be their essential backbone, a fiber-only broadband network would impede some economically disadvantaged families (an important constituency for the project) from accessing the new internet services. Project planners therefore decided to add Wi-Fi services to the network's scope.

TECHNICAL INSIGHT IS A GAME-SAVER

An electric co-op in the Southeast engaged their prime integrator, Fujitsu, once the project had started and decisions regarding technology had been made. Fujitsu immediately realized that certain equipment essential to the technology was to be phased out by the vendor soon after completion of the project. Working together, the co-op's project team and Fujitsu selected an alternate technology that was a core part of the vendor's roadmap and used equipment which would be fully supported over the long term.

technology for your organization's and community's needs, consider which technology will support data traffic growth and the infrastructure over the long term.

CAN I USE MY EXISTING ELECTRIC INFRASTRUCTURE TO HELP LOWER COSTS?

Yes! Broadband infrastructure uses nearly the same things the electric infrastructure does, including rights of way, security, environmental protections, power and logical design. This is one of the reasons why electric co-ops and municipal utilities are well positioned to support a broadband initiative.

We're currently working with a rural electric co-op in the mid-Atlantic region to devise a network build strategy. A core part of the project's vision is to utilize as much of their existing electric infrastructure as possible, limiting the cost of the core backbone build. Any cost savings will be used for the building and operating the last-mile FTTH network. In the end, the existing design and infrastructure components— such as poles, conduit, and sub-stations—will lend themselves beautifully to a layered broadband network.

WHAT SOURCES OF FUNDING ARE AVAILABLE?

Funding is available on the local, state and federal levels. Federal initiatives like the FCC's Rural Digital Opportunity Fund (RDOF) and the USDA's Broadband ReConnect Loan and Grant Program provide funds for construction, improvement, or acquisition of the facilities and equipment needed to provide broadband service in eligible rural areas.

Some states also support broadband deployment, typically through grants, loans and tax incentives, with last-mile projects receiving the most state funding. At the state level, the requirements are more specific, and not every state has broadband funding programs. Finding what's available in your state can be tricky. Fortunately, the Pew Charitable Trust has developed this handy on-line tool that lets you search available broadband funding opportunities by state.

Local or organizational funding is also available, depending on your community circumstances. Electric utilities can often use funds to expand fiber within the electric system to provide for smart grid technologies and capabilities. Cities and towns can also seek bonds to provide a source of funding, but these can require significant steps such as a public vote.

HOW CAN WE MINIMIZE PROJECT RISK?

To minimize risk, you must first spell out the specific areas of risk or uncertainty. Risk falls into four broad categories.

Project performance risk is tied to satisfactory execution and completion, on time and within budget. There are two main ways to implement a broadband network. On the one hand, you can take on the day-to-day responsibilities and risks yourself by internally managing the entire project and its vendor relationships. On the other hand, you can engage a third party to shoulder some or all of the burden. One third-party option is to hire an engineering firm, who would typically provide technical expertise and project management services for specific project phases.

If you have the resources, expertise and project management experience to oversee the entire process, this is a viable option. Otherwise you'll want an established full-service prime integrator who can handle the integration and coordination of all workflows and provide complete project accountability.

Financial risk typically involves ensuring that your chosen funding sources are large enough to provide adequate funding of the project phases for which they are intended. You must also ensure that the terms are not overly burdensome and that the funding is easy enough to obtain with the resources you have. Mitigating financial risks begins with careful study, research and planning that enables you to establish a realistic budget that you can commit to if you're managing the project internally. If an outside project partner is involved, ask them to contractually commit to meeting your budget requirements.

Technical risk refers to network design and performance. Is the network technically sound and operationally efficient? Is it secure from hackers and other bad actors? Will it operate reliably? Can the fiber infrastructure scale and evolve? Managing your technical risks involves having a solid understanding of the current and emerging technologies and how each would fit the long-term needs of your broadband network. This typically requires being in frequent contact with vendors to understand their technology roadmap.

Organizational risk refers not only to the electric co-op or public power utility, but to the key decision makers and leadership teams overseeing the project. Mitigating organizational risk is all about doing your homework upfront. Everyone at the table must understand his or her role, the utility and community's needs and priorities, the project scope and vision, and the decision-making process. Choosing a single accountable partner to work with you all the way from the broadband, financial and engineering study to the execution phases—design, build, operate, and maintain the network. The single-partner approach reduces complexity and the potential for mistakes.

NOW THAT YOU KNOW THE QUESTIONS—FIND SOMEONE WITH THE ANSWERS

These are challenging times for rural electric co-ops and municipal utilities. Electricity revenues are down in many areas as residents move to larger areas in search of more opportunities. Investing in a broadband network can go a long way toward boosting non-electric revenues and igniting local economic development.

Yes, building your own broadband network is a big undertaking: perhaps the biggest project you'll be involved with as part of your co-op or utility. But you don't have to go it alone. By working with an experienced broadband partner from the beginning—a partner who understands all aspects of planning and implementation, and who can help you understand and anticipate those steps—you'll have the resources, technical expertise and project management services needed to navigate the process, start to finish, with no surprises.

As a Broadband Practice leader at Fujitsu Network Communications, Inc., Anthony Bednarczyk works with customers and manages internal teams to win network services business, then serves as the primary point of contact with new customers. Anthony's experience in business strategy, disruptive technology, network design, integration, and operations has given him insights that help maximize the value of networks, deliver key strategic direction to customers, and build and maintain strong partnerships.

Anthony has worked with global technology companies in a variety of roles including mergers and acquisitions, data analytics and software development, and business development. He holds a MBA from University of Texas at Austin, as well as a Bachelors of Business Administration in Finance and a Bachelors of Science in Economics from Southern Methodist University.

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Rising to the Internet Access Challenge

By Alan Fitzpatrick
CEO
Open Broadband, LLC

We've experienced a significant change in residential internet traffic load and distribution. In the pre-COVID days, most students were in school, and parents were at work. Home internet usage peaked in the evenings and was mainly downloading - e.g. streaming Netflix and other content. Post-COVID means children and 2 or more parents are at home using the internet from 7 am to midnight. Usage is significantly higher than before, particularly during the daytime. Homes quickly became the center for education, telemedicine, work from home, conferences and webinars.

If you have a high capacity fiber or cable connection your bandwidth should be fine in handling the increase in traffic. However, if you have DSL, satellite, or a cellular hotspot, or simply live in a rural area with limited fiber backhaul, the limited amount of bandwidth per home can cause both a slowdown and variability, depending on what others in the neighborhood are doing.

PRESSURE POINTS

More and more people are using Zoom and other video collaboration services throughout the day. This is a constraint on the upload bandwidth. When the upload bandwidth is full, a new user request will not go through. New upload connections may not be available until people drop off the Zoom calls. There is no 'buffering' on upload like one would have in downloads. Compounding this is the use of VPNs by parents working from home. VPNs consume bandwidth even when nothing is being uploaded.

THE CHALLENGE

Open Vault reported Internet usage was up 47% in 1Q20 and the change of demand to flattening between day and night. Some of the large carriers reported as follows:

- Comcast reported experiencing a 33% increase in upstream traffic
- In mid-April, Spectrum reported an increase of nearly 32% for upstream traffic.
- As of the end of April, AT&T reported a 22% increase in core network traffic
- In mid-May, Verizon reported significant growth at an application level, highlighting an 81% increase in VPN usage, a 1,200% increase in collaboration tool usage, and video streaming 36% higher than typical pre-COVID days.
- Nokia recently reported that distributed denial of service (DDoS) attacks are up 50% during the COVID crisis. These attacks can short-term loss of service for users.

"What makes the COVID situation more of a challenge is the speed of change - this growth occurred in just a few weeks."

ISPS RISING TO THE CHALLENGE

The growth of internet traffic in general should surprise no one in the industry. Reports from companies like Cisco report a 20%+ growth in traffic every year, and ISPs are always planning network growth in their markets. What makes the COVID situation more of a challenge is the speed of change - this growth occurred in just a few weeks. To address the demand many ISPs have been doing the following:

INCREASE IN FIBER CAPACITY

Even if an ISP is not delivering fiber to the home, they still use fiber circuits to backhaul traffic. As a fixed-wireless ISP, Open Broadband relies on fiber circuits from our tower locations back to our datacenters. We've increased fiber capacity, as much as 10x over the previous connection.

INCREASE IN NEW SERVICE ACTIVATIONS

Almost all ISPs have experienced a surge in demand for new broadband service connections. The month of April set a new high for us at Open Broadband for new service activations. In rural markets broadband access may have been viewed as a 'luxury' item in the past, but with parents and children now spending most of their time at home, broadband access has become a must-have. Companies such as Windstream reported record service activations in 2020.

FREE PUBLIC WI-FI ZONES

We are strong advocates of free public Wi-Fi zones that provide everyone access. Many ISPs quickly provided additional Wi-Fi zones as a response to the pandemic. At Open Broadband we added free outdoor Wi-Fi zones at churches, parks, and government locations in over a dozen areas in North Carolina. One doesn't have to be a paying customer to access the system, nor does one feel pressured to buy a cup of coffee or French Fries to use the service. Sitting in the car or on a park bench provides safe, unlimited usage broadband access to those without home service.

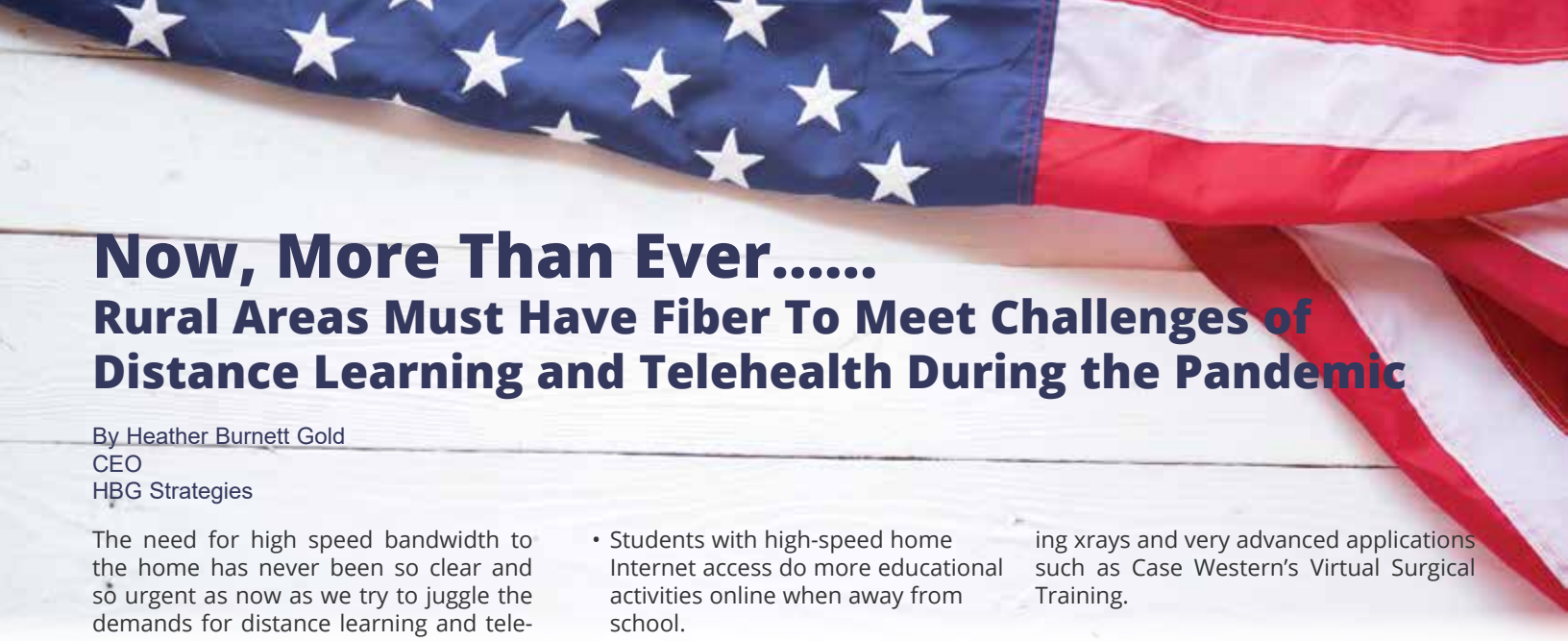
GROWTH IN WISP SERVICE

Fixed-wireless ISPs have been expanding across North Carolina in recent years and we see no signs of it slowing down. Users need service quickly, and often a fixed-wireless connection is the fastest method to get high-speed internet service to the premise. We recently activated a 400 Mbps fixed-wireless connection to a business located on the opposite side of railroad tracks from the fiber line. WISPs are stepping up to the post-COVID challenge by increasing their installation pace and expanding their networks for greater reach.

CONNECTIVITY PLEDGE

Many ISPs signed the FCC's Connectivity Pledge, committing to uninterrupted service to all customers, regardless of their ability to make bill payments during the pandemic. The ISPs who still use data caps and overage charges also agreed to waive these during the pandemic. Let's hope this change becomes permanent. We've always believed usage should be unlimited.

Never has broadband service been as critical as it is right now. It is up to all of us in the industry to meet the challenge of deploying broadband, and making it affordable and accessible to everyone.



Now, More Than Ever……

Rural Areas Must Have Fiber To Meet Challenges of Distance Learning and Telehealth During the Pandemic

By Heather Burnett Gold
CEO
HBG Strategies

The need for high speed bandwidth to the home has never been so clear and so urgent as now as we try to juggle the demands for distance learning and telehealth created by COVID19.

As of the end of March, 45 states had declared some sort of school closures from a few weeks until the end of the school year. This equates to 118,000 K-12 schools and 54 million kids and we are not even discussing higher education which brings in hundreds of other institutions and 1000s more students. What has the impact been on the educational system of the US and for the students themselves? Are students continuing to learn? What fault lines in learning have emerged as we have attempted to go online?

There are three principle areas of need with respect to successful distance learning:

1. Internet Access – the area where you as builders and providers of broadband services can have impact;
2. Device access – usually managed by school administrations through school funding and direct corporate grants;
3. Training access or digital literacy for both teachers and students.

The Quello Center at the Michigan State University has been heavily involved in researching the impact of internet access on student performance. A recent study by the Center, working with the Merit Network, surveyed approximately 3000 students across 21 intermediate schools located primarily in rural areas.

The findings were astounding and a real call to arms for increasing access to high speed broadband in rural areas.
Quoting, the study specifically found:

- The "homework gap" is only one small indicator of the differences in student performance related to inequalities in home Internet access.
- Students with high-speed home Internet access do more educational activities online when away from school.
- The gap in digital skills between students with no home access or cell phone only and those with fast or slow home Internet access is equivalent to the gap in digital skills between 8th and 11th grade students.
- Students with high-speed, home Internet access have higher overall grade point averages (half a letter grade higher, the difference between a B and a B- average).
- Digital skills predict higher scores on pen-and-paper versions of standardized tests, such as the SAT and PSAT.
- Students who do not have high-speed Internet access at home are less likely to plan to attend college or university.
- Students with higher digital skills are more likely to plan to enter a career in a STEM- or STEAM-related profession.
- The complete study and additional information can be found at broadbandgap.net and https://doi.org/10.25335/BZGY-3V91

While educational institutions can and do utilize various funding resources through the Schools, Libraries and Healthcare funds, the real need is to connect the students in their homes to the distance learning centers, often teachers' homes. For this purpose, a community needs a comprehensive fiber to the home build out. This kind of analysis has such strong additional ramifications for any community considering broadband deployment and further augments the argument that this is as a necessity for all, not a luxury.

Telehealth encompasses many applications from low usage email communications between you and your physician to ultrahigh bandwidth usage such as reading xrays and very advanced applications such as Case Western's Virtual Surgical Training.

Telehealth faces many of the same challenges as distance learning but the issues are slightly more complex as there are a myriad of privacy and reimbursement regulations that qualify how and when telehealth can be utilized.

Telehealth is particularly needed in rural areas as they continue to lose access to health care due to a lack of doctors and the closing of hospitals. And this need was critical before the onset of the COVID 19 pandemic. With the pandemic, patients and doctors everywhere, including normally well served urban areas, have had to find alternatives to the traditional office visit model. Technical assistance requested by the Middle Atlantic Telehealth Resource Center (a quasigovernment entity serving the Middle Atlantic states) rose from 27 inquiries per month in February 2020 to 282 in March 2020, an almost 1000 fold increase!

A recent analysis by Frost & Sullivan, Telehealth—A Technology-Based Weapon in the War Against the Coronavirus, 2020, estimates that the demand for telehealth technology will increase the telehealth market in the United States seven-fold growth by 2025, resulting in a five-year compound annual growth rate (CAGR) of 38.2%. In 2020, alone fueled by COVID 19, the telehealth market is likely to experience a single year-over-year increase of 64.3%.

But for many rural areas, access to this advanced technology remains scarce, limited by the availability of bandwidth needed for its use. For example, according to the FCC's 2020 Broadband Deployment Report, 22.3% of Americans in rural areas and 27.7% of Americans in Tribal lands lack coverage from fixed terrestrial 25/3 Mbps broadband, (the FCC's minimum) standard) as compared

to only 1.5% of Americans in urban areas. The good news is that this availability gap continues to decrease, and it appears that even more resources are on the way.

The Federal government has implemented a special program worth $200 million under the CARES Act. This program will allow health care providers to purchase telecommunication services, information services, and devices to provide connected care services for the treatment of COVID-19 or other conditions during the pandemic in order to free up resources to allow health care providers to treat COVID-19 patients or prevent the spread of COVID-19.

And we are about to enter the largest auction of Broadband Funding in the FCC's history, the Rural Digital Opportunity Fund, which could bring $20B to rural areas over the ten years, with fiber receiving more favorable weight in the auction.

Finally we anticipate that Congress will pass an infrastructure bill at some point this year, currently estimated at $1Trillion, in which Broadband and fiber are expected to receive some portion.

Heather Burnett Gold

Heather Burnett Gold is the CEO of HBG Strategies, a consultancy engaged in broadband education targeted to enable 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 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.

A Revolutionary 10G PON Solution

By Frank Yang
Sr. Strategic Product Line Manager
Champion ONE

A new XGS-PON fiber access network solution available from Champion ONE is highly scalable, flexible, and field-proven. It enables network operators to start small and pay as they grow, reaping cost savings and operational benefits along the way.

The cost of next-generation PON technology continues to fall, and is now approaching the same price level as legacy GPON/EPON technologies. For fiber access network operators feeling the pinch of GPON's bandwidth limitations, this is a welcome development. Since the new 10G EPON and XGS-PON standards utilize different wavelengths, they can even be laid over existing services and fiber infrastructure, facilitating a gradual migration to higher speeds.

However, there are significant physical limitations to this approach using the traditional network architecture. In this configuration, network operators would likely need to deploy a new 10G OLT chassis. This hardware occupies a large physical footprint at the head-end and requires a steep capital outlay. Furthermore, its high power consumption would contribute to high operating costs going forward. For a network operator who needs to add only a few 10G PON drops, this physical and financial reality has made it difficult to justify the investment.

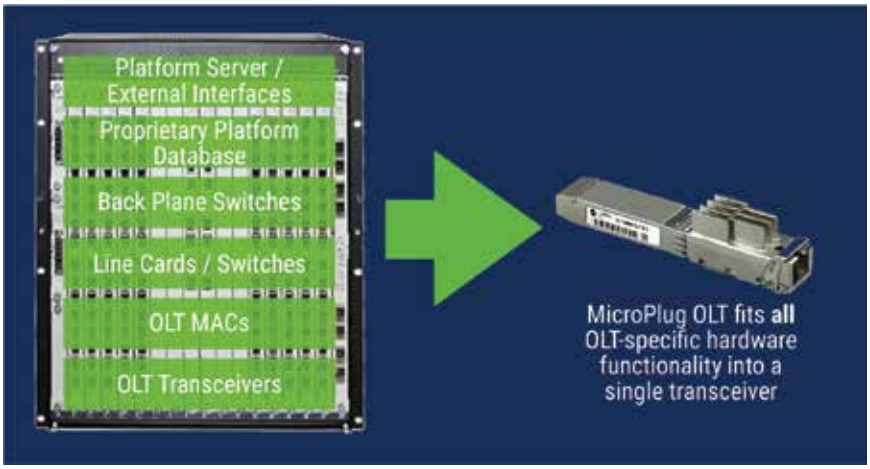
However, there is now a viable alternative: the MicroPlug OLT SFP+.

As shown below, this revolutionary design fits all of the functionality of a traditional OLT chassis in a compact SFP+ optical transceiver form factor. As such, it can be plugged into an available 10G Ethernet switch port, effectively turning that port into a PON OLT. Meanwhile, the other ports on the switch are free to use for other applications (mobile backhaul, PTP Ethernet, or many more).

Therefore, by deploying PON services with the MicroPlug, network operators can truly scale according to demand, all the way up to large-scale deployments. In that case, a fully loaded rack of 576 OLT ports this can translate to a roughly 60% footprint reduction and 60% reduction in power consumption for every OLT chassis replaced.

The MicroPlug OLT can be paired with a MicroPlug ONU at the customer end, which adds additional deployment flexibility. Additionally, its open design renders it compatible with the multiple chipsets that power many of the leading ONU models available today.

To learn more about this solution, visit www.championone.com.



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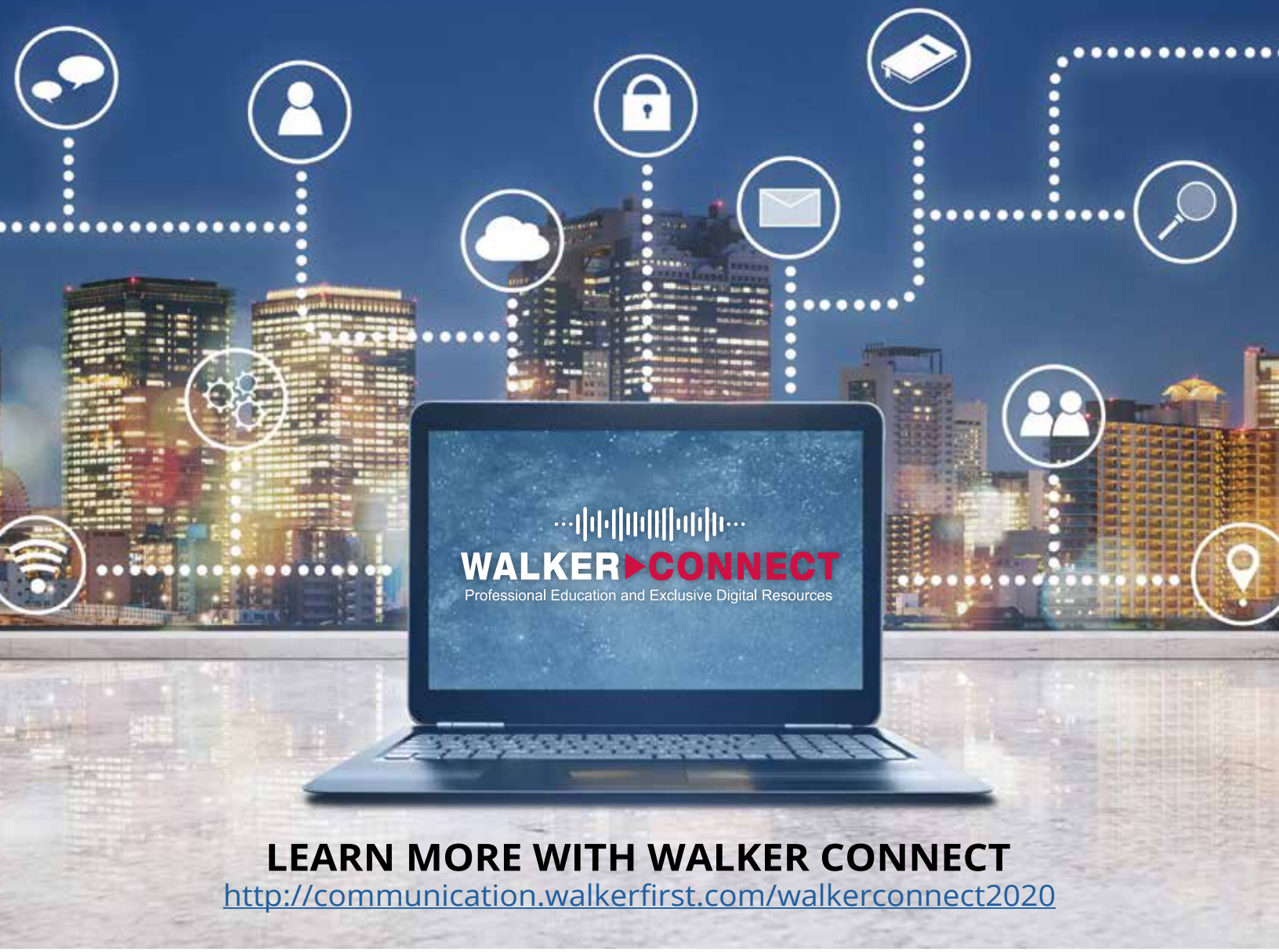

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Fiber Broadband Association Consumer Study Shows Changing Internet Use During Pandemic

Washington, D.C., (May 6, 2020) — Today, the Fiber Broadband Association and RVA, LLC released a new study that reviewed the changing ways that American consumers are using the Internet during the pandemic and the quality of their broadband experience. The study shows dramatic shifts in the use of advanced applications that require both strong upload and download capacity. Researchers found that, while the Internet backbone has held up well, differences in access quality have caused consumers to ration bandwidth and lose productivity.

Key findings include:

- Users have found the Internet crucial for weathering the pandemic – for communication, news, provisioning, entertainment, work, health, and education.
- The use of video conferencing has exploded, with 46% of respondents using it for staying in touch with family, 24% for business, and 16% for educational purposes. Among site flexible workers currently working from home, 68% are using video conferencing.
- Telemedicine is on the rise: 12% of respondents have used video conferencing for healthcare, up from just 2% in 2019.
- The Internet backbone has performed well, with average speeds up compared to spring 2019 data.
- People with lower-performing broadband connections are rationing Internet use inside the home. Among users with the slowest bandwidth and highest latency, 49% reported actions such as asking other family members to curtail Internet use during work video conference calls. They also reported lost time waiting for apps.

"COVID-19 didn't 'break' the Internet and that's primarily because of the investments made in future-proof, reliable fiber broadband," said Lisa R. Youngers, President and CEO of the Fiber Broadband Association. "High-speed broadband access is essential for mitigating personal and economic damage from this crisis. Yet we clearly need to invest more to improve our infrastructure and bring high-speed fiber broadband access to more consumers."

The full report is available to members of the Fiber Broadband Association on its website.

NRECA, NTCA Applaud Bipartisan Legislation Expanding Financial Stability During Pandemic

ARLINGTON, Va. (Jul 2, 2020) – National Rural Electric Cooperative Association (NRECA) CEO Jim Matheson and NTCA–The Rural Broadband Association CEO Shirley Bloomfield today applauded the introduction of bipartisan legislation to support rural communities and critical infrastructure providers in response to the COVID-19 pandemic.

Sens. John Hoeven (R-ND), Tina Smith (D-MN), John Boozman (R-AR) and Kyrsten Sinema (D-AZ) introduced the Flexible Financing for Rural America Act in the Senate to allow electric cooperatives and small, rural telecom providers to adjust the interest rate on existing loans from the U.S. Department of Agriculture's Rural Utilities Service (RUS) loan programs. Reps. Vicky Hartzler (R-MO) and Tom O'Halleran (D-AZ) introduced companion legislation in the House.

"America's electric cooperatives face significant financial shortfalls due to the ongoing pandemic," said NRECA CEO Jim Matheson. "Despite that, electric cooperatives are working to help their communities by working with co-op consumer-members on extended payment plans, accelerating cash back programs, and expanding broadband access."

"Economic development has been part of electric co-ops' DNA for decades and that element of community leadership will be critical as communities rebound from the public health emergency. This essential legislation will give co-ops the flexibility to manage financial shortfalls and focus on the long-term stability of the communities they serve," Matheson said.

"Hundreds of NTCA members have answered the call in committing to keep Americans connected in the most rural and remote parts of the country. These companies and cooperatives will of course do everything within their power to keep delivering on the promise of connectivity for the communities in which they live and serve," said NTCA CEO Shirley Bloomfield.

"At the same time, the economic impacts of the ongoing pandemic make it a challenge for smaller rural operators to sustain services. This critical legislation would help many of our members continue responding to their customers' needs and building Smart Rural Communities℠ even during this time of crisis."

America's electric cooperatives and small, community-based broadband and voice providers deliver essential services in the most rural, and impoverished parts of the country. Many of them meet that challenge, in part, with low-cost financing from USDA's Rural Utilities Service. However, RUS does not permit borrowers to adjust existing loans simply to take advantage of lower rates, and penalties are significant in the narrow circumstances that allow for refinancing.

The Flexible Financing for Rural America Act would allow electric cooperatives and small, rural telecom providers to adjust RUS debt to current market rates without penalty. This will provide greater cash-flow flexibility to meet the needs of rural consumers in these challenging economic times and allow essential rural utilities to be part of the long-term recovery.

As the coronavirus pandemic causes local businesses to close their doors and hardworking Americans to lose their jobs, new economic projections show the nation's electric cooperatives could suffer up to $10 billion in lost revenue through 2022. Small rural broadband providers are also seeing consumers struggle to pay voice and broadband bills, with nearly 60% of such providers reporting that uncollectible amounts were up by as much as 10% since the start of the pandemic, and another 15% of providers reporting that bad debt was up by as much as 20% since mid-March.

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The Way Forward

By Shirley Bloomfield
CEO
NTCA

The COVID-19 pandemic has altered society as we know it. All of us understand that regardless of how quickly we may come out of stay-at-home orders and evolve in social distancing practices, Americans are witnessing a shift in the conduct of our everyday lives and new ways of doing so many things.

I have never been prouder of NTCA's membership than I have over the past several months. As "hometown providers" based largely in the areas they serve, their community commitment in the face of the coronavirus pandemic has been heartening. We estimate that more than half of the signers of FCC Chairman Pai's pledge to "Keep Americans Connected" are NTCA members—and, in so many cases because of their hometown presence, our members have gone above and beyond the terms of the pledge to help their families, friends, and neighbors. From offering "drive-up" Wi-Fi connectivity in public areas to enabling service upgrades for families working and learning from home, our members are committed to keeping their communities connected in as many ways as possible.

And despite the pandemic, we continue to move full speed ahead on deploying new broadband infrastructure. A recent NTCA survey revealed that 90% of our members remain focused on fulfilling network deployment plans this year, and even in the past month, we have heard a number are using responsible socially distant practices and the relatively lower traffic on roadways to complete as much construction activity as possible.

Yet, our job is not done.

NTCA believes it is most effective to conceive of potential responses to the challenges presented by the COVID-19 crisis in the form of near-term and longer-term measures. In the near-term, we need both to make sure that those who are not yet connected get connected and to make sure that those who are connected today stay connected. In the longer-term, we need to think about how we can develop a coherent and coordinated national broadband infrastructure policy so that we are not back here again someday, staring at the next crisis and wondering why some customers lack broadband altogether, why other customers have unreliable access that does not enable effective use of virtual private networks or distance learning platforms, and why still other customers might have access to robust, future-proof networks but lack the ability to afford services on those networks.

And while NTCA is proud of our members for providing hotspots and other innovative ideas such as drive-in Wi-Fi in the face of the immediate crisis, these are not long-term solutions to eliminating the homework gap or ensuring that Americans remain forever connected. The homework gap, for example, begins at home—meaning that we should focus on programs that drive the delivery of world-class networks to every American home throughout a community so that students can engage in synchronous learning. As the pandemic has shown, we also need networks with robust symmetrical capability that truly enables virtual private networks and other applications that make effective teleworking possible.

From the Alaskan Bush to the Mississippi Delta, no American should get second-class broadband service, or worse yet, no service at all. That is why NTCA recommends that Congress adopt a "Forever Connected" approach to promote the deployment of future-proof networks and ensure the next time we find ourselves in a national disaster, no student, senior citizen, or rural or urban American is left in the digital darkness.

We recommend following these simple guidelines when crafting legislation for long-term broadband solutions:

1. Leveraging existing broadband programs is the best way of getting the most immediate return on investment while also avoiding confusion and potential inter-agency conflicts.
2. Prevent duplication of scarce federal resources by requiring all agencies to strictly coordinate use of their broadband programs.
3. Require all agencies to use updated broadband maps and meaningful challenge processes to ensure that unserved areas are accurately identified.
4. Invest in technology that can be readily upgraded to deliver the fastest speeds over the long-term life of the asset being built, rather than supporting technologies that look cheaper to deploy now but are unable to provide meaningful internet access over time.
5. Remember that any program must focus not only on building the broadband network itself, but also sustaining that network over time once it has been built.

NTCA members have been building Smart Rural Communities℠ for decades and creating jobs and opportunities for their neighbors, and their commitment to connecting rural America is second to none. As we move forward as a nation, our members look forward to helping to deliver further on the promise of sustainable and affordable communications services across rural America.

Shirley Bloomfield is chief executive officer of NTCA–The Rural Broadband Association, the premier association representing nearly 850 independent, community-based telecommunications companies that are leading innovation in rural and small-town America. With more than 30 years of experience representing the country's smallest independent 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 the national economy.

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Infrastructure Planning in Times of Acceleration and Uncertainty

By Francisco Sant'Anna
Senior Industry Advisor for Regional Services Providers
Ciena

The events of 2020 are radically transforming our lives. Behavioral and economic changes that were already underway have been drastically accelerated, and technology is at the core of the enablement of many of those shifts. Communication and digital services have been instrumental in responding to the crisis and adapting to the new scenarios. But taking a lead role in supporting this acceleration means extra pressure on the technology infrastructure of service providers and additional challenges on planning its evolution. Talking to network strategists around the globe, we compiled 5 consistent best practices of those who are finding their way to a continuous and sustainable progress of their business amidst so much uncertainty.

KEEP OPERATIONS SIMPLE

Often, in operations, less is more, thus network simplification is becoming a big mantra for service providers. Leaner IP architectures are getting the spotlight, focusing on eliminating unnecessary protocols on the IP stack to minimize security risks and configuration complexity.

Maximizing the productivity of the technical staff is becoming a top priority - not just a question of cost control, but a flexibility asset that allows operators to quickly respond to occasional surges in the demand of service orders, keeping customer satisfaction unharmed. Smart IP troubleshooting and scenario simulation tools are being adopted to drastically reduce staff time involved in diagnostics and change-management. Providers are favoring platforms that support zero-touch-provisioning to increase site deployment agility, as well as investing in improving the quality of their inventory to equip their staff with the best possible information.

Another approach to minimize operations complexity is to tackle legacy inefficiencies. TDM (Time Division Multiplex) and DACS (digital access and cross-connect system) platforms are great examples of it. The 30-year-old technology of T1s/E1s and SONET/SDH systems is becoming harder to support, but there are still many applications and customers relying on these connections. Tackling its modernization is a chore that operators have been postponing for years, usually only acting when an end-of-support is announced by the vendor. Once they finally get to it, most report that the migration of those legacy interfaces to convergent packet boxes equipped with the necessary pluggables or modules not just simplify and de-risk their operations, but also frees up fiber strands and space, and saves energy. Anticipating the efforts and investments to modernize these older infrastructures is thus a sure way to start collecting the operational benefits earlier.

MAKE SAFER BETS

In scenarios of uncertainty, where the future value of most variables is highly unpredictable, it is wise to play safe on the few variables we can control. One of the surest trends in the telecommunications market is that bandwidth demand will continue to go up, so positioning to scale capacity is a no brainer. As the recent surge of digital interaction and content demand depleted the bandwidths stocks of most service providers (which were expected to support the growth of the next couple of years), there is no question that upgrading capacity throughout the entire network is critical. But it is necessary to do so thinking a few steps ahead, planning for the long term. It means selecting platforms that are highly scalable, preferably in a pay-as-you-grow model, from a vendor well positioned to sustain the innovation required to support your continuous bandwidth growth.

" . . . futureproofing boils down to choosing solutions that are open, scalable, evolving, and carrying the DNA of the most likely future requirements."

Solid financials and evidence of sustainable growth of a vendor are not only signs that they are more likely to make it through the shifting market, but a necessary condition for them to keep up with the huge investments needed to fuel continued innovation – and consequently be able to support your evolution.

GO FLEXIBLE

One of the greatest lessons from the recent crisis is the importance of flexibility and adaptability to quickly react to changes. Technology service providers not only need robust business continuity plans for their operations, but they also need to be able to dynamically allocate resources to help their business customers build their own contingency plans and responses when needed.

Flexibility also means being free to shift paths as scenarios evolve. Open archi-

tectures with standards-based solutions built for interoperability become key assets to make infrastructures highly adaptable, responsive, and cost-effective as the demand and technology evolve. Programmable and highly scalable platforms are vital resources to enable the development of new services and create new revenue streams, furthering a healthy evolution of the business.

FOCUS ON THE CUSTOMER EXPERIENCE

In the era of cloud and digital services, users do not tolerate to go blind, to wait, or to not receive what is expected. There is no room for not delivering the committed service levels, to not providing online portals and full visibility, to not allowing the customer to be in control of their experience. Investing in deployment agility, service level assurance, and visibility tools is crucial to sustaining customer loyalty.

EMBARK ON A JOURNEY, AND HAVE YOUR MAP

Planning a resilient and adaptable network to withstand economical and technological disruptions is not a one-time project, but an ongoing journey. It is a vision towards which we advance in small but steady steps, building capabilities, adding resources, always fine-tuning the course. A detailed map and a well-planned itinerary are valuable tools to succeed in a journey, and for the network evolution, it is no different. Setting a coherent framework that establishes the course, with a detailed vision and a comprehensive set of guidelines, is essential to enable your continuous progress in the right path.

This evolution journey involves multiple investment decisions, platform selections, and architecture choices. Each of those should be consistent with the vision to help you advance towards a clear and univocal direction. A good example of a solid evolution framework is Ciena's Adaptive Network™. It is a blueprint based on three basic principles to guide investments into lasting business success. The first is the Programmable Infrastructure, referencing the need to build towards a dynamic pool of virtual and physical resources, instrumented, open, scalable, and secure. The second is Analytics and Intelligence – the driver to develop AI and machine learning capabilities based on both big and small data coming from the programmable infrastructure. The final pillar is software control and automation – the end goal to enable ultimate responsiveness by applying this intelligence into action through open-domain control and multi-layer orchestration.

At our times, future-proofing investments is a pre-requisite for any technology project, otherwise, the odds are too high that a platform will be outdated before its payback period. And futureproofing it usually boils down to choosing solutions that are open, scalable, evolving, and carrying the DNA of the most likely future requirements. The leading long-term technology trends for networks are the use of AI, analytics, and automation. For a platform, to carry this DNA means to be programmable, instrumented, able to feed an analytics layer and to be orchestrated and automated by a control layer.

2020 may mark a major transition in the pace of economic and behavioral change in the world. When the future is becoming faster, having a clear vision and actions consistent with it is vital to thrive. Examine your plans, keep operations simple, make safer bets, go flexible, focus on the customer experience, and embark on a journey to success!

Francisco Sant'Anna is Senior Industry Advisor for Regional Services Providers. In this role, he leads Ciena's initiatives in helping these providers evolve their networks to meet their current and future business challenges through hardware, software, and services technologies.

Francisco is a Telecommunications Engineer with a Master in Telecommunication Systems, with 20 years of experience in the service provider industry.

Jane Brightwell Receives AFCEA Award

By Randy Turner
Director, Marketing Communications
Walker and Associates

During AFCEA West 2020, held in San Diego this past March, Jane Brightwell was recognized as a recipient of the AFCEA Women's Appreciation Award. This award recognizes and honors an AFCEA member who has gone above and beyond to further the careers of women. Winners are selected by members of the AFCEA International Membership Committee.

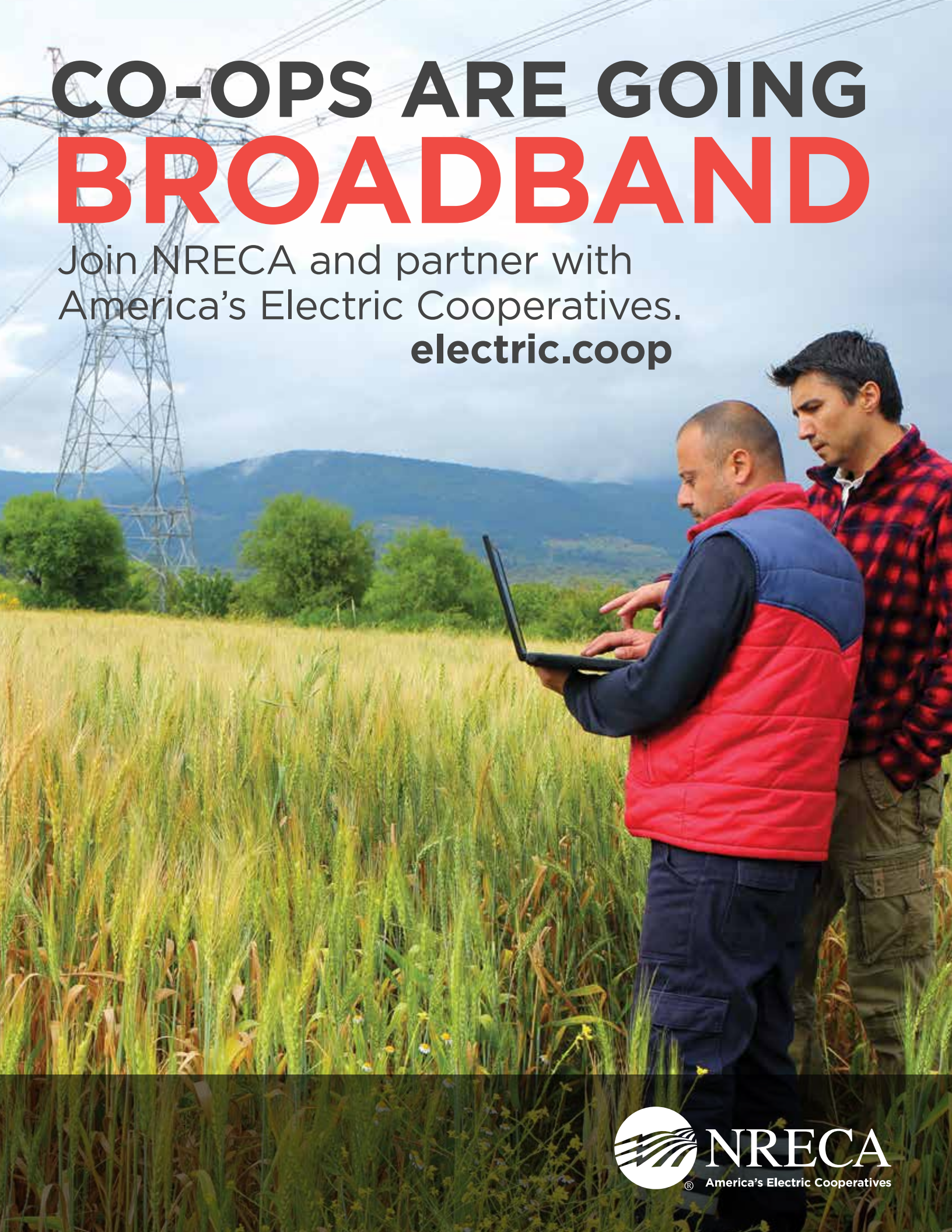
Nominees were evaluated based on the following considerations:

- Supported the development of women business and/or government professionals by facilitating introductions with prospective experienced mentors
- Personally acted as a mentor to one or more female students or business/government professionals
- Actively supported and promoted STEM scholarships and careers (in business and/or government) to female students at any educational level
- Sponsored or advocated a highly-qualified woman candidate for a new or increased position in her company or government
- Actively developed, or contributed to developing, shared opportunities for women in business and government to network, learn new skills, share best practices, celebrate accomplishments, and develop professionally

The awards event was co-sponsored by Walker and Associates and Ciena Corporation, and included a keynote speech by Brigadier General Lorna Mahlock, USMC, Director, Command, Control, Communications and Computers (C4) and the Deputy Department of the Navy Chief Information Officer (CIO) of the Marine Corps. BGen Mahlock then helped present awards to the four winners of the Women's Appreciation Award, and the event concluded with drinks and appetizers, giving everyone a chance to network with senior leaders in the AFCEA community.

Jane Brightwell, left, receives the award fromBGen Lorna Mahlock, USMC

Ms. Brightwell is the Vice President of Federal, International and RBOC Sales at Walker and Associates, where she has worked for more than 20 years in a variety of leadership roles.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Rural Broadband Funding Update – Help Is on the Way

By Kara Mullaley
Community Broadband Market Development Manager
Corning Optical Communications

Renewed interest in bridging the digital divide is helping create more rural broadband funding opportunities. This is welcome news because building and operating rural broadband networks is costly. Without government-sponsored funding support, it's unlikely the digital divide can be completely eradicated. Two recent programs take direct aim at this important national priority: the U.S. Department of Agriculture's (USDA) ReConnect Program and the Federal Communications Commission's (FCC) upcoming Rural Digital Opportunity Fund (RDOF). Together, these programs have budgeted more than $21 billion to help close the digital divide and will provide a real boost to the community broadband movement.

USDA RECONNECT PROGRAM

The USDA Rural eConnectivity Pilot Program (ReConnect) was authorized by Congress in March 2018 and provides a variety of funding programs targeting unserved and underserved rural communities. Two phases of the program have been announced. The first phase began in 2019 and is well underway, authorizing more than $600 million in the form of grants and loans. The funding includes $200 million in grants, $200 million in loans and $200 million in grant/loan combinations.

The USDA reports that between April 23 and July 12, 2019, phase I of the program received 146 applications for $1.4 billion in funding. The first award was announced in October 2019, with Forked Deer Electric Cooperative in Tennessee receiving a $2.85 million grant to make broadband at speeds of at least 100 Mbps available to 347 households and one critical community facility spread over 435 square miles. There are now 82 awarded applicants from phase I planning to bring broadband to rural areas across 34 states. Winning bidders (www.usda.gov/reconnect/awardees) include telcos, electric cooperatives, government entities, a tribal authority and fixed wireless providers.

" . . . these programs have budgeted more than $21 billion to help close the digital divide . . . "

The next phase of ReConnect is underway. It has a budget of $550 million, and the application window for the second round of funding ran January 31, 2020 through April 15, 2020. According to the USDA, several rule changes from the first phase of the program are now applied to the second phase. The USDA has established evaluation criteria to select winning applicants. It evaluates a variety of factors and puts more weight on certain aspects. Criteria include the rurality of the service territory; the number of businesses, farms, health care facilities and other important anchor institutions; and rural broadband network performance. As of June 25, 2020, the USDA is investing in 1 project from the second round of the program, reviewing applications and awarding approved projects on an ongoing basis.

RURAL DIGITAL OPPORTUNITY FUND

The FCC's RDOF is a promising program that will make $20.4 billion available, over a 10-year period, to fund rural networks that offer both broadband and voice services. The funding will be disbursed through a reverse auction, closely following the auction process of the Connect America Fund Phase II auction (CAF-II) of 2018.

RDOF funding is derived from traditional high-cost universal service funding previously allocated to territories served by large price cap telcos, including Frontier, CenturyLink and AT&T. The FCC has decided to move away from the traditional method of disbursing Universal Service Fund (USF) support to incumbent carriers and award it through a reverse auction. Winning bidders for RDOF funds will have to commit to deliver broadband and voice services at the specified service level speeds to those same territories.

The FCC approved RDOF rules at its January 30, 2020, open meeting and proposes a two-phased approach. Phase I will target areas defined as wholly unserved with 25/3 Mbps service, offering $16 billion in funding. Phase II will target rural territories identified as partially served, and any areas not won in the first phase. Phase II will have a budget of $4.4 billion (plus any remaining funds from Phase I).

A wide range of service providers, including telcos, telecom and electric cooperatives, WISPs and competitive broadband operators can participate in the auction. The FCC will use a weighting system to favor bids to deploy service at higher speeds up to 1 Gbps downstream and with lower latency, meaning fiber broadband should be well represented.

These two programs are encouraging news for the rural broadband community. Although much has been accomplished in the past few years, there is still a lot of work to do. These funding programs will go a long way toward helping expand rural broadband access and contribute to closing the digital divide. Rural communities across the country deserve access to this utility and much more.

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.

Huntington Independent School District

Small rural school district adopts Wi-Fi 6 and unified wired and wireless network

Lessons of the past lead IT to prioritize top-notch support and forward-looking technology

The residents of Huntington, Texas, take pride in their school district. Rightly so. The Huntington Independent School District (ISD) serves more than 1,600 high school, middle school, intermediate school and elementary school students on five campuses. No matter the students' needs, teachers and administrators are always there to support them. They expect the district-wide wireless network to do the same.

One day, when all 400 middle-school students logged onto Edgenuity courseware, the Wi-Fi crashed district-wide. Jeff Baird, technical director for Huntington ISD, called the vendor to fix problems, but the response was as slow as the network. Replacing APs or patching software didn't improve the situation, either. The problems continued, and costs kept mounting.

When Baird presented a plan to the administration to replace the existing infrastructure, "everyone agreed that trying to shore up the existing infrastructure was just throwing good money after bad," he explained. So, they rebid the project and selected CommScope.

SUPPORT AND EQUIPMENT THAT DON'T FAIL THE USERS WHO DEPEND ON THEM

Baird had two main priorities in choosing a network partner: top-notch support and technology that would take the district far into the future. CommScope, with its RUCKUS portfolio, checked both boxes—and then some. For starters, CommScope enabled the school district IT to combine its wired and wireless networks with one infrastructure, one vendor.

With the RUCKUS SmartZone network controller, Baird and his team could also manage every access point and switch from a single pane of glass. Because the RUCKUS APs are Wi-Fi 6 certified, high-density performance went through the roof. Speed dramatically increased as well. The RUCKUS stackable multigigabit ICX switches enabled the school district to ramp up its internet speed to 2 Gbps. "Before, we were maxed out on bandwidth. Now, bandwidth is doubled and we have a clear and easy upgrade path to future higher speeds," says Baird.

Baird's other must-have, top-notch support, came into play early on. In the project's first phase, the budget didn't allow for replacing all the existing switches at once. CommScope engineers worked with the IT staff to integrate the remaining legacy switches with the ICX stackable switches.

"Their people were tremendously responsive and helpful. I never got a runaround. I could escalate any problem and get a call back with a resolution," Baird explained.

The new network is also significantly easier to manage and update. For example, when a new ICX switch is added to a stack, it automatically inherits the stack's existing configurations. Baird contrasts this with the old network.

"The legacy switches required a lot of manual configuration. The ICX switches simplify everything from initial setup to everyday management. Almost every configuration can be changed from the central dashboard without touching the switch," he says.

Changing out the old APs with the new ones was just as easy. Patented technologies like BeamFlex+™ adaptive antenna and ChannelFly enabled the consolida-

CHALLENGES

- Unreliable Wi-Fi limited the use of online applications
- The switches were limited to 1 GB
- Maintaining separate networks was time intensive
- Small IT staff
- Poor vendor support

SOLUTION

- 160 RUCKUS® indoor APs
- 40 RUCKUS ICX switches
- RUCKUS SmartZone network controllers

BENEFITS

- Went from 1 Gbps to 2 Gbps with an easy upgrade path
- Supports more online learning and better safety, security and emergency communications
- Simplified, single-pane-of-glass management across APs and switches
- The APs are Wi-Fi 6 certified and IoT equipped, future-proofing the network for years to come

"Without question, the new network has given us the foundation for digital learning, wherever the future takes us."
Jeff Baird
Technical Director, Huntington ISD

tion of some APs while supporting the multigigabit Wi-Fi 6 capabilities and ICX switches. The technologies use machine learning to create the strongest connections and highest throughput, compared to competitive products. CommScope engineers worked with Baird's team, using the AP's dual-band design to eliminate any co-channel interference.

"We can configure each AP for 2.4 GHz or 5 GHz and do it on the fly from the SmartZone console. We can check the status of the Wi-Fi in every school with a glance at the dashboard. But, in terms of everyday operations, we pretty much ignore the Wi-Fi. It just works," says Baird.

The new network also gives IT more options for strengthening safety, security and emergency communications. IT can now easily set up SSIDs on the Wi-Fi to open secure parts of the network for users or events. "We'll be looking at options for improving emergency communications and surveillance, as well as locking down the schools using more IoT-connected devices like door locks," says Baird.

NEW OPPORTUNITIES FOR IMPROVING ONLINE TESTING, SECURITY AND SAFETY

With the network now delivering rock-solid Wi-Fi performance, district-wide online testing is back on the table, and that promises to save teachers a substantial amount of time. Baird is already looking down the road and soon plans to add RUCKUS Cloudpath Enrollment System, which coordinates with the network to manage the onboarding of students and device authentication. He is also considering RUCKUS Analytics, a cloud-based network monitoring service for RUCKUS networks.

"We already get more information about network utilization than we ever had in the past," says Baird, "but RUCKUS Analytics should give us more ways to look at usage and optimize performance."

When schools closed during the COVID-19 pandemic, the Huntington ISD was quick to bring distance learning online. Middle and high school students were able to interact with their teachers via the Google Classroom learning platform. Even pre-kindergarten and elementary school students were online—engaging with teachers and parents via the Google Play Seesaw app. Much of the credit goes to the faster, more reliable and agile CommScope network.

"Without question, the new network has given us the foundation for digital learning, wherever the future takes us," says Baird.

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Satisfying Your IT Cost Reduction Initiatives and Solving Supply Chain Constraints in Challenging Market Conditions

By Gerry Goris
Director of Channel Sales
ENET Solutions, Inc.

As we are all living in unprecedented and challenging times, our clients are looking to their trusted advisors and partners now more than ever to guide them with strategic and innovative options. This collaboration will empower them to continue to meet their overall network connectivity objectives while concurrently satisfying their cost reduction initiatives.

A tremendous strain has been placed recently on many global networks with a significant increase in demand in internet traffic, video streaming, mobile and remote access to facilitate the need for High Speed Connectivity. This increased demand for bandwidth supported by the Service Providers, Carriers, Data Centers, Educational Institutions, Healthcare Providers and Enterprise Business' requires them to upgrade and bolster their network infrastructure in an accelerated timeframe to address the immediate demands of their clients in these dynamic conditions.

This critical need for increased network infrastructure scalability is putting a stress on financial budgets, product supply chains and overall resources. However, these market conditions have brought additional visibility and attention to an evolution in sourcing practices that has been occurring in the networking industry for many years. "The adoption rate and utilization of third-party Optic's/SFP's and network connectivity products has grown exponentially year over year as end users are requesting OEM alternatives to meet their budget objectives and lead time requirements. Products in high demand include OEM Compatible High Speed Optical Transceivers, Direct Attach Cables, and Active Optical Cables. "Jason Barrette- President ENET Solutions, Inc. Making the decision to consider an OEM alternative is the first step in this journey.

The next step is to find a partner that provides you with the highest level of quality and service to meet your needs. Wading through all the options online can be overwhelming at times and there is no limit to the number of providers attempting to offer solutions to the networking community. They range from brokers and trading companies with varying levels of reputations to several standout companies that offer quality, service, and solutions that set themselves apart from the pack. Taking the time to do your due diligence and thoroughly vetting your considered OEM Compatible Provider through a qualification and validation process will protect you from issues in the future.

ENET Solutions customers state their preference for the highest level of quality, reliability, performance, and service at a lower price point than the cost of an OEM product. Leveraging ENET provides over 15 years of industry experience, product knowledge, quality, and support that they can rely on. Enet Solutions products are designed and manufactured specifically for the most demanding network environments. With an entirely unique go-to-market strategy, markets seeking a true OEM alternative that offers identical functionality to OEM products and a lower acquisition cost without sacrificing quality or support, include Service Providers, Utility Providers, Data Centers, Enterprise Business, and Fed/Public Sector. "Our clientele utilizes us alongside their OEM partners and view us as a valued strategic resource to satisfy cost reduction initiatives and supply chain continuity. We offer more than 15,000 compatible solutions over more than 50 various OEM platforms providing our clients with a single source and point of visibility into the fragmented network infrastructure of the overall marketplace."Jason Barrette President ENET Solutions, Inc.

" . . . critical need for increased network infrastructure scalability is putting a stress on financial budgets, product supply chains and overall resources."

Growing and Simplifying Rural Access Networks

By Prayson Pate
SVP Solutions Marketing and CTO Edge Cloud
ADVA

Facilities-based broadband operators are being challenged to increase bandwidth and coverage. This demand is being driven by natural growth of services, but also by disasters like COVID-19. At the same time, operators are being squeezed to hold or cut access fees, while maintaining margins. That means cutting costs – both capex and opex. How can operators square this circle?

MOVING THE FOCUS TO THE SECOND MILE

There has been tremendous technical progress on the first mile. The latest mobile technologies connect users with more than an 1Gbit/s. Bonding and vectoring with DSL is not far behind. Cost reduction in optical components make FTTH an economic solution, enabling even higher access bandwidth. Such tremendous progress in first mile technologies is now creating a challenge for the second mile.

But all these innovations require a supporting metro transport network, and that means fiber in the ground and equipment in the PoPs. Obviously, DWDM will need to move closer to the end customer. Traditional solutions with vertically integrated optical transport and massive scale OTN switching are not well suited for tomorrow's networks. These approaches are based on closed and proprietary equipment from traditional suppliers. They tend to be expensive, and they don't enable mix-and-match to select best-of-breed components for each function. They do work, but they are not a platform for efficient growth or innovation – or maintaining margins.

NEW CHOICES, NEW ADVANTAGES

Fortunately, new approaches are available to help save the day. They build on a pragmatic separation between network layers for flexibility and ease of operation, while providing open interfaces to further simplify network operations. Such disaggregated packet-optical networks build on essential components such as:

- Open line systems with fixed and remote configurable optical add-drop multiplexers as underlying transport layer
- Ethernet connectivity with highly scalable, carrier-grade aggregation devices that can groom 1Gbit/s and 10Gbit/s feeds into 100G uplinks, all operating at wire speed
- Powerful demarcation devices with lower cost, higher throughput, and beneficial features such as layer 3 capabilities, service assurance, synchronization, security, and environmental hardening
- Open control based on standard north-bound interfaces at domain controllers

A sample network is shown below. It provides for efficient access and aggregation.

SOLUTION COMPONENTS AND REQUIREMENTS

The solution includes the following components, listed along with their requirements:

Metro rings – The ring loading is initially below 100Gbit/s, so its 200Gbit/s provides plenty of headroom. Initially, a single wavelength carries all traffic, and fixed or flexible ROADMs can be applied for a later upgrade.

Aggregation nodes – Each aggregation node connects 20 to 40 sites, that can be any of:

- Residential FTTH services at 50-250Mbit/s
- DSLAM/GPON with 1/10GbE uplink
- Mobile connecting business with 1GbE or 10GbE

Ethernet services – A rich set of Ethernet services are delivered, including:

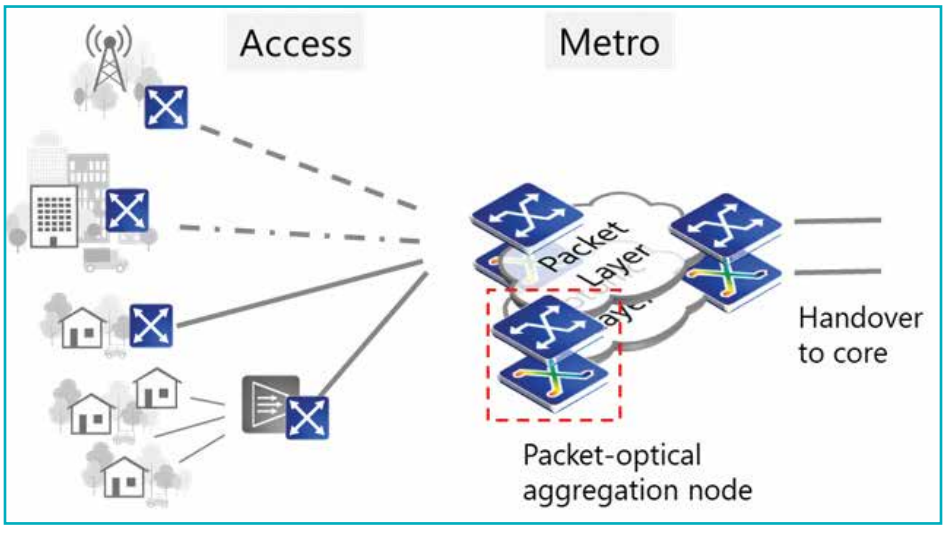
- MEF 3.0-compliant Ethernet private lines (EPL) and Ethernet LAN (ELAN) services
- Scaling bandwidth from sub-Gbit/s to 100Gbit/s
- L2/L3 VPN services in combination with PE router
- Service assurance with comprehensive OAM capabilities
- Value-adding features such as sync delivery and end-to-end security

New services – The growth in network capacity opens the opportunity for new and expanded services.

- Providing higher capacity to existing customers and competing for business services
- Transparent connectivity with OTN-services
- Addressing mobile wholesale and enterprise services with secure connectivity and precise timing

Management and control – This aspect is essential for efficient operation. Required functions include:

- FCAPS management and end-to-end service control
- Automated device configuration and service activation
- Open interfaces for ease of integration into umbrella management systems



HOW DO WE ACHIEVE THIS VISION?

One aspect of moving forward is paying for upgrades. Service providers might be reluctant to modernize networks because of the required upfront investment. But there can be no revenue growth without investment, and no additional investment without higher revenue. The FCC may be able to help with its Rural Digital Opportunity Fund (RDOF), which is aimed at bridging the digital divide. This fund will provide up to $20.4 billion over ten years for building gigabit speed broadband networks in underserved rural areas. The goal is to connect millions of American homes and businesses to modern networks with speeds of at least 25Mbit/s downstream and 3Mbit/s upstream.

Another part of the puzzle is how to build the network. Fortunately, all this technology is built into products available today from Walker and ADVA. Our best-of-breed packet and optical equipment provide a modern approach to access buildout, and it's all controlled by our management software. Solution components include:

Packet access – ADVA's leading edge products in this category include:

- FSP 150-GE100 Series for 1GbE demarcation and pre-aggregation
- FSP 150-XG100 Series for 10GbE demarcation and pre-aggregation

Packet aggregation – Our FSP 150-XG480 is the industry's newest and most efficient 100GbE service aggregation device

Optical transport – ADVA's FSP 3000 open line systems and terminals provide scalable and cost-efficient optical transport layer

Management – ADVA's Ensemble management suite includes:

- Ensemble Controller for FCAPS management, abstraction, and network control
- Ensemble Optical Director for end-to-end OTN and WDM service management with network intelligence
- Ensemble Packet Director simplifies activation of packet services offloading operations from many manual tasks

LET US HELP YOU GET THERE

With Walker and ADVA, you have partners who can help you expand your network and services – and do so within your budget. Talk to us about how you can achieve your vision for tomorrow's network.

UTC Reimagines 2020 Annual Conference and Expo

By UTC Meetings Department

Imagine the possibilities of attending a trade show that gives you all the knowledge and learning of an in-person event from the comfort and convenience of your home or office. Allowing you to experience educational sessions live and on-demand, as well as offering a virtual exhibit feature connecting you with partners to freely discuss use-case scenarios while discovering solutions together.

UTC is working with its education program sponsors and presenters to deliver live and pre-recorded content to our attendees. Offering a dual presentation delivery option allows you to enjoy the original education program subject matter and schedule, while providing flexible viewing patterns. Conference delegates will be able to engage with presenters, ask questions through virtual chats, and set up private meetings. Attendees will have access to the annual conference session gallery that includes virtual training, summits, pre-recorded sessions, and tracks. Attendees can view the pre-recorded sessions at their convenience or at a scheduled time, after which the panelists in those sessions will be available for a live Q&A.

For the first time, our content will be recorded and archived for later access by event delegates through an on-demand feature enabling participants to view more of the conference educational content and acquire additional Professional Development Hours (PDH).

UTC leadership, members, and staff would like to thank our sponsors, exhibitors, and technology partners for continued support as we pivot to launch this virtual expo. We encourage all utility delegates to participate in sponsored virtual sessions and events. Delegates will be encouraged to spend a generous amount of time in the virtual expo hall, which offers 24/7 access to make networking easy and convenient.

Here's how it will work: Each exhibiting company will have a virtual exhibit booth. These virtual exhibit booths offer unique opportunities allowing our technology partners to exceed the number of contacts obtained via an in-person trade event, organize contacts and correspondence more easily, provide product collateral, link video downloads, track analytics, and schedule appointments. We expect a greater domestic and global utility participation, increasing your impact in our marketplace to generate a higher return on your investment.

In light of the current situation, UTC has modified its registration fees:

Utility members and non-members $895.00
Technology partner members and non-members $1,595

If you are currently registered and have questions regarding your conference registration, please contact meetings@utc.org for personal assistance.

On behalf of all of us at UTC, we thank you for your critical and lasting support of the association. Everything we do is centered on providing our members, partners, and stakeholders with the data, content, and information needed to perform vital jobs. Now more than ever, your work is an essential lifeline for the country and the world. We are holding our meeting virtually in response to travel restrictions, state and organization return-to-work policies, and limitations on gatherings associated with the COVID-19 pandemic.

There is a tremendous amount of effort being put forth to launch the virtual conference and expo. This is an opportunity for all of us to come together, utilize technology, and continue to learn and adapt despite this time of unwitting change.

UTC will publish additional details through conference promotions and updates to the event's website. We are looking forward to creating a new UTC experience with you in 2020 that will continue the fun and connections we've always enjoyed.

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10G PON Rises to the Challenge of Growing Network Demands

By KT Mishra
Market Manager
ADTRAN

Spring 2020 has made its mark on history for many reasons, but will also go down for many as the time when Gigabit Passive Optical Network (GPON) deployment passed its "sell-by date." Amid the flood of traffic driven by consumers and teleworkers combined, GPON alone is unable to deliver, and a new set of solutions is required.

10 Gigabit Symmetric Passive Optical Network (XGS-PON) provides symmetric 10G bandwidth withstanding the most bandwidth-intensive applications of tomorrow without compromising on subscriber density. GPON networks have delivered an excellent return on investment for services in the 100Mbps to 250Mbps range during the last two decades. However, XGS-PON will carry the torch forward for the Gigabit society, where broadband services ranging from 250Mbps to multiple gigabits will become the de-facto offerings over the next 20 years.

WEIGHING YOUR OPTIONS

As more people begin to work remotely, spend more time at home, and rely more heavily on video conferencing and virtual meeting applications, the impact on upstream bandwidth is going to be especially critical. As a result, service providers will soon need to be advertising upstream speeds as well as downstream speeds.

At home, people will need more bandwidth as long-form and large- screen video and bandwidth-heavy video conferencing applications require more symmetrical bandwidth to achieve high quality. However, there remains the question of when to make the switch from GPON to XGS-PON to power your optical distribution network (ODN). The difference in cost for a GPON-based Optical Networking Unit (ONU) and an XGS-PON based ONU when scaled to 100,000 subscribers or more can be significant enough to favor deploying your access network with GPON.

Many service providers, though, look beyond the 20-30% increased cost of XGS-PON electronics over GPON and compare the total cost to connect an FTTH subscriber. With the ONU making up a small portion of the overall connection cost, the use of XGS-PON over GPON carries a premium of around 2% to 3%. So, is the extra cost delta justifiable? Let's take a closer look.

SUPPORTING MORE SUBSCRIBERS, BETTER SERVICES

If you were to switch to an XGS-PON network, you would benefit from increased network capacity enabling you to expand your existing footprint and increased service take rate. With XGS-PON, over 2,000 customers can be served out of a single rack unit space, increasing the subscriber density of aggregation equipment to an all-time high. The ability to have the network capacity to offer lucrative multi-gigabit services directed at a premium residential and enterprise customers and do this cost-effectively using a single common ODN makes for a pretty compelling case.

When an operator chooses XGS-PON to power their network, they afford themselves the expanded network capacity to support a proliferation of streaming 4k cameras, uncompressed gaming, and streaming services while mitigating an ensuing spike of failed gigabit speed tests. With a GPON network, an average peak rate of 4Mbps upstream and 25Mbps downstream will virtually guarantee an elevated number of failed gigabit speed tests and a large volume of costly customer care calls.

HOW ABOUT GPON NOW AND XGS-PON LATER?

What if you could benefit from the economies of GPON today and migrate to XGS-PON with minimal investment tomorrow? Since the two technologies operate on different wavelengths, both GPON and XGS-PON can coexist on a single ODN. This is extremely handy since it allows you to serve different customers and cater to different needs on the same ODN. By deploying with a coexistence module, you can benefit from the economies of scale and breadth of choice offered by GPON and delay the added cost of XGS-PON for later, or never, if market drivers for increased capacity do not come to fruition.

HOW ABOUT GPON AND XGS-PON TOGETHER, BUT SEPARATE?

Another option to consider is deploying both GPON and XGS-PON today with or without a coexistence module, using both a GPON OLT and an XGS-PON OLT. This solution gives you a clear separation between subscribers. Because of the separation, each PON port can be used to serve up to 128 subscribers. However, there is the extra investment to fund and maintain the architecture and the difficulty associated with moving GPON customers to the XGS-PON network in the future, if needed.

HOW ABOUT BOTH GPON AND XGS-PON NOW, BUT BETTER?

Perhaps the best alternative is a combination OLT that integrates the coexistence of GPON and XGS-PON into a single entity. The advantage of deploying a Combo PON OLT is that you can serve GPON customers today and add XGS-PON customers later without having to add any new equipment. Since most of the cost differential between GPON and XGS-PON deployment is on the ONU side, a Combo PON OLT is the perfect low-cost, upfront investment in GPON and the least disruptive and most economical migration to XGS-PON.

The bottom line is that when making network investment decisions with decade-long impact, 10G PON provides the next-generation fiber access technology needed to support network scale, density, and flexibility for residential and business broadband demands.

Learn more at ADTRAN.com/10G.

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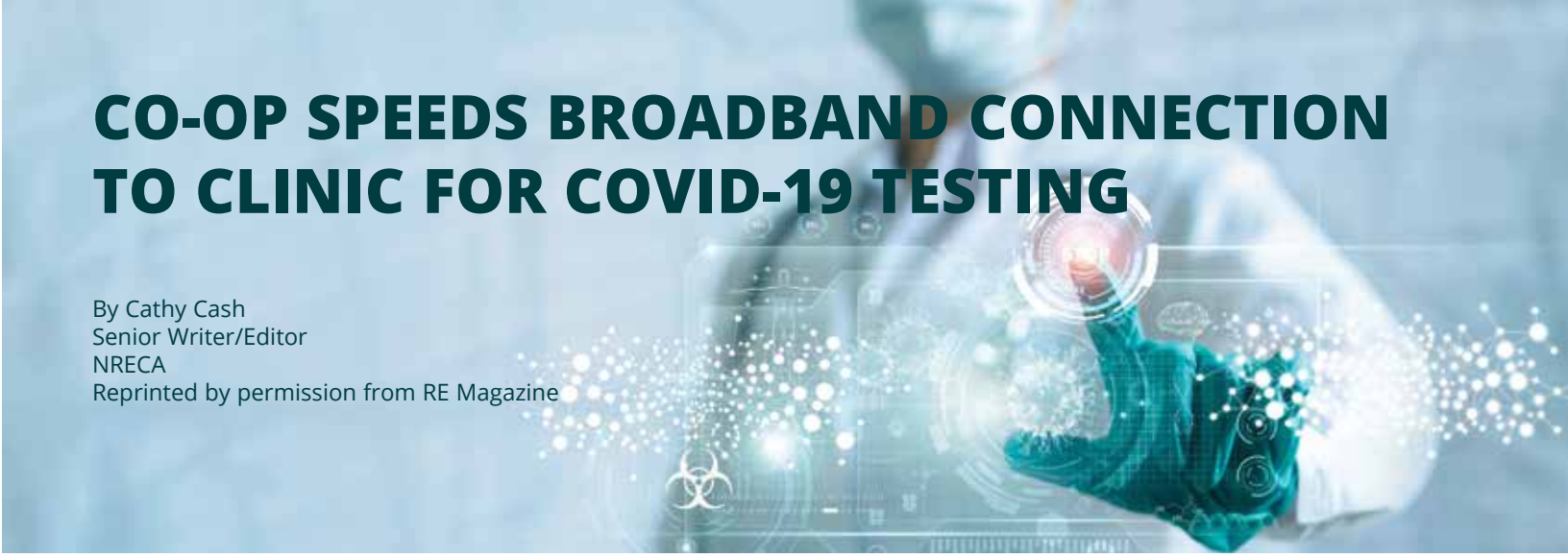
CO-OP SPEEDS BROADBAND CONNECTION TO CLINIC FOR COVID-19 TESTING



By Cathy Cash
Senior Writer/Editor
NRECA
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The urgent request from the county's only hospital came on a Thursday evening: Could the local electric cooperative provide broadband internet access to a new clinic to test patients for COVID-19—by 8 a.m. the following Monday?

On a good day, a crew can excavate and drill around 500 feet of conduit to lay fiber cable. NineStar Connect's closest connection to the facility was 1,800 feet away.

George Plisinski II, manager of telecom operations for the Greenfield, Indiana-based co-op, described the situation with a baseball analogy: "We were down 9-0 in the bottom of the seventh."

Curveballs included obtaining state and city permits to bore into a state road and a local street; getting gas, water, and communication utilities to mark underground lines over the weekend; a late-season wet snow; and broken drilling equipment.

But NineStar Connect was up for the challenge, Plisinski said, because "we live our co-op principles every day, and concern for community was right there with us."

The co-op, which provides electricity, broadband, and water services, called on co-op member and state Sen. Michael Crider to expedite the necessary permits, a process that normally can take up to a month.

Crider, who chairs the Homeland Security and Transportation Committee, got the Indiana Department of Transportation to approve the permits within minutes.

"That our state senator would ask on our behalf to push a permit through on Friday night set the wheels in motion," Plisinski said.

Local utilities agreed to waive the 48-hour call-before-you-dig period and worked through the night Friday to mark lines. At daybreak Saturday, six high-pressure gas lines—including one that fed the entire city of Greenfield—along with one 12-inch water pipe and phone lines were "all standing in our path to get where we needed to get," Plisinski said.

Then came the snow. By nightfall, the co-op crew managed to dig halfway to its connection in heavy slush.

"From phones to internet, involving communication, patient flow, and documentation was all contingent on having the technology and infrastructure they provided us."

Early on Sunday, the pump on a vacuum excavation system failed, stopping their work. The co-op contacted the mayor, who dispatched two vacuum trucks to the scene, preventing a four-hour wait from another location.

The NineStar Connect crew was running two directional drills when one had mechanical issues, forcing them to use the smaller drill before abandoning that and digging the last 30 feet by hand.
"We're using shovels and spades, digging it down 3 feet deep," Plisinski said. "And it's dark at this point."

A little after 10:30 p.m. Sunday, March 15, the co-op provided the clinic with broadband internet.

"We stopped by there Monday at 7 a.m.; everything was good to go," Plisinski said. "Two people were waiting to be seen while we were there before the clinic officially opened."

NineStar Connect provided multiple-gigabit service through a private connection back to Hancock Regional Hospital. The clinic doctors and staff used the same software and equipment as they did at the main hospital, which the co-op connected nearly two decades ago.

"Without the incredible work and dedication from our partners at NineStar Connect, we would not have been able to open and provide care to those that needed us most," said Jenn Cox, business director for Hancock Health Gateway Services. "From phones to internet, involving communication, patient flow, and documentation was all contingent on having the technology and infrastructure they provided us."

Rapid Deployment Network-as-a-Service Options for Utilities in the Wake of COVID-19

By Bobbi Harris
CEO
Smart Water Smart City, LLC

COVID-19 has taught many lessons and identified new challenges for everyone, but for the electric, water and gas utilities it has once again highlighted the need for command and control of the network. By utilizing the strength of telecommunications, utilities can enable more automation of assets and focus their time on what is most important – safe, reliable service delivery.

Artificial Intelligence (AI) built into automated applications and edge computing enabled over automated networks will help utilities make decisions more confidently. AI and intelligent devices also release utility exposure and risk from human-heavy application at a time when limiting human interaction is vital.

By deploying a standards-based network (e.g. NB-IoT), operators can leverage a deep, diverse ecosystem of devices and sensors. Major chipset manufacturers are producing low cost, powerful communications devices in mass quantities that operate in a wide range of environments. Device manufacturers are using these chipsets to bring to market sensors that have the same security as smart phones while addressing a wide range of applications for command and control, smart cities, smart parking, environmental monitoring (earthquake, wildfire, etc.), and many other applications possibly including the detection of COVID-19 or other viruses in contained environments.

"Utility workforce management systems are also in the spotlight as it becomes more difficult to manage constantly remote fleets and people faced with social distancing. "

A variety of solutions are employed for utility Field Area Networks (FAN), asset management and SCADA, but with the rapidly evolving technical landscape and COVID business models, utilities now must look for additional network options, which focus on standards and provide a lower cost, highly scalable alternative to manage assets.

NETWORK-AS-A-SERVICE

Standards-based LTE is now mature, with proven performance in Critical Infrastructure Industries (CII). Utilities looking for suitably low-risk and future-proof investments are assessing the benefits of private LTE and NB-IoT in licensed spectrum. Control of the communications network is the most direct way to maintain security and service and with a growing range of choices available, each utility needs to assess the benefits against their own automation roadmap and business goals. One strong option for control of the network without the high cost of infrastructure ownership is the Network-as-a-Service (NaaS) model.

Just as the distribution grid needs a dynamic infrastructure that can handle the radical changes occurring in generation and consumption, a truly smart grid needs equally smart communications to deliver the most benefits. The communications network must be as secure, and reliable as the power, water or gas network because they are becoming increasingly interdependent. But this does not mean a utility has to sink millions into building another network.

Utilities subscribing to public networks, or network slices within public networks, experience escalating costs, security risks, and lack of control over the technology. Often utilities are locked into proprietary hardware solutions and are limited by single-sourcing and the vendor's technology roadmap. An LTE/5G-based IoT network allows utilities to manage their own data and monitor and control new and existing assets, while 3GPP compliant IoT endpoints offer interoperability protection.

Although this is not necessarily a new-fangled idea, NaaS options from new market entrants such as Puloli, are focusing on private IoT networks connecting devices in innovative ways with even lower costs than in the past. These options allow utility operators to maintain total control of their network without having to build dedicated internal organizations; They can have confidence in a standards-based network that offers the benefits of mainstream technology.

NaaS models built upon a stakeholder service level agreement (SLAs) offer flexibility and capabilities beyond traditional self-designed, buy, build, and operate models. This SLA approach enables a variety of public-private partnerships. For example, an electric investor-owned utility may partner with a regional economic

"The communications network must be as secure, and reliable as the power, water or gas network because they are becoming increasingly interdependent."

development agency, several municipalities and cooperatives, and another gas-only utility to provide environmental monitoring, water and gas leak detection, online and offline asset monitoring including distributed energy resources, security services and many other regional specific services. AI and advanced utility automation require very granular data from a large number of sensors, monitoring, and diagnostics devices. With the economic challenges of the pandemic, utilities are looking for ways to achieve this automation and control in a low-cost, highly scalable system which can be rapidly deployed.

BETTER SERVICE TO CONSUMERS

In the past, utilities viewed communications networks as an unavoidable cost of doing business. Today, utilities also need a communications network that releases them from a future of limited infrastructure and stranded assets. Continued utility modernization will require a communications network that is foundational to better customer service, immediately and for the future. Complex data analytics, intelligent automated devices, and real-time command and control are all made possible with a highly scalable, lower-cost, high quality network-as-a-service.

COVID-19 shifted consumption patterns as Commercial & Industrial (C&I) demand plummeted, and residential consumers increased use. These shifting patterns have also stressed the commercial carrier networks as remote workers tax infrastructure with video meetings and virtual events. Utilities now require more real-time data than ever before to not only flatten the spikes, but also to better serve the consumers faced with layoffs and business closings. Utility workforce management systems are also in the spotlight as it becomes more difficult to manage constantly remote fleets and people faced with social distancing.

The option to have a third party deploy and manage the utility network may offer a more rapid deployment cycle for IoT use cases that have been postponed during the workforce strain of COVID-19. This option integrates a needed system into the utility network, while freeing fulltime employees to work on other projects and bring additional support for utility strategic initiatives.

Today, a new NaaS offering may be the best option as cities and states reopen and another shift in demand leads utilities to quickly evolve again. As additional command and control over a real-time network is needed for a rapid development, network design, and deployment in a short order, a NaaS solution can be a turn-key end-to-end solution. Critical infrastructure industries have new options that are focused on protecting and advancing business even as the next crisis looms.

Bobbi Harris is a utility telecommunications and smart city industry expert and the founder of Smart Water, Smart City, LLC. She is a leader in market analysis, strategic intelligence and marketing strategy. In her years as a Global Strategic Marketing professional, she has focused on utility issues, business drivers and telecom technologies to address water and energy challenges including smart cities, cleantech and green building initiatives. Her insights are sought by key stakeholders, including elected officials, investors, and electric, water and gas utility leaders and technology executives worldwide. Bobbi is one of the ESI 2019 Global Smart Energy Elites. She graduated summa cum laude from Campbell University and earned her MBA from the same.

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CONSIDERATIONS FOR NETWORK MAINTENANCE OPTIMIZATION

When was the last time you really examined your network maintenance contract? The truth is that your network maintenance contract may be broken without you knowing.

Network infrastructure is not identical year-to-year. New equipment is added, legacy hardware is removed, configurations change, and system demands increase or decrease.
The agreements are so complex that no one knows where to even begin to evaluate their effectiveness or delivery of value.

That's why we created this Tip Sheet, to help you break down your Service Level Agreements and begin to understand how you can reduce your OPEX dollars by cutting-out unnecessary coverage and reducing network downtime.

Whether you are negotiating a new agreement or managing existing agreements, there are specific questions you should be asking.

Maintenance contracts that fail to address these changes are, at best, leaking money and at worst, they are a ticking time bomb ready to go off in the middle of a crisis.

PRE-NEGOTIATION QUESTIONS

1. WHAT IS YOUR REQUEST FOR PROPOSALS PROCESS FOR MAINTENANCE CONTRACTS?

Many network agreements are entered into as an afterthought, when new equipment is purchased, or are signed as renewals. This makes RFPs for network maintenance contracts rare.

But your organization probably has an RFP process that demands needs analyses, internal reviews, and budget negotiations. Enacting your company's formal RFP procedure is an ideal way to ensure that you are not overspending on network maintenance.

2. WHAT EQUIPMENT IS ON MY NETWORK?

Include serial numbers, models, and criticality assignments in your inventory. Investigate scenarios that may change the criticality assignment of the hardware.

Identify existing coverage provided through entitled support and any other maintenance contracts that may cover the equipment.

Remember that OEMs may encouragecompanies to renew existing maintenancecontracts without thoroughly reviewing thecurrent state of the network, so it is up to thebusiness to perform due diligence.

SERVICE QUESTIONS

3. WHAT LEVEL OF COVERAGE DO I NEED?

Instead of relying on the definitions assigned by your maintenance provider, evaluate coverage levels and descriptions based on your business needs.

For example, a vendor may propose that non-critical equipment is assigned a guaranteed response time of two hours. However, without a precise definition of "response," your organization may wait much longer to achieve service restoration.

4. WHAT FACTORS INFLUENCE RESPONSE TIMES?

Some contracts may include clauses that require the customer to respond to inquiries within a set period or incur response-time penalties.

Response times can also be influenced by "peak" and "off-peak" times and differences in time zones.

5. WHO CONTROLS ESCALATION?

Navigating through unnecessary and time-consuming troubleshooting procedures simply to get to the next level of support is frustrating. To avoid this scenario, ensure that your network maintenance contract allows for client-driven escalation and de-escalation.

MANAGEMENT QUESTIONS

6. DOES THE CONTRACT INCLUDE AN INDEMNIFICATION CLAUSE?

If the contract was drafted by the vendor and not reviewed by your legal team, the answer is likely "no." Indemnification clauses mandate that the service provider pays for any third-party litigation costs that result from a breach of contract.

This simple provision can save your company thousands and shows the provider that you are protecting your best interest.

7. HOW WILL DISPUTES BE RESOLVED?

What happens if there is a dispute regarding the contract? Many contracts include provisions for binding or non-binding arbitration. Binding arbitration prevents the case from going to court while in non-binding arbitration, either side can decide to dismiss the arbitrator's decision and take the case to court.

8. HOW WILL CONTRACT UPDATES BE HANDLED?

Many OEM maintenance contracts do not allow for equipment to be added during the course of the agreement without signing a new contract and issuing a new contract date.

This forces the client to manage several maintenance contract start and dates and increases the risk of overlapping coverage.

To avoid this, ensure that your maintenance contract allows for the modification of equipment and coverage during the course of the agreement without signing a new contract.

Continued on Page 53

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PROTECT WHAT MATTERS

By Sarah Walker
Services Product Line Manager
Walker and Associates

We live in a time where staying connected while working, learning, and communicating from a distance is more important than ever. As we operate our networks and deliver services to our customers, we have an opportunity to help protect the health, well-being and future prosperity of the communities and people we serve. We are part of the essential workforce and infrastructure; Providing the stability and solutions to keep our nation strong as we navigate uncharted territory together.

During times like these, we take inventory to ensure that we are doing all we can to protect core assets: the equipment and networks on which our customers and communities rely. What will happen if a critical equipment component fails? Do you have service agreements in place to support swift remediation and resolution? Do you have confidence that you can efficiently access an expert engineering resource to isolate and resolve the issue; to aid in root cause analysis? Are you maintaining and augmenting your network to facilitate optimal performance and uptime tomorrow and in years to come?

What else will 2020 throw our way? We hope to see smoother sailing from here, but wise leaders know that preparation and planning can make all the difference when nature, or life, throws a curveball. Are your network components protected from the elements as we head deeper into hurricane season? Do you have redundancy and recovery plans in place?

How about the future? With conditions changing rapidly, do you have the in-house resources and expertise needed to pivot for what is next? Do your systems and architecture enable you to scale and adapt? To deliver the solutions, your customers need to secure and optimize their traffic?

If you are asking these questions, you are not alone; Walker and our trusted partners are here to help. We provide

support as you take inventory of your assets and maintenance agreements. We eliminate complexity and guide you to best in class solutions that we tailor for your success. We complement your operations with services enabling you to fulfill the needs of your community and customers rapidly.

Walker leverages relationships and shares strategic insights gained through a 50-year legacy of servicing the telecommunications industry. As we look to the future, Walker is continually evolving our portfolio of services to help you overcome challenges and realize your visions.

WalkerFirst Services currently include:

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IN THE SPOTLIGHT

By Randy Turner
Director, Marketing Communications
Walker and Associates

JAMES JONES

James Jones recently joined Walker as the Regional Account Manager covering the Bayou area including TN, AR, MS and LA.

James has more than 13 years' experience in the telecommunications industry, most recently with FiberRise as an Account Manager. Prior to FiberRise, he was at ADTRAN for over 11 years, starting as Technical Support Engineer before moving to Technical Training. While at ADTRAN he also worked as a Sales Engineer supporting Windstream and Tier 3 Customers in Nebraska.

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SARAH WALKER

Sarah joins Walker with nearly 20 years of experience in telecom and cloud communications. Her new role is Services Product Line Manager as part of the Marketing Department. She started her career at Speakeasy, where she worked in Sales and Business Development roles for four years. She then transitioned to Support to focus on serving the partner community and solving customer issues. Sarah has spent the last 10 years working for MegaPath (now Fusion Communications) leading Service Delivery, Implementations Engineering, and Technical Support organizations. Sarah is passionate about leveraging technology to drive exceptional customer experiences and outcomes. She is very excited about the opportunity to bring the knowledge and insights she has gained working on the front lines back to Walker.

You will notice that Sarah shares the Walker name; she is Rick Walker's daughter, and granddaughter of company co-founders Chris and Virginia Walker. Sarah grew up in Virginia and attended college at Warren Wilson in Asheville, North Carolina, before relocating to Seattle, Washington.

When not immersed in work, Sarah loves to travel; Taking in the world and its people one step, bite, taste, and conversation at a time.

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336-731-5271

TAYLOR BRIGGS

Taylor Briggs recently joined Walker as a member of the Optical Business Development team. Tayor studied at the University of North Carolina at Wilmington, where he majored in Business Marketing. He has a background in Marketing and Sales, with a successful track record in the real estate market. Although new to the telecom industry he is proving a quick learner, using strong interpersonal skills to build and maintain key relationship with customer/partner organizations. Join us in welcoming Taylor to the industry and to Walker and Associates.

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336-731-5252

TRUDY DEWITTE

Trudy joins Walker following a long career at AT&T, Lucent, Alcatel-Lucent, and Nokia. Most recently, she helped shape the 5G campaign organization. Prior roles included sales, customer marketing, corporate marketing, and communications. She loves all things telecom and finds it a fascinating puzzle to solve. Mostly, she appreciates the people she's worked with and counts many as life- long friends.

Trudy is pursuing a Masters of Arts at St Bonaventure University for Integrated Marketing and Communications and finds the courses relevant to each day of work in her new role. Trudy is excited and grateful to join Walker and to be part of this achieving team. Her main goal is to deliver meaningful contributions in Third Party Optics and SD-WAN.

Trudy lives with her husband Dan in Rochester NY. Trudy enjoys hot yoga, pilates, and swimming. During the summer, she is an avid gardener. She is looking forward to getting her new kayak in the lake, the bike on the road, and hiking a few (small) Adirondack peaks.

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CHRISTOPHER WALKER

Congratulations to Christopher Walker, who was recently announced as the new VP of Federal Development for Walker and Associates. He began his career with Walker working in marketing, followed by Commercial Inside Sales and Commercial Outside Sales, prior to his eventual leadership roles within the Federal Sales Department. Christopher has most recently managed the Federal Inside Sales Department while working on his MBA from Wake Forest University School of Business in Winston-Salem, NC. Flanked in the adjacent photo by CEO Chrystie Brown and President, Mark Walker, Christopher is ready to manage the Outside Federal Sales Managers and will be highly customer facing as the company expands its reach into this market. Following graduation later this year, he and his wife will relocate to the DC area. Join us in our congratulations and best wishes for his ongoing success!

ReConnect[ing] Rural America

By Brad Finstad
USDA Rural Development State Director
USDA | MN

After years of trying to bring high-speed broadband connectivity to the residents and businesses in the city of Harmony, Minnesota, Harmony Telephone Company (HTC) will be able to do just that. With help from a $2,700,000 loan and $2,700,000 grant investment through the United States Department of Agriculture (USDA) ReConnect Loan and Grant Program, HTC will be able to connect 577 households, a health care center and a critical community facility access to fast uploads and downloads, video security capabilities and the choice to work from home.

USDA Deputy Secretary Stephen Censky announced this investment and two others, totaling nearly $11 million, on January 17 at the Harmony Fire Station among 50 plus attendees. Learn more about these investments here.

USDA's ReConnect broadband program is one of the newest ways that USDA is helping rural communities build the infrastructure necessary to bring sufficient access to high-speed broadband.

Background on ReConnect Program

In March 2018, Congress provided $600 million to USDA to expand broadband infrastructure and services in rural America. On December 13, 2018, Secretary Perdue announced the rules of the program, called ReConnect, including how the loans and grants will be awarded to help build broadband infrastructure in rural America. USDA received 146 applications between May 31, 2019, and July 12, 2019, requesting $1.4 billion in funding across all three ReConnect Program funding products: 100% loan, 100% grant, and loan-grant combinations. USDA is reviewing applications and announcing approved projects on a rolling basis. Additional investments in all three categories will be made in the coming weeks.

These grants, loans and combination funds enable the federal government to partner with the private sector and rural communities to build modern broadband infrastructure in areas with insufficient internet service. Insufficient service is defined as connection speeds of less than 10 megabits per second (Mbps) download and 1 Mbps upload.

On April 22, USDA Deputy Under Secretary Bette Brand announced that USDA received 172 applications requesting $1.57 billion in the second round of the ReConnect Pilot Program. Congress appropriated $1.3 billion for the first and second rounds of the ReConnect Program. USDA made $550 million available for the second round. The application window for round two closed on April 15, 2020. That includes up to $200 million for grants, up to $200 million for 50/50 grant/loan combinations, and up to $200 million for low-interest loans.

The Coronavirus Aid, Relief, and Economic Security (CARES) Act provided $100 million in additional funding to the program. USDA received 11 round one ReConnect Program applications that are eligible for the $100 million Congress allocated to the program through the CARES Act.

In addition to the ReConnect broadband program, USDA helps to improve the expansion of broadband service through the Telecommunications Infrastructure Loan and Loan Guarantee program. Most recently, USDA announced it was investing in $86 million for 17,000 people and businesses in eight states.

For example, in our neighboring state of Wisconsin, the Chibardun Telephone Cooperative Inc. is receiving a $10 million loan to install 328.5 miles of Fiber-to-the-Premises (FTTP) to serve the rural areas of the Prairie Farm and Sand Creek exchanges.

Since October 2019, USDA has invested $744 million to bring high-speed broadband e-Connectivity to 172,000 households, 19,000 rural small businesses and farms, and more than 500 health care centers, educational facilities and critical community facilities in 34 states.

To learn more about USDA's broadband programs, contact your local Rural Development General Field Representative Dominic Henderson at dominic.henderson@usda.gov or (218) 820-9168.

USDA Rural Development provides loans and grants to help expand economic opportunities and create jobs in rural areas. This assistance supports infrastructure improvements; business development; housing; community facilities such as schools, public safety and health care; and high-speed internet access in rural areas. For more information, visit www.rd.usda.gov/mn.

If you'd like to subscribe to USDA Rural Development updates, visit our GovDelivery subscriber page.

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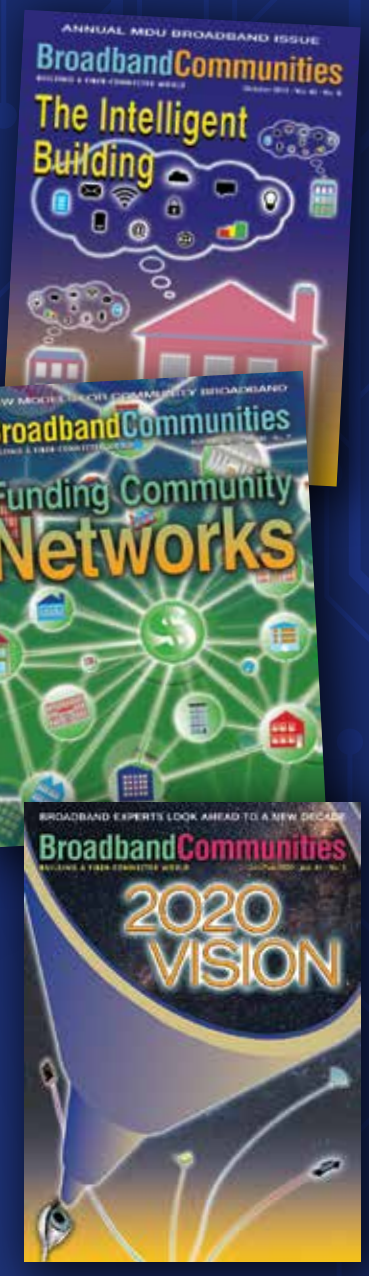

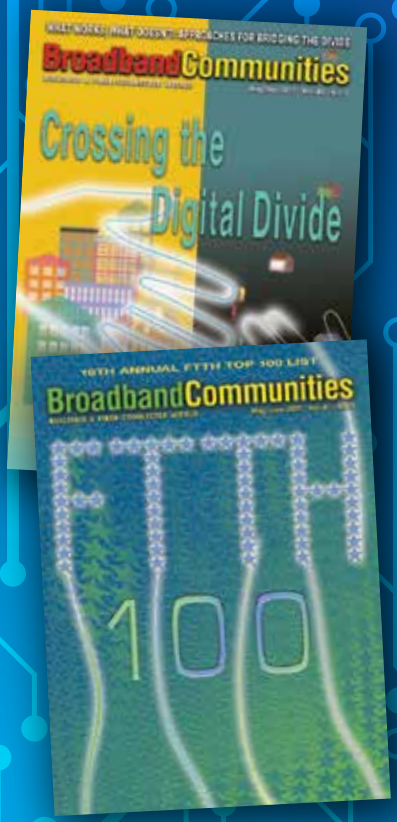

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‘A BLESSING’: CO-OPS DELIVER FREE PUBLIC WI-FI HOTSPOTS DURING COVID-19

By Cathy Cash
Senior Writer/Editor
NRECA
Reprinted by permission from RE Magazine

Eric Cunningham was worried about his students.

As superintendent of the Halifax County School District in North Carolina, he knew that his 2,300 kids already faced hunger and other challenges of living in a low-income, rural community. By early April, schools were closed in response to the COVID-19 pandemic, and, without widespread internet access in the county, children were bound to fall behind in their learning.

That’s when the trucks from Aulander-based Roanoke Electric Cooperative arrived, ready to install a free public Wi-Fi hotspot in school parking lots.

“It was a blessing,” Cunningham said. “We’re 100% free lunch, which means a lot of our students don’t have access to the internet for home use. We have to look at other means to support them. What I’ve learned from this pandemic is that the internet is needed like electricity, especially when it comes to learning.”

Roanoke Electric’s quick hotspot build-out was part of a trend among co-op broadband providers eager to keep their communities connected during the pandemic. Hotspot locations have included churches, parks, restaurants, and co-op offices across rural America. Users can connect to work, do homework, watch movies, or shop, all from the safety of their vehicles.

In Fayetteville, Arkansas, OzarksGo, a subsidiary of Ozarks Electric Cooperative, partnered with several local school districts to create free Wi-Fi hotspots, including on school buses. Initially, a school district equipped the buses with Wi-Fi technology for cellular internet connections then parked them in areas convenient to families. When this proved too expensive and slow for multiple users, the co-op connected them to its OzarksGo’s fiber-optic network, offering high-performance internet connections.

“ . . . without widespread internet access in the county, children were bound to fall behind in their learning.”

“We know how important broadband access is, especially now,” said Steve Bandy, general manager of OzarksGo. “We were happy to help with this innovative solution.”

Continued on Page 47

METRICS QUESTIONS

9. HOW WILL METRICS BE TRACKED?

Metric tracking is the only way to ensure that a service provider adheres to the tenets of your network maintenance contract. Tracked metrics should reflect areas of maintenance that are under the control of the service provider and should motivate the correct behavior.

10. WHICH METRICS WILL BE TRACKED?

The specific metrics to track depend on individual contracts and the needs of the business. However, there are some common areas to look at when setting up metrics:

- Service availability
- Defect rates
- Production failures
- Security

FINALLY…

Do not enter into a network maintenance contractlightly. Consider all aspects of coverage, including equipment, service levels, changing business needs, and the costs associated with both non-coverage
and over coverage.

To ensure that your network maintenance is optimized for your business needs complete routine assessments of your network configuration, existing agreements, and entitled services. Be sure that your maintenance provider is held to the same high standards that you provide for your customers.

Request a complete copy of the Top 10 Considerations for Network Maintenance Optimization brochure at info@walker-first.com

As an active member of multiple state, regional and national industry associations, Walker and Associates is strategically engaged with organizations supporting telecommunications markets. We demonstrate our commitment through event sponsorships, contributing educational content and advertising, and exhibiting at conferences and expos.

As live events are on pause during the pandemic, we are engaging with events converting to virtual formats. Walker is also hosting its own series of webinars, known as WalkerConnect. You can access our library of video assets on our YouTube channel at https://www.youtube.com/channel/UCGz01El6dOuAvkdc4k5SGIQ. You can also refer to the Upcoming Events section of our website, https://walkerfirst.com, for additional details and the most current schedule of live and virtual industry events. Walker is looking forward to the time when we are face to face again, supporting associations and their important work.

AUGUST 2020	
NLIT Summit 2020	VIRTUAL
UTC Broadband Workshop	VIRTUAL
TTA Convention & Product Showcase	San Antonio, TX
NYSTA Annual Conference	Saranac Lake, NY
UTC Telecom and Technology	VIRTUAL
SEPTEMBER 2020	
Broadband Communities Summit	VIRTUAL
UTC Region 3 Fall Meeting	VIRTUAL
OCTOBER 2020	
Berkeley Lab	Berkeley, CA
NASA AMES	Mountainview, CA
NETS	Poconos, PA
TSTCI Annual Meeting	Irving, TX
TANE Annual Meeting	New Castle, NH
UTC Region 6	VIRTUAL
WSTA Fall Conference & Exhibits	VIRTUAL
KTA TTA Joint Conference	Bowling Green, KY
SCTE Cable-Tec	VIRTUAL
ATA Tech Showcase	Anchorage, AK
NOVEMBER 2020	
Mountain Connect Broadband	Dillon, CO
Ft. Huachuca Innovation Day	AZ
UTC 5G, Broadband and Small Cell Workshop	Nashville, TN
ACE/RUS Symposium	Oklahoma City, OK
DECEMBER 2020	
TechNet Cyber	Baltimore, MD
SD Fall Plant	TBD
Fiber Connect	Nashville, TN

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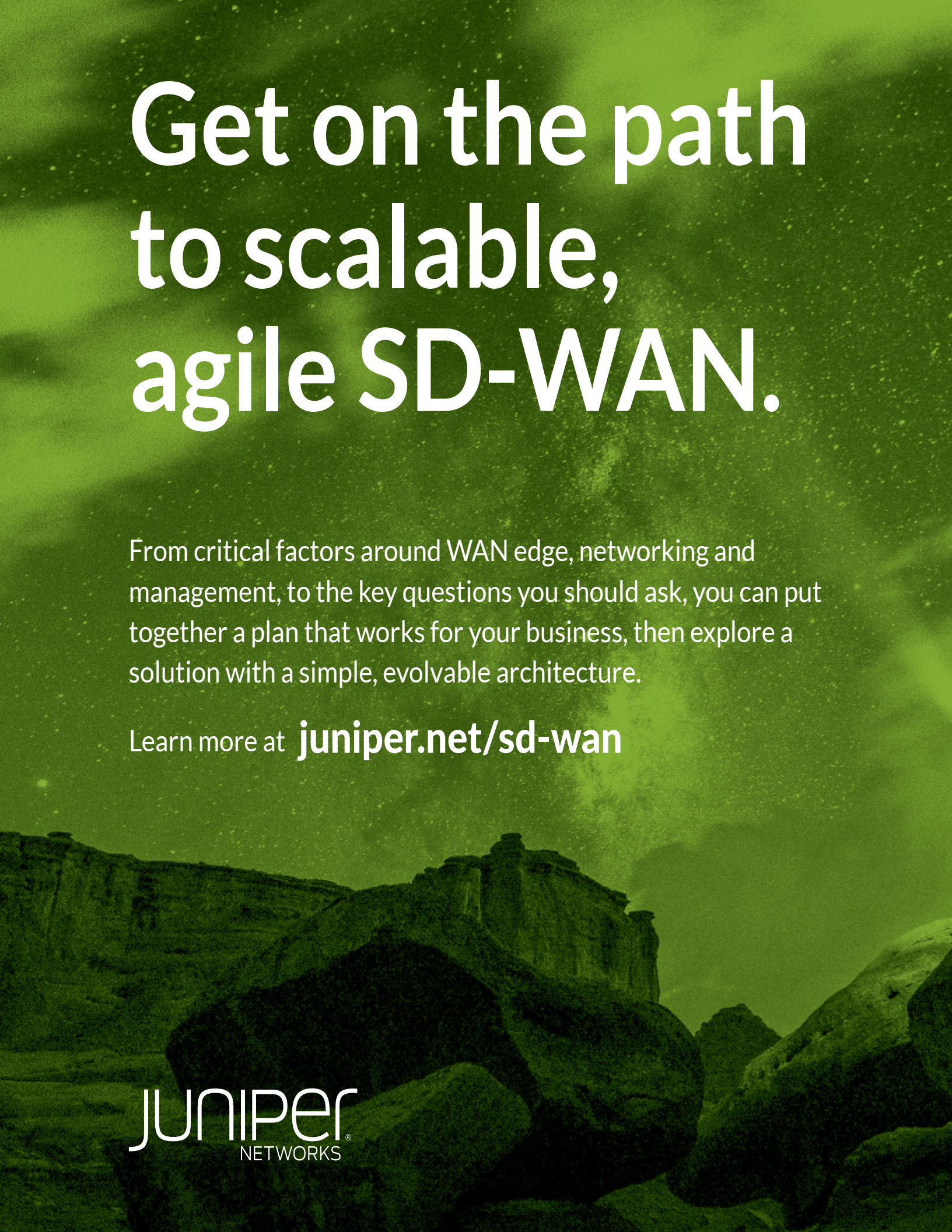
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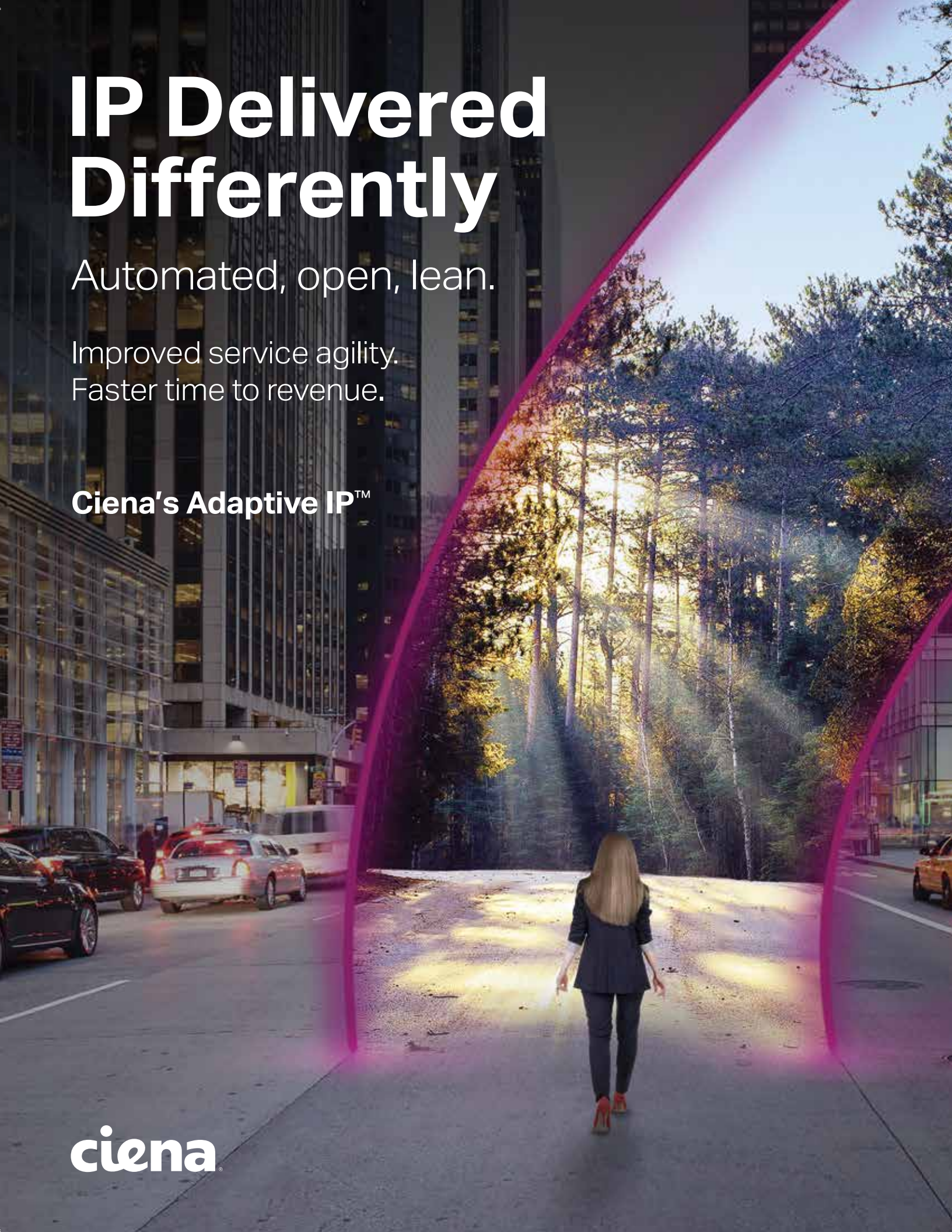
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