

FUNDING RURAL BROADBAND

- ✓ **Maximizing Network Investments**
- ✓ **Identifying Funding Resources**
- ✓ **The Emerging Role of Rural Electric Cooperatives**
- ✓ **Redefining Broadband**
- ✓ **Questions Rural Broadband Providers Must Answer**



Broadband
with low risk
and even
lower stress?

Relax. We got this.

Your community wants broadband—you want what's best for them and your co-op. At Fujitsu, we get it. We take the weight and project risk off your shoulders, managing your entire broadband implementation start to finish.

- Smarter, more reliable grid
- New broadband services
- Increased below-the-line revenue

We're vendor-neutral integrators, focused on building a long-term, scalable solution delivered on time and on budget. With Fujitsu by your side, deploying an operational-ready, broadband network is easier than you think. Because we get you.

(888) 362-7763 | us.fujitsu.com/telecom

shaping tomorrow with you



FUJITSU

Fujitsu Network Communications • 2801 Telecom Parkway, Richardson, TX 75082

© Copyright 2019 Fujitsu Network Communications, Inc. FUJITSU (and design)® and "shaping tomorrow with you" are trademarks of Fujitsu Limited in the United States and other countries. All Rights Reserved.

IN THIS ISSUE . . .

FEATURE ARTICLES

- 4 Funding Rural Broadband - A Frontline View
By Alan Fitzpatrick, Open Broadband, LLC
- 9 Public-Private Partnership Will Build Out Affordable Broadband in Rural America
By Sarah Tyree, CoBank
- 10 Questions for Rural Broadband Providers
By Prayson Pate, ADVA Optical Networking
- 13 Fiber: We Are the Difference for US Jobs
By Lisa R. Youngers, Fiber Broadband Association
- 16 Funding Opportunities
By Vantage Point Staff
- 21 Rural Deployments: What to Buy?
By Steven S. Ross, Broadband Communities
- 22 Mapping A Better Broadband Future
By Chip Pickering, INCOMPAS
- 25 Investing for the Future of Rural Broadband Infrastructure
By Shirley Bloomfield, NTCA
- 28 Broadband Breakthrough: Electric Cooperatives are increasingly seen as part of the solution to rural connectivity
By Cathy Cash, NRECA
- 35 NC Broadband Infrastructure Office
By Jeff Sural, NC Department of Information Technology's Broadband Infrastructure Office (BIO)
- 36 Show Me the Money: Broadband Funding for Rural Utilities
By Bob Lockhart
- 42 What's Your Time IQ?
By Brenda Abdilla, Management Momentum
- 45 Do More Than Show Me Money
By Bobbi Harris, Smart Water Smart City, LLC

RESOURCE ARTICLES

- 6 Beyond the Digital Divide: How Regional Providers Will Thrive on Digital Disruption
By Francisco Sant'Anna, Ciena
- 15 Keeping the Friday Night Lights Bright
By Jeff Babbitt, Fujitsu
- 18 Broadband in Rural America: OzarksGo Declares It's About Time!
By Juniper Networks
- 31 Maximizing Investment and Reducing Operational Expense
By Tom Coburn, ADVA Optical Networking
- 32 An Update on Rural Broadband Funding Opportunities
By Alyson Moore, Corning
- 39 Build Your Best Network Under CAF II
By Javier Lopez, ADTRAN
- 49 Rural Fiber Distribution TAP Architecture
By Fritz Amt, CommScope

WALKER NEWS

- 17 Walker Recognized by Juniper Networks
- 46 In the Spotlight
- 50 Upcoming Events

Editor's Letter

Broadband funding appears to be a hot topic these days. Each industry event so far in 2019 has allocated at least some part of their educational content toward discussion of funding mechanisms for broadband deployment. New federal and state programs, coupled with relaxed state legislation regarding electric cooperatives, make this an important topic for the industry, and one we believe resonates well with our subscribers.

There appear to be two basic elements of this discussion, however. One is the definition of broadband, which according to the FCC is still 25/3 Mbps. This threshold is the measurement by which communities are eligible for federal funding programs. Anything below this standard may be considered underserved or unserved. Communities at or above the FCC definition fall outside the scope of federal funding, and must rely on incumbents or new competitors who identify a return on an investment for new infrastructure.

The second element is dependence on US mapping to identify unserved and underserved communities. By all accounts, current maps are highly suspect, leaving many communities disconnected from vital digital resources. According to a research report by CNet earlier this year, "The lack of visibility means 19 million people in this country still lack broadband access at a time when the service is considered as important as water or electricity."

The digital divide has been about more than the convenience of fast downloads of music and movies for years. Increasingly, broadband connectivity is about economic development, community stability, and community safety. The need for greater than 25/3 Mbps is clear.

Consider, for example, that the FCC website offers a Household Broadband Guide, which includes a chart to compare minimum download speeds for light, moderate and high household use for one, two, three or four devices at a time. Industry leading researchers forecast that by 2021, North American households will have an average of 50 networked devices. By this forecast, the FCC doesn't offer a solution using its model of 25/3 Mbps.

Whether by 5G or fiber, greater bandwidth paves the way for healthy communities where educational opportunities abound, economic opportunities extend to small and medium sized businesses, digital healthcare options are available, and community stability is ensured.

This issue tackles a variety of opportunities for broadband deployment in rural America. Funding network infrastructure is increasingly seen as a public/private initiative, as explained in CoBank's article on page 9. Partnerships with new players such as electric cooperatives pave the way for community development, as outlined in Cathy Cash's article on page 28, and the story of OzarksGo on page 18. Initiatives on the state level are on the rise, as noted on page 35 highlighting the work of the NC Broadband Infrastructure Office. Broadband deployment is on the move, and manufacturers are focused, as you'll see in this issue, on products and technologies designed to maximize investments and minimize operational expenses.

Shirley Bloomfield and Lisa Youngers offer great insight in their articles as they discuss the value of broadband deployment in America. Ms. Youngers states that "High speed broadband, which is propelled by fiber deployment, is the great equalizer for many communities throughout America, especially those in rural areas." And Ms. Bloomfield expresses hope in her comment that "Funding rural broadband is an extremely important endeavor. I am so encouraged by recent developments that indicate these efforts are a shared national interest."

Randy Turner

Editor, Skinny Wire
Director, Marketing Communications
Walker and Associates
336-731-5246
randy.turner@walkerfirst.com
SWEEditor@walkerfirst.com



Opinions expressed by contributors and commentators do not necessarily reflect the views of Walker and Associates, Inc.

Funding Rural Broadband – A Frontline View

By Alan Fitzpatrick
CEO
Open Broadband, LLC

Our ISP was formed to address the need for broadband in underserved communities, and as a result, have a frontline view of building in rural areas. Using the options listed below we've been successful in funding fixed-wireless broadband deployments across 11 counties in North Carolina.

County and Town RFPs

This has been one of the most effective ways of matching funding to local needs. An example is the Orange County NC Broadband Initiative (<https://www.orangecountync.gov/963/Orange-County-Broadband-Initiative>). Rural parts of the county were in desperate need for broadband service. Orange County established a \$500,000 grant and issued an RFP to service providers to build out in these specific areas. Other communities followed the RFP path, and we are fortunate to be working in NC counties such as Wayne, Alexander, Franklin, Granville, and Vance, and towns including Angier and Sanford.

This funding is usually lower than state and federal programs. However, counties and towns specifically target areas of need, and are bottom-up driven. Need isn't based on FCC viewpoints and broadband maps but rather on the needs expressed by the residents and businesses. In my view, no one understands the problems better than the people living in the community. Targeted grants, that are managed locally and focused on specific areas of need in the community is a winning combination.



Public-Private-Partnerships (PPP)

For communities lacking the budget to establish grants, an effective approach has been to align purchasing with ISPs willing to deploy in areas of need. We've partnered with towns by providing service to Town Halls, Fire Departments, Police Stations, Water Treatment Plants, Public Works, Parks and Rec, and other buildings. This revenue source helped justify our network build.

Towns and Counties introduced us to rural airports previously limited to DSL service. One of these had an emergency medical unit that could not function well without broadband. Funding public Wi-Fi zones has provided a dual benefit of improving service in a community, while providing much needed revenue to an ISP. Startup centers such as coworking facilities are another area where local need can help provide funding to a new ISP. Simply by redirecting purchase decisions, towns and counties can influence investment in areas of need.

State Grants

North Carolina established the GREAT broadband grant program that awarded

almost \$10M in broadband grants in 2019 (<https://governor.nc.gov/news/governor-cooper-announces-nearly-10-million-expand-internet-access>). These grants are expected to be funded again in coming budget years. The grants have restrictions that the first two categories above did not. Restrictions included: Must be a Tier 1 county, funds can only be used in census tracts that did not already have a 10 Mbps x 1 Mbps option, and requires matching funds. We are thankful that the state established the program and we were delighted to be awarded grants in Caswell and Vance counties. Virginia announced a similar state broadband grant program called VATI (<https://www.dhcd.virginia.gov/virginia-telecommunication-initiative-vati>).

USDA ReConnect Program

This federal grant/loan program (<https://www.usda.gov/reconnect>) has a \$600M pool. This option is larger than those listed above, but there are significantly more hurdles to pass. The program is not intended for startup companies, and requirements include 3-years of audited financials. 5-year budget projections down to the line item, and there is a long



About the Author: Alan Fitzpatrick is the CEO of Open Broadband, an ISP providing broadband internet service to underserved communities. Prior to Open Broadband, Alan had 20-years management experience in the Telecommunications and Software industries, including COO of DC74 Data Centers, COO of VoIP Services at ACN Inc., Sr. VP of Engineering for US LEC Corp, and founder and CEO of two software companies.

Alan is a promoter of a gigabit internet infrastructure in North Carolina, and co-founded Charlotte Hearts Gigabit, widely credited with attracting Google Fiber to Charlotte. He later joined as a co-founder of NC Hearts Gigabit. Alan is also an Adjunct Professor and enjoys teaching entrepreneurship and technology courses for Central Michigan University and Johnson and Wales University.

Alan has an MBA from Vanderbilt University and a B.S. in Industrial Engineering from Purdue University.

“ . . . no one understands the problems better than the people living in the community.”

list of other items to complete. In our view this program is designed for large, well-established incumbent providers with a staff of people who have months of time to collect all the data and fill out the forms. For a younger company, it might make sense to hire a grant consultant, assuming one already has the information available. The large ISPs will likely have no trouble applying for this program, but the program is burdensome to small ISPs.

Customers

The best way to fund deployment of net-

work infrastructure is to obtain customers who will pay for service. While the PPP approach mentioned above includes a touch of this, other methods we've used include promoting an early sign-up form with a small deposit to gauge interest. Much like a Kickstarter campaign, an ISP can see if there is enough demand in an area to make a business case decision to deploy. Areas in need do not require much marketing effort. A few Facebook posts, combined with a website sign-up form and encouragement to share on Nextdoor.com and social media platforms can result in hundreds or thousands of signups. It's worked for us.

Closing Frontline Observations

- The more decisions that are made locally the better. The users understand the pain and are not limited by maps, politics, or lobbying

efforts.

- Many grant opportunities are not startup friendly, instead favoring established companies. I question: Why reward companies who maintain status quo? Why not invest in companies who are willing to solve the problem, regardless of how long they have existed?
- The state/federal programs do not stimulate competition. They do the opposite, preventing funding to areas that have 10 Mbps x 1 Mbps service. Perhaps funding broadband overbuilds in these areas is exactly what is needed to improve service to residents.
- Funding rural broadband is possible. Let's continue to make it happen.

A Quick Review of the FCC Household Broadband Guide

By Randy Turner
Director, Marketing Communications
Walker and Associates

A variety of resources are available from the FCC on their website, <https://www.fcc.gov>. One example is their Household Broadband Guide, which provides insight into the minimum download speed a home needs in order to support household use of broadband. Although this resource is currently posted, it indicates a vast gap between US consumers of broadband and federal guidelines.

The chart to the right is from the FCC Household Broadband Guide. Note that it assumes a maximum of 4 users or devices at one time. Current research indicates US households have an average of 10 connected devices, and that number is projected to increase to 50 devices by 2021.

The site differentiates between Basic, Medium and Advanced Services as follows:

- Basic Service = 3 to 8 Mbps*
- Medium Service = 12 to 25 Mbps
- Advanced Service = More than 25 Mbp

By this standard, there would be few, if any, homes where Light Use applies. The basic combinations of email, web browsing, high-definition video consumption, social media posting and viewing, gaming and music streaming likely means multiple devices among the 2.53 aver-

age American household members. This, by default, places most homes in the Advanced Service category, which is above the FCC definition of broadband, currently defined as 25 Mbps download and 3 Mbps upload.

The reality of the digital divide appears perpetuated by standards that are out of touch with current technology. Aging adults, minorities, rural Americans, and lower-income citizens are least likely to have broadband services at home, due to both

affordability and availability of advanced broadband services.

Thankfully attention to bridging this divide through policy changes, legislative focus, and responses to industry lobbying efforts is on the increase. Closing the gap between basic definitions and actual consumer broadband usage is an ongoing challenge for state and federal legislators. Rural Americans stand to gain new opportunities as lawmakers attempt to reconcile these disparities.

	Light Use (Basic functions: email, browsing, basic video, VoIP, Internet radio)	Moderate Use (Basic functions plus one high-demand application: streaming HD video, multi-party video conferencing, online gaming, telecommuting)	High Use (Basic functions plus more than one high-demand application running at the same time)
1 user on 1 device	Basic	Basic	Medium
2 users or devices at a time	Basic	Medium	Medium/Advanced
3 users or devices at a time	Medium	Medium	Advanced
4 users or devices at a time	Medium	Advanced	Advanced

Beyond the Digital Divide: How Regional Providers Will Thrive on Digital Disruption

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

The Connect America Fund Phase II (CAF-II) auction will provide \$1.49 billion to connect over 700,000 locations in 45 states over the next decade. The 103 service providers who won the bid will undertake a demanding task of extending their networks to provide fixed broadband services to those unserved or underserved regions. Nevertheless, the logistical challenges of laying infrastructure in such remote areas are just the beginning of an uphill journey to build a sustainable business practice, attractive to both users and investors, in a scenario of radical transformations. Yet, with the right mindset and by prioritizing investments that enable nimble adaptation through evolving demand, these providers may not only survive, but thrive on the digital disruption of communication services.

Aiming at bridging the digital divide, FCC's CAF-II auction will subsidize network expansion for the 103 winning bidders in 713,176 rural areas where high-quality broadband would not be economically feasible otherwise. Fifty-three percent of this targeted market will have access to download speeds of at least 100 megabits per second, and 99.75 percent will get a minimum of 25 Mb/s—2.5 times the previous minimum standard for the CAF program.

The interest from service providers in the program was significant, leading to competition that allowed for a 70 percent reduction in the initially planned subsidies of \$5 billion over ten years. This means that these providers will be bearing the noble endeavor of taking connectivity to low-density areas with a much smaller amount of support than initially expected. To make their business profitable, they will need to be extremely cost-effective in their approach to infrastructure and operations, and at the same time have attractive offers to secure a

high share of service adoption in the residential and businesses customers reached by their networks.

“The same market forces that are disrupting the business of global tech giants will inevitably come for the regional providers.”

Tight business plans have a small margin for errors, and those service providers will need to make safe and smart technology bets to succeed in an environment of extreme changes. Emerging digital technologies and business models are transforming industries at an increasingly fast pace. There is no business immune to the ongoing digital disruption, but there is certainly no sector as impacted by it as Technology Services. Large service providers have been reinventing their businesses to remain relevant and profitable, but how will this disruption impact the edges of the market? The same market forces that are disrupting the business of global tech giants will inevitably come for the regional providers. Although these companies may not have extensive resources available to understand and plan for the new challenges, they can benefit from a much more agile decision-making process, moving swiftly and effectively to explore the numerous new opportunities and mitigate threats. “Emerging digital technologies and business models are transforming most industries at an increasingly fast pace.”

5G will be a game-changer, transforming the market way beyond mobile network operators. It will enable new parameters for user experience, boost IoT and drive new applications. Fixed-mobile access (for which cost viability is still contro-

versial) may bring new competition for broadband where customers had no prior choice, pushing regional incumbents to reposition their value proposition. It will also create a massive demand for mobile backhaul bandwidth.

Cybersecurity concerns are changing how technology services are bundled and delivered. Tier-1s are integrating Managed Security Services (MSSs) in their connectivity offerings for business customers (firewall, IPS, IDS, Anti-DDoS, endpoint security). Such bundling practices may become the market norm, as CIOs increasingly indicate data protection/integrity and business continuity as a top priority for their offices. Keeping competitive in business services will require regional providers to develop a new skill set to offer MSSs, which may involve virtualizing security network functions.

IoT will reshape several industries, bringing vast opportunities to service providers. Being industry-specific, it will require new vertical expertise to sell and serve business customers, and new partnerships to integrate devices and analytics in the services package. It will also prompt new technologies, network topologies, computing architectures, systems, and service practices that may redesign the way many technology service providers are organized.

Big Data and Analytics will mean new ways for smart regional service providers to add value to local businesses.

Edge Computing will boost the value of their operational sites as potential computing facilities, though it may attract outsiders of the tech industry to provide this scattered infrastructure.

The Digital Experience users enjoy at cloud-based online services is becoming a pre-requisite for any service offering, and providers will need to evolve to

deliver the visibility, control, and flexibility that becomes the qualifying minimum to be considered by customers.

And the consolidation of the cloud culture of Everything-as-a-Service creates myriad new areas for service providers to position themselves as regional technology leaders integrating far beyond connectivity.

How to thrive on digital disruption

Wherever trends may lead the market, it is certain that deep changes are coming to regional service providers, and the key to survive and win in this market will be the ability to adapt. There is no miraculous solution for service providers to address these transformational challenges, and it gets even harder for smaller companies, as many helpful innovations take time to become cost-effective for regional deployments. For example, it may still take a couple of

years for NFVO and network automation to become widely viable for mid-tier networks. However, there is a lot that regional service providers can do now to prepare for the upcoming disruption.

The key is to develop adaptive capabilities to quickly and flexibly respond to demand and competition shifts, being able to seize the numerous opportunities that will come to those who are equipped. Every investment must be made in tune with the guiding principle of adaptability.

For the CAF-II winning bidders, there is a great opportunity to start these new deployments with flexible and future-proof technology choices for their access, aggregation, and core expansions. The future is built now. Start by calibrating RFPs to prioritize open solutions (broadening alternatives to interoperate and manage in the future), favor program-

mable infrastructure (preparing for progressive degrees of automation as they become viable), and facilitate intelligence (software and analysis tools). These criteria will not only extend investments' longevity, future-proofing them for a wider range of scenarios, but also empower providers to be nimble and position for growth.

Want to thrive on digital disruption? Prepare to adapt!

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.

Electric Co-ops and Expanded Rural Broadband Access

By NRECA

High speed internet access is a key ingredient to a healthy 21st century rural economy. Not only is broadband important to the people who live in rural America, it is also vital to the electric co-ops that serve them.

The Federal Communications Commission estimates that 34 million Americans lack access to high-speed internet. The vast majority call rural America home and live in electric co-op service territories.

For more than 75 years, America's electric cooperatives have powered local economies across 56 percent of the nation. As times and technology change, broadband has become an indispensable part of electric utility operations – extending beyond the electric meter and into household energy management. These state-of-the-art energy efficiency services increasingly require access to high speed internet.

Now, nearly 100 electric co-ops are reinvesting in rural America by bringing high speed internet access to rural homes, businesses and schools. This connectivity serves two key purposes: bridging the digital divide for co-op members and enhancing the co-op business operation


network, allowing the co-op and members to adopt emerging energy management technology. These newly connected co-op communities are proven to create jobs, attract new employers, and directly jump start local economies.

The convergence of new technology and partnerships has made rural broadband deployment more achievable than ever. As electric cooperatives work to bring broadband to rural America, some have formed innovative partnerships with local telecom companies and others. Yet despite these advances, the high cost of rural broadband deployment remains the biggest obstacle to successfully closing the digital divide. Rural service territory is often rugged and remote, which drives up the cost of deployment. At the same time, there are fewer customers to defray the costs.

In order to close the digital divide for the 34 million Americans who lack broadband internet access, an expanded combination of federal grant and loan funding through USDA programs is essential. President Trump's infrastructure proposal and the Farm Bill present two opportunities to secure that necessary financial backstop.



“Now, nearly 100 electric co-ops are reinvesting in rural America by bringing high speed internet access to rural homes, businesses and schools.”



A Better Connected Experience



Visibility



Insight



Quality

ADTRAN partners with broadband service providers to optimize and enhance the connected experience by improving network visibility, insight and quality to grow customer satisfaction. Internet the way it should be.

adtran.com/SubscriberExperience

ADTRAN[®]

AD10687C Copyright © 2019 ADTRAN Inc. All rights reserved.

Public-Private Partnership Will Build Out Affordable Broadband in Rural America


By Sarah Tyree
Vice President of Policy & Public Affairs
CoBank

Modern, high-speed broadband is a critical issue for those of us who live and work in rural communities – or rather, the issue is the lack of access to this vital communications network.

In today's world, broadband access has become one of the most important tools for driving economic growth for businesses and communities, and delivering a high quality of life to residents. In the same way that society would expect decent, affordable rural housing to include access to water, electricity and phone service, in today's technology-dependent world, it should also include access to affordable broadband. Rural schoolchildren should not have to go to libraries or school parking lots to access the internet needed to complete their homework assignments, rural businesses should be enabled to capitalize on the global marketplace, and rural residents should have the capability of obtaining critical medical care remotely that is simply not available to them in their distant locations.

The broadband network that serves farmers, rural hospitals, rural businesses and rural residents is the same network that connects large cities and urban residents. Content and applications that are accessed via the internet are hosted in data centers typically located in urban areas. This same data is accessed by both rural and urban residents by wired or wireless networks, both of which are dependent on a broadband backbone to serve rural America.

As a lender to rural infrastructure, CoBank understands both the challenges and the policy implications of committing to deploy affordable broadband throughout the United States. CoBank is a national cooperative bank with a mission – established by Congress – to provide dependable credit and other value-added financial services to agriculture and rural infrastructure businesses. CoBank has been delivering on this mission for more than a century, and has been financing rural communication businesses and being a partner in their growth for more than 30. Our communications customers



“Without this type of ongoing financial support, no temporary financing method such as loans, loan guarantees or one-time grants, will be sufficient to deploy broadband across rural areas and throughout the entire country.”

operate all aspects of the systems that enable rural broadband access, including wireless, wireline, cable, fiber transport and data centers, and we're also supporting electric distribution cooperatives who are entering the broadband arena. As of December 31, 2018, our loans to rural infrastructure customers across the U.S. reached \$21.4 billion, and included rural electric cooperatives, rural water and waste water systems, and rural communications providers.

Challenges in Rural Areas

The key challenges of deploying affordable broadband throughout the United States are the high cost and limited return on investment. If companies could earn a profit building out broadband to all Americans, they would already have done so.

In addition to the high costs associated with constructing broadband infrastructure in rural areas, there are also high costs associated with maintaining and upgrading these networks to accommodate growth of data traffic. The broadband network is a dynamic infrastructure, and frequent technological advances warrant upgrades and regular capital spending.

The higher cost and lower long-term

returns of delivering cutting-edge technologies to sparsely populated areas have led many communications companies to focus on urban and suburban areas, where the larger population translates into scale and therefore better economics. As a result, our rural residents are missing the benefits of the technological revolution many of us take for granted. This is why a digital divide exists in this country, where rural citizens are not provided the same advanced communications services as their urban counterparts.

Universal Service Fund

To eliminate the digital divide, there is a role for the federal government to assist rural broadband, just as there is a role for it to support the federal highway system. The Universal Service Fund (USF) is successful in supporting affordable telephone service, and is now transitioning to a similar role for broadband service. The public policy of providing a cost-recovery mechanism to connect all Americans is not a new concept and its results serve the greater good.

The communications industry continues to evolve rapidly and the federal regulatory framework to keep up with this change is also evolving. Although the USF is supporting the deployment of broad-

Cont'd on page 11

QUESTIONS FOR RURAL BROADBAND PROVIDERS

By Prayson Pate
CTO, Ensemble Division
ADVA Optical Networking

The FCC is planning to expand rural broadband with the CAF II program, which provides “funding to local telephone companies to subsidize the cost of building new network infrastructure or performing network upgrades to provide voice and broadband service in areas where it is lacking.” The program includes requirements for access speed, latency, usage and pricing. But as a rural broadband provider, you should also be thinking more broadly about enhancements to your network, and planning beyond today’s applications. You should be thinking about the future. Here are some questions to consider.

What are the connectivity options for broadband in rural areas?

Rural providers have a wide range of choices for growing their network.

- xDSL involves a tradeoff between bandwidth and cable length. Low population density in rural areas means long cable runs, limiting the achievable DSL bandwidth. Modern xDSL techniques such as vectoring have increased this bandwidth, but we are near the theoretical limit.
- Fiber provides much higher bandwidth than copper, but at the cost of tens of thousands of dollars per mile. Wavelength division multiplexing passive optical network (WDM-PON) is an innovative concept for access and backhaul networks that can help lower the cost of fiber-based access. It uses multiple wavelengths over a physical point-to-multipoint fiber infrastructure that contains no active components.
- Fixed wireless technologies are an option to lower costs, especially in the outer reaches of the network. Point-to-point links can leverage various spectrum bands. Citizens Broadband Radio Service (CBRS)

uses a 150MHz slot in the 3.5GHz spectrum, either for line of sight links at 1Gbit/s, or for sharing among users in a rural environment. 5G wireless using mid-band (2 to 6GHz) spectrum offers good reach and low atmospheric attenuation will soon become an option for fixed wireless.

- Hybrid networks combine the above technologies to optimize bandwidth and costs. For example, the customer access might use xDSL, PON, CBRS, or 5G (see below). The backhaul might use fiber or point-to-point wireless.

What are the other new technologies your network should include?

The telecom landscape is evolving, and that means you need to be on the lookout for relevant technologies to power your network. Here are some hot new technologies for consideration.

- Carrier Ethernet provides a low-cost and high-bandwidth access technology that is ideal for business services and mobile backhaul at speeds up to 100Gbit/s.
- Fiber monitoring. Without fiber monitoring, high-bandwidth services are always at risk of disruption, often with significant negative impact on customers. As soon as service providers invest in a proactive solution that measures the integrity of their fiber plant, they can diagnose faults and take immediate targeted action. This dramatically shortens repair cycles and avoids unnecessary truck rolls.
- Synchronization. Synchronization is a vital ingredient for a growing number of applications, and one that is often overlooked in a packet-based network. Without it, your network cannot achieve its full potential. In

particular, it won’t be able to support advanced applications such as 5G.

- NFV and SDN. Network functions virtualization (NFV) and software-defined networks (SDN) are new technologies to help replace closed network appliances with independent software running on standard servers and switches. NFV and SDN power the development of innovative services at record speed, and enable deployment of these services without changing the network infrastructure.

How will your network support 5G deployments?

CAF II funds network expansion for broadband services, but 5G is looming. Buildouts for 5G will need lots of fiber in the ground, along with distributed compute to support virtualized network infrastructure for 5G. Furthermore, a recent ACG report (<https://www.acgcc.com/wp-content/uploads/2019/05/ACG-5G-Ready-TCO-2019.pdf>) describes the benefits of a converged network for supporting 5G. “This paper presents the results of a TCO analysis comparing the economics of a converged IP/MPLS transport network with more traditional dedicated networks. The results of the analysis demonstrate significant savings with an overall TCO savings of 62%, capital expense (CAPEX) savings of 60%, and operations expense (OPEX) savings of 66%.”

Your plans broadband expansion plans should include support for 5G. Here are some ideas:

- More fiber. Plan fiber routes to support increased base station density. 5G will achieve higher bandwidth by having a lot more cells, which means a lot more base stations. All

of these new base stations will need fiber access. That's a big opportunity for additional revenue.

- More sites. Consider creation of next generation aggregation sites that can support distributed compute for hosting 5G infrastructure.
- Bigger backbones. Allocate extra backbone fiber to support high bandwidth services – both for 5G and for the other services described next.

What other advanced services will your network support?

Today, customers mostly use broadband services for web access, with streaming video taking the lion's share of the bandwidth. But digital services are always changing. Here are some of the future services that will be relevant for rural networks.

- Managed security services. Security threats are growing daily, and addressing them is beyond the technical capabilities of many customers. Managed security services are a very attractive way to close the gap for small and medium businesses, as well as for government sites such as schools and clinics.
- Managed VPN or SD-WAN for telecommuters. Businesses need new employees and using VPNs to support remote workers is a great way to open the door to untapped talent in rural areas.

- Internet of things. IoT is becoming important in rural areas to support agriculture, transportation, manufacturing, and other industries.
- Telemedicine. Telemedicine is a promising way to address the shortage of medical personnel in underserved rural areas. But this only works if you have plenty of low-latency bandwidth available.
- Gaming. Advances in gaming go well beyond Fortnite. Next-generation games will bring in augmented reality and virtual reality, both of which need fat pipes and distributed compute resources.

How will your team gain the needed skills to operate a next generation network?

- Training. New technologies require new skills. Walker and ADVA can help in providing the training for your teams in these new areas.
- Hiring. You will need some new hires to augment your exiting staff. The good news is that there are many new graduates who have the needed skills in the areas of virtualization and automation.
- Pilot projects. Training is good, but hands-on experience is always the best teacher. Small-scale pilot projects enable you to bring new technologies in house, without trying to boil the ocean.

How will you design and deploy your next generation network?

This is the real world, not a high school or college test. You don't have to answer these questions on your own. The teams at Walker and ADVA stand ready to help you plan and deploy your next generation network. We can help you meet the demands for today's subscribers, as well as for next generation services – and help you answer all those questions.



Prayson Pate is ADVA Optical Networking's chief technology officer for the Ensemble division and is an evangelist for network functions virtualization (NFV). He speaks at industry events and writes posts

and articles to inform, educate and entertain, mostly about NFV with plenty of innovation for good measure. These include *The Real CTOs of NFV* series.

Prayson received a master's degree in electrical and computer engineering from North Carolina State University and a bachelor's degree in electrical engineering from Duke University. Prayson has contributed to standards bodies such as the MEF and IETF. He is a named inventor on nine patents.

Cont'd from page 9

band, not all broadband users pay USF fees: if a consumer has only an internet connection and not a phone connection, no USF fee is paid. Modifying the contributions to the USF is a necessary step to keep it fully funded in order to connect all Americans to broadband.

When a company explores how to provide broadband in a high-cost rural area, it analyzes the available support programs and determines whether they will assist in making the project viable. If the company determines the support is not reliable and is subject to change, then the expansion plans are put on hold. Since

December 2011, the funding for the USF high-cost rural program has been capped, so as more companies build out more broadband, each provider is being reimbursed a lower rate each year. This has been a disincentive to making additional investments in high cost areas.

Over the past six years, the Federal Communications Commission has rolled out modified USF programs known as the Connect America Fund to offer certainty to communication companies building in rural communities by providing ten years of stable support. CoBank has seen an increase in investment due to this consistent level of resources.

CoBank views the USF as an important public-private partnership, through which companies can leverage USF's support to obtain private financing to serve rural America. We firmly believe that a sustainable cost-recovery mechanism is imperative to assist the financing of rural broadband. Without this type of ongoing financial support, no temporary financing method such as loans, loan guarantees or one-time grants, will be sufficient to deploy broadband across rural areas and throughout the entire country. We cannot expect companies to deploy broadband in areas where there is no return on investment without a support program. We need dedicated federal investment so every American, even in remote areas in rural America, has access to broadband.

CoBank welcomes the opportunity to collaborate with other entities that care about rural America in supporting USF to deploy broadband to rural America. As the report of the federal Interagency Task Force on Agriculture and Rural Prosperity highlighted, reliable and affordable high-speed internet e-connectivity will transform rural America as a key catalyst for prosperity.

Sarah Tyree is Vice President of Policy & Public Affairs at CoBank.



CORNING

Is Your Network Ready For His Next Big Idea?

His imagination knows no limits, and neither should his network.

Invest in next-generation services that will help transform his next “what if?” into an amazing invention.

Wherever you are with your network transformation, we can help. Our flexible, best-in-class performance and quality solutions address your current needs and easily evolve to meet future network challenges.

Evolve your network.
Transform the world.

Discover how we can help
[corning.com/
community-broadband](https://www.corning.com/community-broadband)

Fiber: We Are the Difference for U.S. Jobs

By Lisa R. Youngers
President and CEO
Fiber Broadband Association

June is an exciting time of the year for Americans — it's the start of summer, which means warm weather, sun, beaches and vacation. But my fellow fiber friends and I also look forward to June because it is when we convene for the annual Fiber Connect conference.

Earlier this summer, the Fiber Broadband Association hosted our three-day conference in Orlando, Florida and welcomed over 1,500 fiber industry professionals and leaders from across the broadband industry. The conference featured keynotes about the future of 5G, the digital divide, the IoT, Smart Cities, Esports and more. All of this showed us one thing: that fiber is what makes the difference for our connected future.

These topics generated fruitful discussions and thoughtful conversations about the potential for our fiber future, but it was the findings from a study released during Fiber Connect that excited me the most.

Researchers from the University of Tennessee at Chattanooga and Oklahoma State University investigated the impact high speed broadband has on the workforce and found that high speed broadband reduced unemployment rates throughout Tennessee, especially in rural communities. A major reason why rural communities have fallen behind urban areas is that they lack access to high speed broadband and other technologies, creating a troubling digital divide in our country. Here are some of the key highlights from the study:

- In studying 95 counties in Tennessee from 2011 to 2016, researchers found that access to high speed broadband can significantly reduce unemployment rates, especially in rural communities.
- Counties with access to high speed broadband have an approximately 0.26 percentage point lower rate of unemployment compared to low

speed counties.

- Early adoption of high speed broadband could reduce unemployment rates by an average of 0.16 percentage points per year.
- Counties lacking high speed broadband have smaller populations and population density, lower household income, and a slightly smaller proportion of people with at least a high school diploma.

These findings illustrate the need for more high speed broadband, particularly in rural communities, to drive economic growth and productivity. According to the latest data from the Federal Communications Commission (FCC), roughly 19 million Americans lack access to high-speed broadband — and most of them live in rural areas. This leaves them struggling to stay connected and unable to take part in the opportunities available to urban residents. People living in rural communities deserve the same access to fast, reliable broadband as citizens living in urban areas. Without high speed broadband access, rural Americans are at an unfair disadvantage in accessing economic, educational and healthcare resources.

High speed broadband, which is propelled by fiber deployment, is the great equalizer for many communities throughout America, especially those in rural areas. This research makes me hopeful for our future because it shows the impact that fiber broadband access can have on everyday people. Broadband creates jobs and provides unparalleled access. It matters to communities and provides a world of difference. So when we chose the theme of this year's Fiber Connect conference — Fiber: We Are the Difference — we did so to show our commitment to making a positive difference in the lives and communities all across America.

“High speed broadband, which is propelled by fiber deployment, is the great equalizer for many communities throughout America, especially those in rural areas.”



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.



Connecting, extending and assuring the cloud

Powering residential broadband with optical and Ethernet transport



For more information, please visit:
www.advaoptical.com

© 2014 ADVA Optical Networking

Keeping the Friday Night Lights Bright

Why Carrier Ethernet is the Best Choice for Evolving Your Network

By Jeff Babbitt
Fujitsu Network Communications, Inc.

In many rural areas, groups of towns are connected by a single network ring or a small cluster of rings – a familiar type of communications infrastructure throughout the US. In these towns, local high school football games often get top billing, complete with video links among the communities to live-stream these games, usually on Friday nights. Sometimes known as the “Friday Night Lights,” these games are one of the most common sources of traffic bursts on rural and small local communications networks. They are essentially mini versions of the fabled “Mother’s Day Events” of traditional telecom.

Service providers in these rural communities have delivered connectivity primarily via 10G for about the past ten years. But today’s 10G networks are struggling to keep pace with the rise of connected-everywhere mobile and wireless services, not to mention the rising trajectory in the bandwidth requirements of new streaming video, audio, gaming, and imaging technologies.

“ . . . the service provider is better positioned for future growth, since a simple firmware upgrade will double the network capacity to 200G.”

To make room for more traffic, service providers will often deploy an $n \times 10G$ DWDM network, but this may not be the best option. An $n \times 10G$ DWDM architecture will meet the near-term traffic needs, but is not guaranteed to handle the typical portfolio of services that providers will need to deliver in the long term. The primary reason is that almost all $n \times 10G$ DWDM networks use non-coherent technologies. 100G services will require a coherent optical network, yet non-



coherent DWDM systems cannot handle 100G coherent channels. Therefore, an $n \times 10G$ network will very likely have to be replaced in the future when 100G service demands arrive.

Luckily, there is another approach that can combine current needs with future 100G services, and still be economical. A high-capacity Carrier Ethernet technology is the most efficient and flexible option to meet capacity needs today, with room to grow for the future.

Most deployments involve Carrier Ethernet transport in a single 100G ring, to provide a carrier-grade architecture with traffic management, network protection, and performance monitoring. This Ethernet approach can match the capacity of $n \times 10G$ DWDM, and is more economical than DWDM when the number of 10G wavelengths grows beyond five channels. It will be easy to accommodate 100G services by adding an $n \times 100G$ coherent DWDM system with little impact to the 100G ring. Additionally, with an Ethernet network, E-Line and E-LAN services can be offered instead of the optical services on the $n \times 10G$ DWDM network. With this approach, the service provider is better positioned for future growth, since a simple firmware upgrade will double the network capacity

to 200G. Additionally, the management system should utilize a future-proof software architecture based on SDN and open APIs.

With a new Carrier Ethernet system, a service provider can add functionality to deliver a range of new services, creating more value through innovation. Offering support for MEF compliant E-Line and E-LAN services, this system enables more flexibility in size and class of service, and has ample capability for both point-to-point and multipoint-to-multipoint bridging. The upgraded transport system will deliver sufficient capacity for now, with a flexible upgrade path beyond 100G in the future. This provides the best possible solution, striking the perfect balance between pay-as-you-grow scalability, maximum efficiency, and optimum ROI. A 100G Layer 2 network offers greater longevity in service provider networks. When trying to “keep the lights on” for the Friday night football game, a 100G Ethernet ring is the best choice.



FUNDING OPPORTUNITIES

By Kristy Szabo
Director of Consulting
Carmen O'Neill, PE
Director of Engineering
Bree Conrardy
Engineering Staff
Vantage Point Solutions

The economic, wellness, and cultural consequences of the digital divide are severe for those lacking adequate access to broadband; and many programs are available, or being developed, to help providers address the service gap in rural areas. Whether it's a federal funding program, a state grant, or something else – what can your operation do to optimize your chance of success in these programs?

While no two programs are exactly alike, a company, community, or cooperative can position themselves to succeed in competitive funding programs by planning ahead and understanding the most common application requirements.

The two most significant components of any program are the engineering designs/capital expenditure estimates and the financial feasibility assessment; these are deeply entwined and serve as the basis for other application components. However, they require considerable time and consideration to be developed effectively; which is why planning ahead (even before a program is announced!) is often a critical factor in securing funding.

Eligibility Analysis

Generally speaking, grantors and lenders are providing money to get broadband to unserved or underserved areas. Where, exactly, are you planning to serve? Eligibility criteria varies from one program to the next, but is generally

based on Form 477 data from the FCC that shows which areas are reported as “served” with a specified broadband speed – i.e., 25Mbps Download/3Mbps Upload.

When evaluating a funding program, it is imperative to understand the eligibility criteria, which areas are eligible, and what degree of service overlap – if any – is permissible. Every other step depends on this, so it is an important strategic consideration.

Services that will be offered

In addition to knowing where you are proposing to build your broadband network, you should also take into consideration what services and speeds you are planning to offer – various broadband speed offerings, voice offerings, video offerings, and package bundles, are all key components of the overall network business plan. It's important to know this when designing the network, as it can impact the way the network will be engineered and the electronics necessary to support the proposed services. It will also influence your marketing research and pricing, and you will want to ensure you have adequate staffing to support each service offered. These factors, in turn, impact your financial projections and business plan.

Engineering layouts and Capital Expenditure estimates

Funding entities need to be confident that, as an applicant, you know what you're doing and that you can get the proposed advanced services deployed to the areas you say you can. The engineering layout is how you make your case.

Once you've determined where, exactly, you plan to deploy broadband, the network design addresses questions such as: How will you receive service from upstream providers? What fiber architecture option is ideal for your company's specifics? Will it be buried, or aerial on utility poles? In addition to painting a strategic vision of your network's future, these answers determine the estimated Capital Expenditures (CapEx) required to complete the project.

Professional Engineering (PE) Certification

It's also worth noting that, to be a good steward of the funding program's resources (public or private), they often require a Professional Engineering certification on the proposed network. This certification ensures that the needs identified for the area can actually be met with the proposed design, within realistic timelines and, perhaps the most critical piece, within the project budget.

Financial Projections & Budget

Financial projections for your operation should include not only the anticipated revenues and debt service on the capital expenditures, but also operational costs. These include staffing, costs of provid-

ing service, equipment costs and maintenance, marketing, insurance, taxes, and professional fees such as engineering, legal, consulting, and accounting. Financial projections will also incorporate planned pricing models and estimated take rates to forecast the financial strength of your proposed network operation.

In addition to the financial forecasts, many programs require a budget that explains where the money for your project will come from – including a required match, if any – and what it will be used for.

Operational Experience & Management Team Experience

Many applications require proof of operational or managerial experience. This is typically a statement indicating that you have been successfully operational for a certain number of years, and your staff is adequately prepared to operate the proposed network.

Timelines

Funding programs frequently include tight deadlines for meeting the buildout requirements; and the penalties for missing them are often severe. For companies unaccustomed to large network buildouts, it's easy to underestimate how long each step takes – for instance, acquiring pole permits is often a complicated and lengthy process and fiber lead times can fluctuate considerably throughout the year and from year to year. Working with a project manager experienced in undertakings of similar size will help protect your organization from these delays and deadline threats.

Community Benefits

In addition to technical and financial information, your application should also clearly identify how the program's dollars will benefit the targeted community(ies) by bringing broadband services to the area. After all – the real goal is the economic, wellness, and cultural benefits of broadband in unserved or underserved areas.

While individual funding programs may open and close, keep in mind that you are making an investment for a 30-year plan. If planned and built correctly, your network will require minimal maintenance or alterations, and will benefit your customers and operation for decades to come. An impact that important deserves thoughtful, strategic preparation – and most importantly, planning ahead.

Walker and Associates Recognized by Juniper Networks

By Tyson Philyaw
Sr. OEM Development Manager
Walker and Associates

Earlier this year Walker and Associates received the AMER Partner of the Year, AMER Telco Partner of the Year and AMER Partner of the year – EAST Awards from Juniper Networks for performance during 2018.

“Walker and Associates is pleased to be recognized by Juniper Networks. Juniper is known to have the foremost channel program within the telecommunications industry, and to be highlighted as a leader within Juniper’s channel is outstanding.” stated Tyson Philyaw, Sr. OEM Development Manager for Juniper Networks at Walker.

“Walker and Associates is excited for our future with Juniper. Our leadership teams are actively engaged at the strategic level, allowing execution by the strongest sales teams supporting Commercial and the Federal Markets.” added Gus Vasilakis, Marketing VP at Walker.

Juniper stated that each of these awards indicates Walker’s outstanding overall performance and the company’s ongoing commitment to providing market-differentiating, value-added services and resources to the service provider market.



Pictured above, left to right: Christian Goffi, Partner Account Leader North America, Juniper; Tyson Philyaw, Sr. OEM Development Manager, Walker; Doug Wilson, Partner Account Manager, Juniper; Mark Walker, President, Walker; Miguel Adorno - Field Marketing Manager, Juniper; Gus Vasilakis, VP Marketing, Walker; Clay Miller, Sr. Systems Engineer, Juniper

BROADBAND IN RURAL AMERICA: OZARKSGO DECLARES "IT'S ABOUT TIME"

By Juniper Networks



Many residents in rural America still lack high-speed broadband, cutting them off from vast informational, educational, and economic opportunities. OzarksGo, a different kind of service provider, has set out to change that for the people of Arkansas and Oklahoma. To bring fiber to the homes of its community, OzarksGo has built an integrated optical network with the Juniper Networks® MX Series 5G Universal Routing Platforms and Juniper Networks QFX5100 Switch.

Stilwell once had the distinction of being the poorest town in Oklahoma. Nearly one-third of its 3200 residents lived below the poverty line, and only three-quarters of adults had a high school diploma. Like many parts of rural America, Stilwell was being left out of the 21st century economy. And it was not alone. Approximately one-quarter of Arkansas and Oklahoma residents lack high-speed broadband—nearly double the national average.

While students at Stilwell schools had laptops, without Internet at home, they were still at a disadvantage. "Having Internet service that's reliable and usable changes people's lives," says Billy Hyatt, senior network engineer at OzarksGo. "The kids don't have to go to the library or McDonalds at night to do their homework."

Business Challenges

Having too few people and being too far removed from the mainstream, rural America has largely been overlooked by the Internet backbone that crisscrosses

the nation, depriving it of fast, affordable access to the World Wide Web. People have few choices of Internet service providers, when they have a choice at all. With less competition, they can easily have to pay higher prices for lower quality services, despite earning less than people in urban areas. But with the help of OzarksGo, a subsidiary of Ozarks Electric, a nonprofit rural electric cooperative, things are changing for the people of northwest Arkansas and northeast Oklahoma.

"We look at broadband the way electricity was viewed 80 years ago," says Heath Noland, network operations manager at OzarksGo. "Broadband should be ubiquitous and simple to deploy, because it's essential to the success of individuals and communities."

Noland, who helped build Ozarks Electric's operational network, jumped at the opportunity to bring fast, affordable Internet to his community. He was soon joined by Hyatt, who has spent more than a decade working on some of the largest service provider networks, and by Steven Karp, who helped build the Arkansas research and education network.

"As a subsidiary of an electric co-op, our focus is to serve our members at the best cost," says Noland. OzarksGo offers allfiber gigabit Internet, premium television, and phone service to residential and commercial customers. Lightning-fast Internet, HD television, and crystal-

clear phone calls come directly into people's homes. Movies download in 30 seconds. The pricing is compelling: a 1 Gbps plan runs less than \$80 a month. With a community focus and a state-of-the-art network, it's no surprise that OzarksGo has seen a surge of customer demand.

Thousands of customers signed up for the service in the first year. "People in the area have wanted an alternative for a long time, and they've been looking forward to us providing it," Noland says.

Technology Solution

Building a network that brings fiber to the home—and delivering triple-play services faster and at a low cost—hinges on an integrated packet optical network from Juniper Networks. The legacy approach calls for building separate dense wavelength-division multiplexing (DWDM) and IP/MPLS networks. With an integrated network, however, OzarksGo can eliminate excessive equipment cost and complexity while simplifying provisioning and monitoring. And with control capabilities, it can improve operations and accelerate service agility. Breaking with the status quo has also enabled OzarksGo to short-circuit the cost and deployment overruns that other electric cooperatives have experienced when bringing fiber to the home in their service areas.

"Using packet optical from Juniper allowed us to bring 100 gig to the table faster," Hyatt says. "With Juniper, we can be nimble and operationally efficient. The network is cost-optimized so by the

“High-speed Internet provides the foundation to close the education gap between poor and wealthy communities.”

time we get to years five and six, we should be more profitable.”

OzarksGo is in the second year of a six-year project, starting in the more densely populated areas around Fayetteville, Ark., and then expanding to areas that might only have a dozen customers. The company began by offering triple-play services where cable and DSL were already available; now it's reaching areas that had little more than dial-up, satellite broadband, or nothing at all.

“Wedington Township, which is about 20 miles outside of Fayetteville, didn't have any service without us—just smoke signals,” says Steven Karp, senior network engineer at OzarksGo. “About 150 people live there, and now people have a gig fiber connection to their homes, enabled by a Juniper packet optical network.”

OzarksGo uses the Juniper Networks MX480 5G Universal Routing Platform for core routing and data center aggregation, and the MX204 3D Universal Edge Router for the 100 Gbps optical ring connecting the access networks at the substations to their core ring for redundancy. The QFX5110 Switch is a universal box that is used to aggregate traffic in the data center as well as provide flexible port options for service distribution in the substations.

“Juniper makes our network faster,” says Karp. “With our Juniper network, we can bring content to our members in rural America.”

Business Results—Banishing DSL, Dial-up, and Smoke Signals

OzarksGo launched as a residential service, but interest from businesses, hospi-

tals, and schools is also high. The second largest school district in Arkansas recently became a customer. That's because OzarksGo's community focus is a compelling differentiator. “When we bid on projects like fiber leases for hospitals, we come at it from the perspective of the community,” says Hyatt. “With Juniper Networks, we are able to be more cost-driven and less profit-driven for services like telehealth.”

In the same way that Ozarks Electric brought electricity to the farms in the 1930s, OzarksGo is bringing high-speed broadband to rural America, giving residents access to the same opportunities and resources as people in more densely populated areas. High-speed Internet provides the foundation to close the education gap between poor and wealthy communities. Job growth is essential to keeping rural areas vibrant. Communities can stay connected to the resources of the broader world. Rural America has lacked access to fast, reliable Internet for far too long. OzarksGo is changing that, one home at a time.

ABOUT OZARKSGO

We're changing the game.

Get to know us a little better and how we're changing the definition of internet in Northwest Arkansas and Northeast Oklahoma.

OzarksGo is a telecommunications subsidiary of Ozarks Electric Cooperative, offering all-fiber gigabit Internet and premium television and telephone services to Northwest Arkansas and Northeast Oklahoma.

The project began by reviewing the way we are able to communicate between our substations and offices. By connecting our substations and offices with fiber-optic cable, we can create a truly “smart” grid that will provide us with more down line automation capabilities, ultimately increasing the reliability of our electric service to members.

In addition, we've watched for far too long our area suffer from a lack of true broadband availability or lack of reliable and affordable service.

EMPOWERING MEMBERS

OzarksGo is also a natural extension of our purpose - “empowering communities and empowering members”. We believe that broadband is the electricity of the 1930s and 1940s. Remember, in 1930, fewer than 10% of farms had access to electricity. In 2016, 53% of Americans lack access to broadband (as defined by FCC - 25 mbps download speed and 3 mbps upload speed).

Much like we did with electricity in 1938, we're going to provide real, affordable broadband to Northwest Arkansas and Northeast Oklahoma.



POWER GRID 4.0
DIGITALIZATION
FORUM

MONTRÉAL,
QUÉBEC
CANADA

OCTOBER
16, 17, & 18,
2019



For more information visit: UTCPowerGrid.org

The Path to the Digitized Future of the 21st Century Utility

Customer demand, emerging renewable energy production, and energy storage are a few major developments driving electric utilities to evaluate the opportunities and challenges associated with these new energy sources, and how their existing infrastructure may need to transform. Such evaluations are causing decisionmakers at utilities to consider automation and digitization their existing utility communications networks.

Utility information and communications technology (ICT) market indicators signify that electric utilities must come to terms with the necessity to build robust and intelligent networks supported by smarter infrastructures. The investment in digital assets is paramount, and C-level executives are continuing to realize that now is the time to allocate resources to transform their core utility business.

The UTC Cross-Border Power Grid 4.0 Digitalization Forum will be the premier global venue to discuss these issues. This event will bring together the CEOs, CISOs, CIOs, and the full slate of utility C-suite officials and their teams for a three-day foray into these issues.

HOST
UTILITY



SNC • LAVALIN

PREMIER
SPONSOR



PLATINUM & DAY 1 RECEPTION SPONSOR



BRONZE SPONSOR



BLACK & VEATCH
Building a world of difference.

BRONZE SPONSOR

To view featured speakers or
register as a speaker please
visit: UTCPowerGrid.org



HOTEL INFORMATION
Hotel Omni Mont-Royal
Montreal, QC



Rural Deployments: What to Buy?

Recent actions by the White House and Department of Commerce complicate already difficult choices for network deployers. The issues are not purely technical.

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

the United States.” The same day, the Commerce Department slapped Huawei with a requirement that it receive a special license before it buys any American technology – including the chips and software it uses in its products.

The two actions were not directly related, even though news reports treated them as one. The message, if you were watching network news, is that anything made in China is now subject to new and possibly draconian regulation. That’s premature. The Commerce action was mainly due to Huawei’s allegedly continuing to violate sanctions on North Korea and Iran after promising that it would not sell equipment to those countries. The U.S. has long required such restrictions as a precondition for licensing use of such technologies, ranging from Google’s Android to chips used in cellular networks. It brought the hammer down on ZTE a few years ago for similar violations, and before that on both Huawei and ZTE for violating software copyrights. But stiffening those rules with licensing reviews and adding the potentially cumbersome purchase reviews asked by the new executive order could, in theory, restrict purchase and software updates on all equipment made in China, including equipment made there by American companies.

How, then, does a deployer minimize risk and satisfy its lenders without going broke? A few suggestions:

- Expect a policy that, in practice, will be less draconian than advertised, but don’t count on it. The threat is real and the stakes are high.
- In an election year, politicians want to appear tough. The fine points of technology mean nothing to most of them. Keep in touch with regulators and your federal elected officials.

Be prepared to modify grant and loan applications. Huawei itself sells about as much equipment and software worldwide as all other suppliers combined; if it is hobbled, prices will rise.

- Regulatory focus will be on equipment and software used in the network core. Most equipment is used at the network edge, close to customers. That is especially true of 5G. A good reason for multiple network providers in the same region to coordinate their 5G network plans is that a single central office is easier to protect than a half-dozen. Broadband Communities’ financial models suggest cost savings and revenue increases that can double or triple overall profits with coordination and consolidation, even without savings from using “white box” equipment that can easily be run from the same, domestically supplied software if necessary.
- Coordination requires looking at what equipment others in the region are using, looking at routing options and fiber counts so their routes mesh, and considering 5G sites that can combine all spectrum licensed to all carriers in a given area (not easy!), so providers won’t be stuck providing only low-margin dark fiber to cell sites controlled by national carriers.

For more details, see https://www.bbc-mag.com/pub/doc/BBC_May19_Hawk.pdf

What if most of us don’t find out about the next war until it is over? The internet’s very reason for being was to keep the United States running in time of nuclear war. It was designed as a decentralized “network of networks” that could route traffic around sections “damaged” by the unthinkable. The idea was to coordinate military actions, get paychecks and cash delivered, and inform the public when to evacuate and when to return home.

Today, the internet itself is the target. We use it to control power and sewage treatment plants, factories, traffic lights, aircraft, medical facilities, first responder networks, military installations and, of course, those cat videos. Soon, we will also use it for driverless vehicles, warehouses, ports and more. The network of networks stretches around the world.

The United States itself has shown the potential of cyberwarfare by gumming up the computer controls of Iran’s nuclear materials production and cutting connections to a Russian troll farm in St. Petersburg. Now we notice that most of our network electronic devices are manufactured in China, a country emerging as our biggest economic rival.

On May 15, President Trump issued an executive order for multiagency review of any transaction that, among other things, “poses an undue risk of sabotage to or subversion of the design, integrity, manufacturing, production, distribution, installation, operation, or maintenance of information and communications technology or services in

Mapping a Better Broadband Future

By Chip Pickering
CEO
INCOMPAS

In the last decade, the FCC has been focused on how to ensure that all Americans have high-speed broadband available to them where there is no business case for the private sector to deploy. It has done so largely through the FCC's universal service fund (USF)—which has been transformed from supporting telephone networks to broadband networks in rural areas.

Despite the FCC's best efforts, we still face serious challenges in connecting all Americans, including businesses of all sizes, to high-speed broadband. Many are starting to question the data used to measure broadband access and competition. Indeed, the broken broadband maps have been a frequent target for criticism by both Republicans and Democrats in Congress.

The FCC data estimates that approximately 21.3 million Americans live in areas without broadband access; however, Microsoft's user data tells a very different story. Over 160 million Americans are not using high-speed internet access (currently defined at 25 Mbps download/3 Mbps upload by the FCC). That's a huge discrepancy, and a huge problem.

Building Out Broadband Networks

Some of the problem is about broadband network coverage, but there also is an issue with affordability. The other problem we face as a nation is that there is very little choice for competitive broadband service at home. Most Americans only have ONE provider, TWO if they are lucky—which means that there is not sufficient competitive pressure on these monopoly providers to invest and innovate.

INCOMPAS' competitive fiber provider and wireless members continue to deploy broadband throughout the nation. It remains the case that building last-mile fiber is costly and time-consuming. The good news: The FCC has taken a number

of steps in recent years to address these issues, including adopting policies that encourage more predictable and more reasonable costs to build, and adopting a one-touch make-ready (OTMR) policy for pole attachments that INCOMPAS and its members endorsed.

For wireless deployment, the FCC, led by Commissioner Brendan Carr, has adopted streamlining processes to encourage deployment, including 5G network rollout—which is the next generation of wireless networks that companies have begun to deploy. It is important to emphasize that all wireless networks are reliant on wireline networks. Real 5G will require a dense, competitive fiber infrastructure—new networks built across the nation, ideally by hundreds of local broadband builders.

With the introduction of 5G, the expectation is that more devices will be connected online. For example, the number of Internet of Things (IoT) devices is expected to grow to 10 billion by 2020 and 22 billion by 2025, according to IOT Analytics Research. Given the data demands, there will be a significant need for more wired backhaul—i.e., fiber, to carry wireless traffic to the internet. As such, the efforts to streamline both wired and wireless deployments is important to enable faster and more cost-effective broadband networks to be built.

The Need for Accurate Broadband Mapping

There are a number of efforts being discussed to address the challenges with delivering broadband networks where there is no economic case to build those networks. However, the nation's current

broadband map is unreliable. It is broken and needs to be fixed immediately so that funding is directed to those areas that currently are not served.

The FCC's map depends on providers to identify and report where they "could" serve—not where they actually "do" serve; and once a provider says it could serve a census block, the FCC considers the entire population of the census block to be served. This has added to the frustration that broadband availability in the U.S. is inadequate as the broadband map does not reflect true broadband network availability.

There are certain efforts underway to remedy these deficiencies. For example, the FCC has a proceeding open to improve Form 477, which providers use to report their broadband data. FCC Chairman Ajit Pai has indicated that he plans to introduce reform measures to Form 477 at the FCC's August meeting. Congress also tasked the National Telecommunications and Information Administration (NTIA) with improving the broadband maps, and it currently is working to do so in eight states.

We need reliable and verifiable coverage maps so that communities and consumers are informed, and policymakers can make prudent decisions for rural broadband funding. INCOMPAS supports reform of the FCC's Form 477 so that





infor-
s u b -
w o u l d
the maps.
crowd-sourc-

broadband providers offer more granular information about their network coverage, such as where they currently provide service at the address level. INCOMPAS also believes using third-party data, such as Microsoft's user information and the FCC's subscription information, dramatically improve the maps. We also believe crowd-sourcing data so consumers can confirm where they do and don't have coverage will help bring the internet to families most in need of connections. No child should have to sit outside a fast food restaurant looking for a homework hotspot.

Legislation to require improvements have been introduced in the Congress, but there is no reason for the FCC to delay. It should improve the Form 477 and include other data points from third parties now so that there is a better understanding of the need for broadband infrastructure to be built with targeted funding.

Prioritizing Unserved Areas

Identifying the areas that have the greatest need for infrastructure—urban, suburban and rural—is the right policy choice. Former FCC Commissioner Mignon Clyburn recently testified before the House Energy & Commerce Committee, stating:

“Funding must be targeted to places with the greatest need, to ensure that those communities and citizens who have been completely left behind, are connected as quickly as possible. Prior attempts—while important and well-intentioned—

simply have not done enough to close persistent gaps. Investments must begin there.”

Our fellow Americans who have been left behind because they have no access to broadband infrastructure should be our nation's priority, and Chairman Pai has made this his priority. He has proposed a new Rural Digital Opportunity Fund that would spend more than \$20 billion over 10 years to address the persistent digital divide through a reverse auction. A reverse auction that allows all providers—whether competitive or incumbent—to participate in the opportunity to obtain that funding to build and serve these areas will ensure that taxpayers will get as much bang for their bucks as possible. In fact, reverse auctions have brought more benefits and saved the taxpayers money.

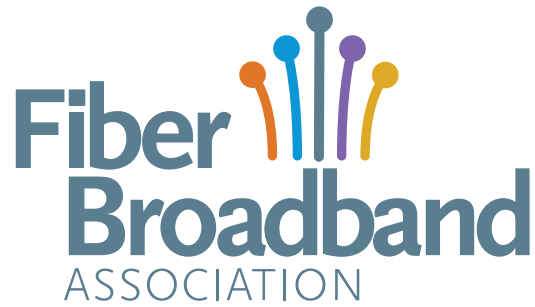
One study estimated that the Connect America Fund II auction resulted in 70% less funding than the FCC's original model suggested would be needed to deploy broadband. We need to stretch our limited dollars when we are using taxpayer money to build broadband, and using reverse auctions that allow all providers a chance to compete for the funding will drive needed efficiencies.

It is heartening to see the efforts underway to ensure every American citizen has the opportunity to connect to broadband and enable every community the chance to connect to the digital economy. This is a worthy goal that will serve our nation well.

About the Author

Chip Pickering is the CEO of INCOMPAS, the internet and competitive networks association. Chip was a six-term Republican Member of Congress representing Mississippi's Third District. During his time in the House, he served on the Energy & Commerce Committee, where he was vice chairman from 2002 to 2006, as well as the Science Committee. While chair of the Basic Research Subcommittee, he oversaw the transition to the commercial internet, and the establishment of domain names, registries and internet governance. He also successfully led a bipartisan legislative effort to codify net neutrality principles through the House in 2006. Before serving in the House, Chip was a key Republican Senate staffer in developing the 1996 Telecommunications Act. In addition to his work with INCOMPAS, Chip teaches at Ole Miss.





Accelerating the Connected Future

Join the Fiber Broadband Association and accelerate the connected future—built on fiber

The Fiber Broadband Association is the largest and only trade association in the Americas dedicated to the pursuit of all-fiber optic network infrastructures and technologies.

As a member, you will benefit from the education, information, tools, resources, and advocacy you need to grow your business and accelerate fiber broadband deployment.

**Invest in your future and join the
Fiber Broadband Association today.**

**FiberBroadband.org/Join
Membership@FiberBroadband.org**

Investing for the Future of Rural Broadband Infrastructure



By Shirley Bloomfield
CEO
NTCA

It certainly has been an exciting few months for our industry. Rural broadband funding is picking up momentum like a rock rolling downhill. We have seen President Trump and FCC Chairman Ajit Pai announce the launch of the Rural Digital Opportunity Fund, which will provide \$20.4 billion over the course of 10 years to support broadband efforts across rural America. House Energy and Commerce Committee Chairman Frank Pallone (D-N.J.) reintroduced the LIFT America Act, which aims to provide resources to build sustainable broadband in rural areas, and we continue to hear buzz about a potential infrastructure bill that emphasizes a shared national goal of expanding rural broadband. Proper funding is needed to achieve this goal, and I am optimistic about all of these developments.

We know the benefits of broadband connectivity are many. That is why recent momentum to provide resources for rural broadband expansion across America is so encouraging. However, funding is only the first step. The second step is spending it wisely, and for this, we must take great care.

NTCA believes the best way to capitalize on recent momentum to solve our country's rural broadband challenges is to invest in the future, not just in immediate needs. We can do this with good policy that expands on what has worked in the past and promotes investment in long-term solutions. That means leveraging existing federal programs with proven track records of success, like the FCC's Universal Service Fund. The U.S. Department of Agriculture (USDA) and the FCC already have the expertise in place to implement large quantities of federal dollars to support rural broadband buildout. Rather than reinventing the wheel, it is critical that Congress use these tried and tested existing federal

broadband programs to distribute new loans and grants.

We also need to be mindful of the potential for overbuilding. Many hands will be raised in the effort to take advantage of these funding programs, so coordination is key. Any infrastructure dollars directed toward rural broadband deployment should be coordinated with federal broadband programs at both USDA and the FCC. This will ensure that all programs are working with each other to prevent costly duplicative overbuilding resulting from efforts to hastily spur broadband deployment.

"Funding rural broadband is an extremely important endeavor. I am so encouraged by recent developments that indicate these efforts are a shared national interest."

Finally, it is important that we spend money on long-term solutions. That means investing in future-proof fiber-optic networks. Even the great promise of 5G will ultimately rely on substantial fiber investments—especially in rural America. What would be ineffective and especially inefficient is prioritizing technologies that are cheaper in the short term but cannot provide the broadband speeds and capacity for meaningful internet access for the long-haul. That is why when the government looks to fund rural broadband, it is critical that we invest in technology that can be readily upgraded to deliver the fastest speeds over a long period of time. Additionally, when we build sustainable infrastructure in rural America it engenders confidence that the broadband-supported investments

in economic and educational opportunities in these rural communities are similarly sustainable.

Funding rural broadband is an extremely important endeavor. I am so encouraged by recent developments that indicate these efforts are a shared national interest. However, providing the resources is just the first step in the process. How we spend these funds is just as important, if not more so, than receiving them in the first place. That said, there are three points to keep in mind as funding for rural broadband gains momentum:

1. Stick with what works. Programs like the Universal Service Fund are tried and tested in successful rural broadband deployment.
2. Beware of overbuilding. More money can create more occasion for costly and duplicative overbuilding.
3. Invest in the future. Look for long-term solutions like fiber-optic networks that can be readily upgraded and provide the fastest speeds over time.

Access to high-speed internet is an essential part of our lives. Through coordination and investment for the long term, we can make sure more Americans have the access they need today and tomorrow.



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.



A Better Formula for Rural FTT



Whether you're establishing or expanding your fiber-to-the-x (FTTX) network, CommScope can help you build a high-performing network quickly and cost-effectively.

CommScope offers a complete line of fiber to the home (FTTH) solutions developed specifically for rural and suburban deployment. By leveraging our fiber distribution technologies and tailoring them to serve low- and medium-density subscriber environments, this portfolio provides flexibility, scalability and ease-of-use to overcome the challenges of deploying fiber in rural and suburban areas.

TH Deployments



Equipment Savings

- With tap architecture, providers have seen large reductions in the number of optical fibers used in a deployment—some as large as 87 percent.

Plug-And-Play Equipment

- Our fiber enclosures eliminate the need for drop cable splices, allowing technicians to simply plug preterminated drop cables into ports on the outside of the terminal.

Deployment Efficiencies

- The four-fiber cables used make for more efficient deployments. More cable on the truck reels means less splices when they reach the end.

Deployment Economics

- Tap architecture uses less cables—keeping deployment costs under control, wherever they take place.

BROADBAND BREAKTHROUGH

Electric cooperatives are increasingly seen as part of the solution to rural connectivity

By Cathy Cash
Senior Writer/Editor
NRECA

Reprinted by permission from RE Magazine

"What we are sitting on is transformative."

Ron Holcomb is on Capitol Hill in Washington, D.C., telling congressional staff about how a number of member-owned, not-for-profit electric cooperatives are embracing a new phase of their core business: improving the quality of life in rural America, this time through broadband internet access.

Earlier this year, Tipmont REMC in Lafayette, Indiana, accelerated its broadband commitment when it bought its local fiber competitor.

"If there is a better investment, I can't think of one," says Holcomb, Tipmont's president and CEO. "An essential service co-op, that's what we have to become." It's an increasingly familiar refrain lately, as some electric co-ops across the country study, plan for, and initiate projects to bring broadband to their unserved or underserved communities.

More than 100 electric cooperatives are deploying broadband, and another 200-plus co-ops are exploring the option and conducting feasibility studies, according to NRECA research.

Several states have passed or are passing laws addressing potential legal hurdles for electric cooperatives to get into broadband. And many states offer loans and grants that co-ops can leverage for connectivity projects

Huge new federal programs aimed at boosting rural broadband are making billions of dollars available to co-ops and other providers, while national media reports and access advocacy groups are referencing the promise of electric co-op engagement in rural broadband with increasing frequency.

"I do believe we've reached a tipping point for general acceptance of the potential role of co-ops in solving this problem," says Brian O'Hara, NRECA regulatory issues director for telecom and broadband. "We're very much considered a part of the equation.

"That certainly doesn't mean co-ops must be the solution in every case," he adds. "But there's been a noticeable realization at the local, state, and federal levels that what electric co-ops bring to the table is uniquely valuable in working to bridge the digital divide."

The stakes are significant. Lack of reliable high-speed internet access means many of the small towns, farm communities, and remote populations that co-ops serve risk being left behind in key areas like education, health care, jobs, and commerce.

A recent NRECA study estimates about \$68 billion in economic value will be lost to the estimated 6.3 million co-op-member households without broadband if they remain unserved or underserved over the next 20 years. Similarly, a 2018 Purdue University study commissioned by Indiana Electric Cooperatives and Tipmont REMC and funded by CoBank found Indiana can expect to reap \$4 in economic gains for every \$1 invested in broadband.

Electric co-ops get that. "They're in a position, not unlike 80 years ago, to make a real difference in their communities," O'Hara says. "Their success hinges on critical pieces coming together."

Changing state laws

Co-ops and statewide associations in several states have worked to amend or rewrite outdated or inadequate laws that could hinder cooperative broadband projects.



In Indiana and Missouri, co-ops successfully pressed to change laws that could have forced them to revise easement agreements with landowners to include running fiber-optic cable over their existing infrastructure.

Passage of the easement bill was "a crucial step in bringing high-speed internet service to rural people across the state who desperately need it," says Caleb Jones, CEO of the Association of Missouri Electric Cooperatives. "It took a true grassroots effort to make this happen."

In fact, co-op clout is a key factor in paving the way for broadband access, says Scott Bowers, vice president of government relations at Indiana Electric Cooperatives. "There is more hope that this problem is going to get solved because co-ops are leading and actively engaged," he says. "We're crossing obstacles off the list."

This year in Mississippi, Gov. Phil Bryant signed a law that allows electric co-ops to pursue broadband. In a state that ranks near the bottom on internet access, the bill passed the legislature overwhelmingly. After the bill was signed, nearly all of the state's 25 electric co-ops indicated they would be looking at options for broadband.



"We've listened and paid attention to the fact that there is a great need not being met in the rural parts of our state and other states," says Jason Siegfried, president and CEO of Southern Pine Electric in Taylorsville, Mississippi.

The 70,000-meter co-op is in the midst of a feasibility study that will inform a broadband strategy as early as this year. "We recognize that co-ops are getting into the business in other states and having success," Siegfried says.

Texas co-ops are pushing for legislation that, like in Indiana and Missouri, will address delivering retail broadband without revising easements.

"We can install fiber on the pole for electric system communications, but we can't deliver broadband without obtaining a new easement," says Darren Schauer, general manager and CEO of Guadalupe Valley Electric Cooperative. "If we can get legislation passed, we can take those resources and apply them to building additional fiber."

The co-op began providing fiber-to-the-home to its south central Texas territory in 2013 and plans to serve 14,000 members by year's end.

In North Carolina, dual easement use is just one issue electric co-ops want state lawmakers to address. A bill making its way through the legislature would alleviate the easement concern, lift the state's 20-year ban on electric co-ops using U.S. Department of Agriculture (USDA) grants for broadband service, and allow co-ops to use their fiber networks to enable retail communications.

Nelle Hotchkiss, chief operating officer of the statewide North Carolina Association of Electric Cooperatives, says constituent feedback during the 2018 elections has helped their cause.

"The legislators on the campaign trail last fall heard it loudly and clearly," she says. "The consumers in rural North Carolina are tired of waiting for affordable, reliable, high-speed broadband."

State funding programs begin

States have also begun to create broadband loan and grant programs to offset or defer the enormous upfront costs of building out fiber infrastructure.

In March, Tennessee Gov. Bill Lee awarded six electric co-ops nearly \$6.3 million in state broadband accessibility grants to connect rural residents.

"The biggest hurdle with broadband

remains funding," says Trent Scott, vice president of corporate strategy for the Tennessee Electric Cooperative Association in Nashville. "It's expensive. Yet the co-ops are structuring projects in such a way that they can be successful. Grants and low-interest loans from the state or federal government will have a big impact on the speed at which we can deliver broadband to people in underserved areas."

Indiana recently launched a \$100 million grant program to get broadband built in areas the state defined as unserved.

"Gov. [Eric] Holcomb's announcement, as well as the significant support of the Indiana legislature, is pretty indicative of how Indiana policymakers view the role that electric co-ops can play," says Bowers of the Indiana statewide. "They are looking to electric co-ops to help solve the connectivity problem and not just in Indiana."

Federal initiatives grow

At the national level, the Federal Communications Commission (FCC) this year plans to auction about \$100 million from its Connect America Fund (CAF) to get internet access built in unserved or underserved communities. Another auction is slated for 2021.

The CAF program was opened to electric co-ops for the first time in 2018, and the FCC awarded 35 co-ops about \$225 million to be doled out over 10 years.

Electric co-ops' efforts got another boost last year when the USDA created ReConnect, a rural broadband program that's part of the Rural Utilities Service (RUS). Congress has allocated \$1.15 billion for ReConnect grants, grant-loan awards, and low-interest loans specifically for rural broadband.

Congress also authorized a new annual \$350 million grants-and-loans program for deploying rural broadband in the 2018 Farm Bill. Projects in areas with fewer than seven meters per square mile may qualify for grants covering up to 75 percent of the cost.

Agriculture Secretary Sonny Perdue traveled last year to tiny Hamilton, Alabama, to present Tombigbee Communications, Tombigbee Electric Cooperative's broadband subsidiary, with \$2.98 million from the RUS Community Connect Broadband Grant Program. The co-op serves about 10,000 meters.

"To compete in today's global marketplace, we must remove the infrastructure

Cont'd on page 41

CO-OPS ARE GOING **BROADBAND**

Join NRECA and partner with
America's Electric Cooperatives.

electric.coop





Maximizing Investment and Reducing Operational Expense With Proactive Fiber Monitoring

By Tom Coburn
Product Line Manager
Fiber Assurance Solutions
ADVA Optical Networking

Rural Digital Opportunity funds from the CAF II program enables the buildout of broadband voice and data services to new or under-served end users. Beyond the initial acquisition of funds and installation of equipment, an important part of any provider's business plan is to ensure they gain the highest returns on those funds over time. Ensuring proper network operation and availability maximizes revenue opportunities while also controlling operational expenses improving overall profitability.

Importance of Monitoring Fiber Optic Infrastructure

A major component of any new network upgrade related to this program includes fiber optic buildouts or upgrades. Whether it's a PON implementation to the end user or backhaul for fixed wireless and/or 5G cell services, fiber optics are a critical component of any new or upgraded service.

The value of improving network availability improves customer satisfaction, reduces churn, shortens service activation time, and reduces operational expenses by reducing truck rolls and exposure to SLA penalties.

Benefits of Proactive Fiber Monitoring

In-Service fiber monitoring watches the network proactively without disrupting network traffic. It monitors for fiber cuts and attenuation events that can impact

operation and service quality without taking the network offline. In comparison, traditional OTDR troubleshooting methods are costly and slow as they are utilized after a failure has been reported and are labor intensive.

Proactive fiber monitoring provides updates in seconds or minutes from a central location before the end customer is even aware there is a service disruption. These monitoring solutions enable the "fault fix" process to begin often times before the end user reports an issue.

Fiber Monitoring Highlights:

- Validates fiber infrastructure (new and existing) for proper operation which reduces time to revenue.
- Monitors active networks without the need to take the network offline which reduces the time to identify faults from multiple hours to minutes
- Monitors incremental changes in fiber characteristics with alarm thresholds and historical data to track changes over time before they become critical.
- Improves security and operation of physical assets by monitoring man-hole access and water sensing.

Protecting Infrastructure Investments and Improving ROI and OPEX

Implementing a fiber monitoring solution

“Beyond the initial acquisition of funds and installation of equipment, an important part of any provider's business plan is to ensure they gain the highest returns on those funds over time.”

provides both initial benefits to install and get new services on line in a very efficient manner. Longer term benefits include providing performance monitoring and network troubleshooting, leading to reduced operational costs over time and further protecting revenue and profits by reducing OPEX. A strong ROI makes a proactive fiber monitoring solution an important consideration for any rural carrier or provider expanding their network and services as part of any CAF II initiatives.

An Update on Rural Broadband Funding Opportunities

By Alyson Moore
North American Market Manager
Corning Optical Communications

Conquering the digital divide requires a variety of resources, with financial investment chief among them. Building broadband networks can be capital-intensive projects, and broadband service providers who are committed to rural markets can use all the financial resources they can get. Luckily, the federal government has recently acted to make more funding available.

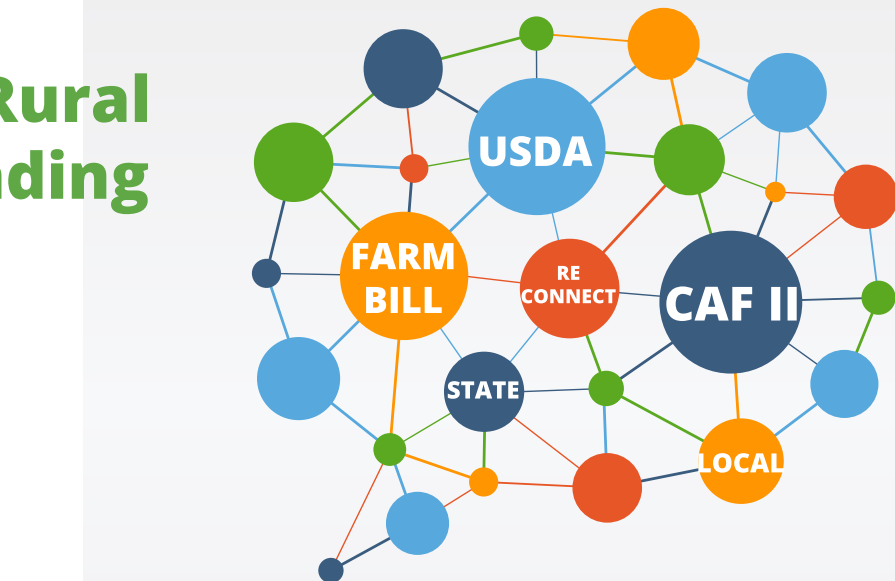
These actions include the introduction of the new ReConnect program at the Rural Development arm of the U.S. Department of Agriculture (USDA). Additionally, funding for traditional USDA rural broadband loan and grant programs has been finalized with recent passage of the Farm Bill. USDA ReConnect Program

The new USDA ReConnect Program was authorized by Congress in 2018 and will provide \$600 million in the form of loans and grants for rural broadband projects. According to the USDA, a primary goal of the ReConnect Program is to expand broadband service to rural areas without sufficient broadband access, defined as 10 Mbps downstream and 1 Mbps upstream.

USDA rules for the program have identified several potential participants, including state and local governments, nonprofit organizations, for-profit corporations, limited liability companies, cooperatives, and Native American tribes. Participants in the program will be required to deliver broadband service of at least 25/3 Mbps to every farm, household, and hospital inside their identified service area.

There are a few funding components to the program, including:

- 100 Percent Grant: Up to \$200,000,000 is available for grants. The maximum amount that can be requested in an application is \$25,000,000. Applications are due to USDA by May 31, 2019.
- 50 Percent Loan/50 Percent Grant: Up to \$200,000,000 is available for



“USDA rules for the program have identified several potential participants, including state and local governments, nonprofit organizations, for-profit corporations, limited liability companies, cooperatives, and Native American tribes.”

loan/grant combinations. The maximum amount that can be requested in an application is \$25,000,000 for the loan and \$25,000,000 for the grant. Loan and grant amounts will always be equal. Applications are due to USDA by June 21, 2019.

- 100 Percent Loan: Up to \$200,000,000 is available for loans. The maximum amount that can be requested in an application is \$50,000,000. Applications are due to USDA by July 12, 2019, though USDA will evaluate and award loan-only projects on a first-come-first-serve basis, beginning in April 2019.

There are specific criteria tied to each funding program. To be eligible for a 100 percent loan or 50 percent loan/50 percent grant, the service area must be in a rural market where 90 percent of the households do not have access to sufficient broadband. The 100 percent grant component is only eligible for rural markets where 100 percent of the households do not have access to sufficient broadband.

A point system will be used, with extra points allotted to projects that commit to offering symmetrical speeds of 100

Mbps. The actual number of farms, businesses, healthcare, and educational facilities the project will serve will be a key evaluation criterion as well.

Farm Bill Provides Rural Broadband Funding

Congress recently passed, and the president has signed the Agricultural Improvement Act of 2018, more commonly referred to as the Farm Bill. It is comprehensive legislation addressing many aspects of agriculture and rural America, including rural broadband. There are a few rural broadband funding mechanisms that flow from the legislation.

The bulk of the funding will allocate \$350 million annually from 2019 to 2023 toward grants, loans, and loan guarantees for rural broadband. To qualify for this funding, service providers will have to target rural markets where no more than 10 percent of the households can get broadband at speeds of 10/1 Mbps. Providers also must commit to bringing 25/3 Mbps to their markets.

There are population-density provisions governing the grant mechanism of the program. Grant funding can only cover

75 percent of a project's cost in areas with fewer than seven people per square mile. For areas with density of between 7 and 12 people per square mile, grant funding cannot exceed 50 percent of a project's cost. Higher-density areas of between 12 and 20 people per square mile will qualify for 25 percent grant funding.

Additional funding mechanisms include \$50 million annually for Community Connect grants; \$10 million for middle mile infrastructure for rural areas; and \$10 million annually for a program that will be called the Innovative Broadband Advancement Program. That program was previously called the Rural Gigabit Network Pilot Program.

The Community Connect Program offers funding that helps cover the costs of providing broadband to community facilities. Funding recipients must offer at least two computer access points for free broadband service.

The Middle Mile Program provides grants and loans for middle mile projects where at least 75 percent of interconnection points are in rural areas, and the network has to be capable of supporting retail broadband service meeting the maximum broadband buildout requirements. Grant funding can only cover 20 percent of a project's cost.

Finally, the Innovative Broadband Advancement Program – provides funding for projects that support innovative technologies and methods that significantly decrease the cost of broadband deployment in rural areas, and provide substantially faster broadband speeds.

The USDA offers program details online. Applications are now being accepted, with an application deadline of September 30, 2019. USDA processes these loan applications as they are accepted.

Connect America Fund Updates

Much of the attention to the Connect America Fund (CAF) program is currently focused on the recently concluded CAF-II auction. Over 100 rural broadband providers won over \$1.4 billion in funding for the next 10 years to help bring broadband to rural areas. The funding will help over 700K locations across rural America to gain better accessibility to broadband. "The successful conclusion of this first-of-its kind auction is great news for the residents of these rural communities, who will finally be able to share

in the 21st-century digital opportunities that broadband provides," said Federal Communications Commission (FCC) Chairman Ajit Pai in a prepared statement. "By tapping the mechanisms of the marketplace, the Phase II auction served as the most appropriate and cost-effective way to allocate funding for broadband in these unserved communities, bringing the highest-quality broadband services to the most consumers at the lowest cost to the ratepayer."

According to the FCC, 53 percent of all homes and businesses served by carriers that won CAF-II auction funding will have broadband availability of at least 100 Mbps. Nineteen percent will gain access to Gigabit service as well. Over 99 percent will have access to 25 Mbps speeds or better.

In other Connect America Fund news, the FCC recently updated the Alternative Connect America Cost Model, or ACAM program. The commission increased funding for this program, which supports small "rate-of-return" telecom carriers, by \$67 million annually, closing some budget shortfalls for the program. The

increased funding will support TELCOs that are in the ACAM program to deliver 25/3 Mbps service and, according to the FCC, expand rural broadband availability to 100K more rural locations.



Alyson Moore manages the North American market for Corning Optical Communications. With 20 years of experience in the telecommunications industry, Alyson's expertise spans a variety of network types including those operated by enterprise and carrier customers. In her current role, Alyson focuses on

the community broadband space, specifically on solutions to increase the performance, lower the costs, and improve the installations of access networks. She holds a bachelor's in marketing and an MBA from Virginia Tech.



CHAMPION
O·N·E™

The Champion of Open Networking

The optical network solutions provider preferred
by service providers, health care systems,
higher education, and more.

Learn more at

www.championone.com/walker

BETTI BOX: NETWORK PERFORMANCE TESTING MADE SIMPLE

Broadband Evaluation, Testing, and Tracking Instrument

- **Easy to Use** – Just plug it in and walk away
- **Field Tested** – Vantage Point has performed hundreds of thousands of tests with this technology
- **Technology Neutral** – Vendor agnostic and works on all networks
- **Responsive** – Receive alerts if a test location goes offline or if a test fails
- **Secure** – Equipment and portal are secure and encrypted
- **A Start-to-Finish Solution** – Protect your support with Vantage Point Data Certification and Filing, included with BETTI Box



"Network Performance Testing is mandatory for most high-cost support recipients. BETTI Box by Vantage Point is designed to meet FCC requirements, and built to meet your operational needs."

Order a BETTI Starter Kit today! Ask us how you can fulfill your Network Performance Testing Requirements.



NC Broadband Infrastructure Office

By Jeff Sural
Director

North Carolina Department of Information Technology's
Broadband Infrastructure Office (BIO)

Ensuring all North Carolinians have access to affordable high-speed internet, anywhere and at any time is the goal of our team at the North Carolina Department of Information Technology's (NCDIT) Broadband Infrastructure Office (BIO). Our work to expand affordable access and adoption of broadband and demonstrating its benefits requires strategic, innovative and dedicated partnerships, policies, tools and programs.

In March, Gov. Roy Cooper signed Executive Order 91, establishing a new Task Force on Connecting North Carolina to increase high-speed internet access across North Carolina. The task force brings together state government leaders to identify and remove barriers to facilitate private-sector deployment of last-mile infrastructure, eliminate the homework gap, and support the adoption of affordable, high-speed internet access, as well as improve data collection and analysis to locate unserved and underserved areas. Their work also will include updating the Connecting North Carolina: State Broadband Plan, which was published in 2016.

The BIO has established strategic partnerships across the state and, together, we are creating new opportunities to better connect our state.

Rural broadband grant program

The Federal Communications Commission's latest data shows that more than 500,000 North Carolinians lack access to broadband at their designated speed threshold of 25 Megabits per second (Mbps) download and 3 Mbps upload. To help close this digital divide, the state legislature established the Growing Rural Economies with Access to Technology (GREAT) broadband grant program. The program provides matching grants to internet service providers and electric membership cooperatives to lower financial barriers that prevent high-speed internet service expansion.

Eligible areas are census blocks or portions of census blocks in Tier One -- the 40 most economically distressed -- counties lacking access to service at a mini-

mum of 10 Mbps download and 1 Mbps upload speeds.

Applicants are scored based on the number of households, businesses and agricultural operations they propose to serve, the average cost per household and speeds offered. Applicants who agree to provide higher-speed service, defined as a minimum of 25 Mbps download and 3 Mbps upload, receive higher award amounts.

In the GREAT grant's inaugural year, BIO awarded a total of \$9.8 million to 21 applicants in 19 counties. This investment is anticipated to result in high-speed internet access to 9,800 households and more than 590 businesses, agricultural operations and community institutions such as libraries, schools and hospitals. Of the 14 companies receiving funding, 11 are NC-based small businesses, telephone cooperatives and an electric membership cooperative.

Future investment and mapping

Prudent investment of state funds for grants and identifying unserved areas requires accurate data and mapping of those areas. FCC data report 94.8 percent of North Carolinians have access to broadband. We know that number is overstated, but currently it is the only data available to track broadband deployment. The BIO has initiated several efforts to gather more detailed data and build more accurate maps of households with and without broadband service.

The use of specialized software allows us to identify the location of fiber optic cables and cell phone towers. We also created an online speed reporting tool that allows a person without service to enter their address from work, library or mobile device and we're able to plot that location.

Along with those efforts, we have partnered with the U.S. Department of Commerce's National Telecommunications and Information Administration to locate and identify additional data sources and analysis methods.

On-the-ground resources

We know that many counties and communities do not have the resources to hire broadband experts, so we can provide this support to them through an on-the-ground technical support team of experts.

Through the First Responder Emerging Technologies program, FirstTech, we are equipping first responders with the technology, tools and training they need to better serve citizens.

In addition, the BIO leads digital inclusion efforts to close the digital divide. These efforts include:

- A statewide collaborative of digital inclusion leaders.
- A pilot program in partnership with the State Library of NC and funded by the Institute of Museum and Library Services to bridge the homework gap that occurs when students are assigned homework that requires internet access but lack an internet connection at home. Through the pilot, Wi-Fi hotspot devices are being provided for up to 35 K-12 households in an underserved county; and
- A feasibility study of telehealth and broadband in 20 counties, in partnership with the NC Office of Rural Health and funded by the Appalachian Regional Commission.

In today's globally-connected society, robust communication networks are vital. Through strategic and innovative partnerships and programs, we are making great strides towards closing the digital divide and providing greater opportunities for everyone.

ABOUT THE AUTHOR

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



Show Me the Money: Broadband Funding for Rural Utilities

By Darren Farnan, United Electric Cooperative
Lee Ayers, Mid-Carolina Electric Cooperative
Bob Lockhart, Utilities Technology Council

Funding opportunities for rural broadband services continue to appear. Rural electric utilities are uniquely positioned to provide rural broadband service, since their infrastructures are already present anywhere that electricity is being delivered. Many rural utilities have existing optical fiber telecommunications for grid management use cases. Thus, those utilities already have local broadband expertise and infrastructure in place. As the U.S. Federal Communications Commission (FCC) and other agencies make rural broadband funding available, rural utilities are uniquely positioned close the digital divide. Recent experience shows that utilities can be successful in their applications.

Recent Successes and Upcoming Awards

The Connect America Fund Phase II (CAF-II) was an overall success, based on the awards made to utility companies. The National Rural Electric Cooperative Association (NRECA) states that over \$225 million was awarded to Rural Electric Cooperatives, bringing primarily gigabit fiber services to rural, high-cost locations. Overall, CAF-II awarded approximately \$1.4 billion over the next 10 years in an area with a previous budget of \$5 billion, due to the reverse auction process. Over 53% of the awarded service areas are now in line to get 100 Mb service – this, in areas where incumbent price-cap carriers were only obligated to provide 10

Mb service. The main requirement of the award is that the recipient be the carrier of last resort for voice service as well, and the recipient will need to become a registered Eligible Telecommunications Carrier (ETC) in the states where they provide service.

Next on the horizon is the Rural Digital Opportunity Fund, also known as RDOF, in which the FCC proposes to make \$20.4 billion available, to enable rural broadband networks to deliver up to gigabit speed broadband. The FCC has said the process will begin in late 2019, with a minimum service requirement of 25 megabits per second (Mbps) download and 3 Mbps upload speeds (25/3), giving preference to proposals with higher speeds and lower latency. This is a significant opportunity for rural utilities to access the level of funding needed to bridge the rural divide. Importantly, this is not new funding. The FCC intends to redirect funding that has been going to large price cap carriers that have failed to meet FCC expectations of providing rural broadband.

Meanwhile, the U.S. Department of Agriculture's Rural Utilities Service (RUS) has diverse funding programs such as Distance Learning, Telemedicine, and Community Connect, but RUS' largest focus has been the Re-Connect Program with \$600 million allocated for a combination of grant and loan awards: \$200

million in grants, \$200 million in loans, and \$200 million in combination grant/loans. and those funds are being awarded through 2019. RUS also received an additional \$500 million appropriation for this program to be distributed in 2019/2020 bringing just over \$1 billion in funding. However, this funding is more complex for recipients due to a somewhat cumbersome application and scoring process. The program's construction, engineering, and environmental requirements can drive up project costs and extend project time frames.

A number of States have implemented rural broadband funding programs to assist providers in extending networks that meet the minimum 25/3 broadband, for example, in Minnesota. However, these programs are often limited in funding amounts in comparison to federal programs.

The Devil is in the Details

Two key administrative topics can have an outside influence on how funds are awarded: broadband definition and mapping. The FCC allocates funds based on their definition of broadband, which can vary over time. Currently, funding is focused on a minimum of 10/1 service for incumbent carriers or the current FCC defined broadband speed of 25/3. Some State funding programs and even CAF-II have implemented a weighting system that favors 100 Mb or Gigabit (1000 Mb)



“The pre-existence of local infrastructure and local expertise can work to the rural utility’s advantage.”

objectives. Meanwhile, utilities should emphasize their experience with infrastructure deployment – considering that broadband is another service that can ride on the upgrade to an already existing infrastructure. The pre-existence of local infrastructure and local expertise can work to the rural utility’s advantage.

Mapping identifies which areas of the U.S. are underserved by broadband. Mapping is critical because awards are based on the FCC’s maps, which have recently come under scrutiny in the U.S. Congress and among broadband providers. The FCC mapping geographically defines areas using U.S. Census Blocks to determine broadband availability. If there is one home served by broadband in a Census Block, then the entire block is considered served and therefore no funding will be available to serve any

speeds. Services below 100 Mb may be unable to provide the benefits for which broadband is intended in the first place. A successful application should demonstrate that the resulting service will meet or exceed 100 Mb, and it should explain why services below 100 Mb will be ineffective toward achieving the FCC’s

homes on that block. Equitable distribution of the FCC’s awards requires mapping more accurately states’ current service levels to each geographic area.

Simultaneously, the current providers report their speeds for each census via FCC Form 477 twice per year, but the FCC does not verify that those reports are accurate. Reporting is entirely on an honor system. This process understates the true lack of broadband availability because unserved households are lumped into “served” census blocks or else those underserved households are in areas where providers overstate the actual speeds they are providing. However, seeking a national broadband map could have the adverse impact of delaying new program funding until more trusted maps are developed.

One Important Next Step

The FCC has recently announced via blog that it will begin discussing the rollout of the Rural Broadband Opportunity Fund during Summer 2019, with rollout in place by the end of 2019. With \$20.4 billion at stake, this issue merits the close attention of any rural utility. Beyond in-house monitoring, utility trade associations keep a close eye on the FCC and keep their members informed of current proceedings and recommended next steps.

Background: Broadband and Rural America **An Excerpt From the Congressional Research Service Publication “Broadband Loan and Grant Programs in the USDA’s Rural Utilities Service”**

The broadband loan and grant programs at RUS are intended to accelerate the deployment of broadband services in rural America. “Broadband” refers to high-speed internet access and advanced telecommunications services for private homes, commercial establishments, schools, and public institutions. Currently in the United States, residential broadband is primarily provided via cable modem (from the local provider of cable television service), fiber-optic cable, mobile wireless (e.g., smartphones), or over the copper telephone line (digital subscriber line or “DSL”). Other broadband technologies include fixed wireless and satellite.

Broadband access enables a number of beneficial applications to individual users and to communities. These include e-commerce, telecommuting, voice service (voice over the internet protocol or “VOIP”), distance learning, telemedicine, public safety, and others. It is becoming generally accepted that broadband access in a community can play an important role in economic development.

Access to affordable broadband is viewed as particularly important for the economic development of rural areas because it enables individuals and businesses to participate fully in the online economy regardless of geographical location. For

example, aside from enabling existing businesses to remain in their rural locations, broadband access could attract new business enterprises drawn by lower costs and a more desirable lifestyle. Essentially, broadband potentially allows businesses and individuals in rural America to live locally while competing globally in an online environment. A 2016 study from the Hudson Institute found that rural broadband providers directly and indirectly added \$24.1 billion to the U.S. economy in 2015. The rural broadband industry supported 69,595 jobs in 2015, both through its own employment and the employment that its purchases of goods and services generated.¹

Given the large potential impact broadband may have on the economic development of rural America, concern has been raised over a “digital divide” between rural and urban or suburban areas with respect to broadband deployment. While there are many examples of rural communities with state-of-the-art telecommunications facilities,² recent surveys and studies have indicated that, in general, rural areas tend to lag behind urban and suburban areas in broadband deployment.

Read the complete publication at <https://fas.org/sgp/crs/misc/RL33816.pdf>



AMERICA IS GROWING

Every day CoBank supports the communications infrastructure of rural America with reliable, consistent credit and financial services. We can be your trusted advisor to offer solutions and lending strategies if you are considering expanding through acquisition or construction/upgrade of your network.

We stand ready to partner with you on forward-looking projects that help rural America stay competitive.



800-542-8072

www.cobank.com

Build Your Best Network Under CAF II: Connect Hard-to-reach Subscribers through Affordable, Low-maintenance, and Flexible Broadband Deployment Solutions

by Javier Lopez
Portfolio Manager
ADTRAN

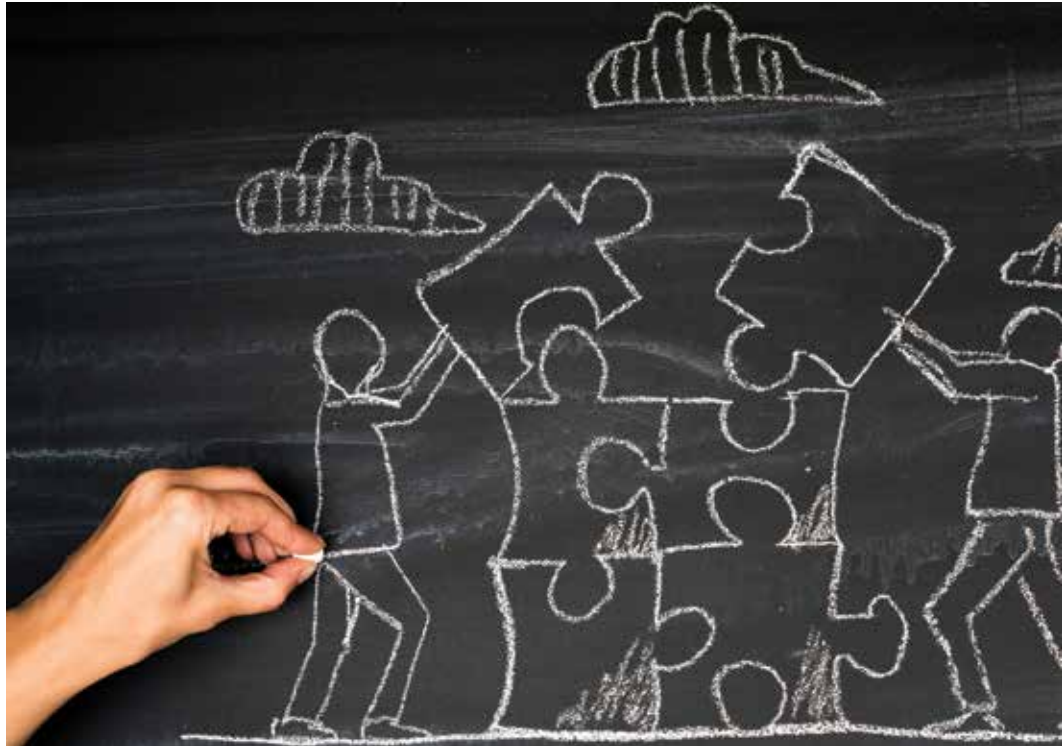
Recently, the Federal Communications Commission (FCC) announced updates to its Connect America Fund (CAF) program to improve the quality and availability of high-speed internet service in rural America. Further, the U.S. Department of Agriculture also unveiled a \$600 million loan and grant program to assist with building rural broadband infrastructure. These avenues present a significant opportunity for service providers to expand broadband coverage in rural and remote areas and help bridge the digital divide that remains in the nation, all while gaining more market share.

Given the range of geographic and logistical challenges involved with rural broadband service delivery, service providers responsible for CAF II build-outs should consider network solutions that optimize existing infrastructure, simplify deployment and provisioning, and improve the broadband experience for subscribers. Fiber-to-the-Node (FTTN) solutions offer just such an approach, with flexible, cost-effective deployment options that ultimately lower the operators' overall capital and operational costs while also affording a range of benefits.

Advantages of Using FTTN Solutions

With broadband service requirements fueling a push for fiber deeper into the network and closer to the end user, service providers can more effectively utilize existing copper infrastructure in combination with sealed FTTN solutions to address subscriber demands for years to come. By deploying the most cutting-edge generation of today's sealed micro FTTN solutions, operators can expect to capitalize on a host of technical advancements and advantages.

- FTTN solutions can tackle a range of subscriber densities, from low-density (16 subscribers) for rural deployments to high-density system level vectoring solutions (up to 384 subscribers across eight nodes) which can serve semi-urban environments and Multi-Dwelling Units (MDUs).
- Some operators may be surprised



to discover the impressive speeds available through deployment of the right FTTN solutions, with some capable of delivering up to 500Mbps services utilizing technologies such as Vectoring and Super-Vectoring.

- The range of long-reach backhaul technology through FTTN deployment can be equally striking, with service coverage extending thousands of feet from the fiber node to quickly and cost-effectively connect hard-to-reach subscribers.
- Powering options for today's latest FTTN solutions are also considerable, including local or remote powering, as well as flexible built-in holdover and battery backup options—all of which greatly reduce installation and maintenance costs.
- Service providers can also expect to deliver best-in-class triple play services over today's leading FTTN solutions, as they support both integrated and overlay POTS, together with IPTV services.
- Lastly, if a wide reach FTTN solution is paired with the right whole-home Wi-Fi solution, operators can deliver an integrated connected home solution that offers subscribers much greater visibility and control over their network.

Tackle CAF II Requirements, Minimize Expenses

As a world leader in broadband access, ADTRAN is committed to supporting service providers as they address the connectivity disparity in rural America. The company's focus remains on delivering the best available options on the market today—solutions that allow operators to fully tackle challenging CAF II deployment requirements while minimizing expenses. Service providers should expect to be able to expand their community's broadband footprint quickly and cost-effectively, and one of the clearest paths to serving the underserved is by deploying today's leading FTTN access solutions. As the market leader in building and deploying solutions for CAF and rural applications, ADTRAN's own portfolio of sealed micro FTTN solutions delivers numerous innovations that help operators affordably deliver broadband services into remote and rural areas. Service providers looking to invest in topnotch options for their CAF II builds would do well to learn more about how ADTRAN's FTTN family of solutions expands service providers' reach to more customers by utilizing enhanced technologies, ultimately helping them build their best networks.

THE 2019

INCOMPAS SHOW

NOVEMBER 4-6 | LOUISVILLE | KENTUCKY



THE STAKES ARE HIGH...

Gain the advantage and be a front runner in the communications market at The 2019 INCOMPAS Show

- Meet with top decision makers to generate new business deals
- Network and build valuable connections
- Stay at the forefront of the latest industry news and trends

Learn more at
SHOW.INCOMPAS.ORG

gaps in rural communities," Perdue said at the event.

'Well past experimental'

In a year tinged by weak agricultural commodity prices, trade tensions, and the historic federal government shutdown, farm loan defaults loom large over rural America's economy.

Many co-op leaders believe broadband internet access is needed now more than ever, for everything from precision farming to online employment and purchases, in the communities they serve. Waiting for third-party providers is often not an option.

"It is clear for the co-ops who want to go into the business and solve the issues of not having rural broadband that there are ways to do it," says Gary Wood, CEO at Central Virginia Electric Cooperative, which received CAF funds for its upcoming fiber buildout. "It's still up to the co-op."

Michael Callahan, CEO of the statewide association Electric Cooperatives of Mississippi, says his state's low population density has kept most broadband providers away. Some areas have only about two households per mile of line, far below the 35 one cable operator insisted on, he says.

So, since the enactment of the easements law, a handful of co-ops have been hard at work on fiber projects. "I'm excited," Callahan says. "All across the spectrum, co-ops can participate and make broadband better in the state of Mississippi."

Likewise in Tennessee.

"Conversations are being had in co-op boardrooms across the state," says Scott of the Tennessee statewide. "All of our co-ops are looking at broadband to determine if that is the right thing to do to best serve their members."

Bowers at the Indiana statewide sees broadband as a way to stem a tide of outward migration from dozens of the state's rural counties.

"Strong communities must have good job and education opportunities. Broadband is an essential piece of that now," he says. "If you have a service territory without broadband, it can be very challenging to attract residents and keep the ones you have. If your customer base is shrinking,

what is that going to do to your affordability component?"

Mike Williams, CEO of statewide association Texas Electric Cooperatives, is more blunt.

"You can't sell electricity to people who don't live there anymore."

He sees the economic benefits as a key factor in a co-op's broadband decision.

"In Texas, some family farmers have to work another job to continue to farm. Broadband gives you the opportunity to do that," he says. "We have communities that are not doing well. We can give them this critical infrastructure so residents can to continue to live and work there."

"It might even encourage young people, who leave and have gotten used to Netflix, to come back and be part of their communities."

NRECA Chief Economist Russell Tucker says it's tempting to get caught up in the rush of co-op broadband, but he cautions a go-slow approach in most cases. He says a key entry point is investing first in backbone infrastructure and communications that will improve a co-op's system and can be leveraged, after careful study, to provide connectivity to members.

"When we talk about bridging the digital divide, it's certainly important to focus on the role of the electric co-op," he says. "Broadband backbones are necessary to optimize operations and adapt to changing consumer behavior. And if a co-op makes the decision to go forward with broadband, they can be a major step toward providing services either directly or through a third party."

So is co-op broadband at a tipping point?

Time will tell, but Bowers says he sees an increasing number of co-ops that are "well past experimental discussions."

"With the amount of investment and effort put in, I think this has become the reality for electric co-ops across the country."

Williams agrees. "Everybody's talking about broadband. Co-ops are doing something about it."

What's Your Time IQ?

Three Tips to Rehab Your Time

By Brenda Abdilla
CEO
Management Momentum



Time overwhelm is the most commonly occurring obstacle to success in today's business world. You can be the most competent programmer, engineer, scrum master or sales leader in your space, and yet the common struggle to master use of your time can gall you endlessly and reduce your effectiveness in nearly all that you do.

TIPS TO REHAB YOUR TIME

1 Tackle Your Physical Environment

Decluttering your office, home, garage and car is not just the latest trend; it may also help you live longer. Recent studies have shown a relationship between clutter and the stress hormone, cortisol, which wreaks havoc on our health. You may think that clutter, messiness and piles of paperwork do not bother you, but evidence shows that these things bother us on a subconscious level.

A simple strategy for clearing clutter is to start by clearing everything off of ONE cluttered surface in your home or office. Just pick stuff up and move it off of that surface. Then take time to clean and improve the surface before you put anything back. Then, focus on the piles and work quickly, but with intense focus—be brutal in your scrutiny of what needs to go where. Don't let yourself go back to what you have always done—it was not working.

If you pay close attention to the state of your feelings after you finish, you may notice a slight elevation in mood—that's dopamine. One of your brain's happy chemicals. There are not a ton of secret strategies needed for de-cluttering. It is pretty basic, because it is a physical thing. Bottom line: take time away from doing other things to clear, clean and scrutinize items in your space. Easy to say, hard to do. But DO it.

2 Rehab Your Electronic Environment

Got thousands of emails? It's not your fault! Over 269 billion emails were sent and received each day in 2017, and that figure is expected to grow to almost 320 billion emails per day in 2021, according to Statista.

Nearly 45% of all email is spam, which includes phishing scams; 76% of companies reported being victims of a phishing scam in 2016 (Symantec). Users find that only about 15% of their email is relevant.

That's a lot of non-relevance to sort through every waking day. The only solution is to find a way to dominate your inbox. You can't let it rule you; instead, create some habits and rules to get it—and keep it—within your control. Otherwise, you and your brain could become buried in a pile of irrelevant information that may be hiding some very, very important information—which defeats the purpose.

The list of strategies you can deploy is endless, but you have to contemplate which ones will work for your unique brain wiring before implementing. Leaving everything in your inbox is not a strategy. That is defeat. Before you employ any new strategies to tackle your inbox, do these THREE basics:

1. Set a rule in your inbox to move every email with the word "unsubscribe" into a separate file. This will reduce your inbox magically overnight.
2. Apply the do, defer or delete strategy to your inbox work which everybody knows. But once you have read something it does NOT get to stay in

there—the "defers" go to your to-do list and/or calendar, and the ones you need to keep track of go to an email folder titled in such a way that you can easily find it. No exceptions. If you are scared, make more folders, or shove everything you're worried about into a special folder you can check in one month. You probably won't even miss it.

3. Find focused time to work in your inbox. Checking it constantly is completely ineffective, regardless of what you do for a living. Other experts say to check it twice a day, which is not enough for most of us. But make some rules for yourself—like that you always have at least 30-minute increments to work in your inbox, never less. Your job is to reduce the number in your inbox, to think clearly about your responses, and to move things forward. You cannot do that without at least 3 or 4 focused sessions per day of at least 30 minutes each.

If you have over 5,000 emails in your inbox, you are going to need a half-day without interruption to clear them and to set-up your new rules and folders. It's going to feel so good when you accomplish this!

(Google any of these strategies if you don't know how to do it for your email platform.)

One more thing about managing our electronic environments: research tells us that 72% of employees cannot find the information they need in the company's information systems. This can be resolved with some improved communication between IT and other depart-

ments to develop common language for filing shared documentation—or maybe just training is needed.

3 Rethink Your Ambient Life

I use the term ambient to illustrate the point of the dings, pings, rings and alerts in our lives, because they exist all around us—ambiently. It would be impossible to talk about time management without addressing something that secretly manages what our brain pays attention to. It probably does not surprise you to know that the average professional is interrupted every three minutes at work (source: The University of California). But guess what the cause of 44% of our interruptions is? The answer is us. Our habits cause us to interrupt our own focus and flow at least 44% of the time.

The problem with the alerts is that they cause a cognitive distraction for our brain. The brain associates the sound or sight of an alert with a possible connection, so hearing or seeing it makes it increasingly hard to resist responding. Check it quick and you have switched tasks—arguably the most anti-time-efficient thing you can do. I ask my clients to consider going a week largely without sounds (except for possibly a sound associated with your children's school or your spouses' texts for safety reasons). No email previews, no dings, no banners, no typing sound on your phone, no push notifications, nothing (except your ringer when appropriate). Oh, and when you are focused, put the DND on your company's instant messaging system. Just you, and your keenly focused mind dominating your devices like a boss. Try it.

Take the Free Time IQ Test <https://managementmomentum.net/time-iq>
Bio:



ABOUT THE AUTHOR

Brenda Abdilla is a PCC level Executive & Leadership Coach. Her diverse client list ranges from the US Department of Justice, Medtronic, Cisco, the Women's Bar Association, Comcast to IHS Markit. Brenda also serves as the Professional Chair of a Women Presidents' Organization group in Denver, CO. She is the author of three books, her most recent is What's Your Lane: Career Clarity for Moms who Want to Work a Little, a Lot or Not at All. Visit her site to take free assessments on your next Career Change, Working Style or Time Management issues. <https://managementmomentum.net/assessments#freeassessments>

Subscribe to the Coaching Minute or take the Free Time IQ test at www.ManagementMomentum.net

How Do You Go Online?

By Edward C. Baig, USA TODAY

You get your internet at home by subscribing to a high speed broadband service, as do a majority of your fellow Americans. That is unless you're among the 1 in 4 adults who've ditched or passed on home broadband. And many of you who've come to that decision have found what you deem a suitable substitute: your smartphone.

Such is a key finding from a mobile technology and home broadband survey of U.S. adults released Thursday by the Pew Research Center. Pew found that 37% of respondents indicated that when using the internet they primarily do so on a smartphone, nearly double the 19% who answered the same way in 2013.

And 45% of the non-broadband crowd say that their smartphone lets them do everything they need to do online, up substantially from the 27% who said so in 2015.

In fact, Pew reports the share of non-broadband users who say their smartphone is the most important reason for not having a high-speed internet connection where they live has nearly doubled over the same time period, from 12% to 23%.

For sure, some people cited the affordability of broadband as the reason for their reluctance. But the percentage of non-broadband adopters who cited price as a barrier, dropped from 33% in 2015 to 21% today.

In the meantime, while the growth of smartphone use for a cyber-connection has grown across all age groups, young adults are more likely to reach for a handset when they go online. Fifty-eight percent of those ages 18 to 29 mostly use the phone for such a purpose, up from 41% in 2013.

As you might expect, income levels are also a factor in whether people subscribe to home broadband. The report found that 73% of U.S. adults say they subscribe to broadband internet services at home, but the number climbs to 92% among adults in households with incomes of \$75,000 or more annually. By contrast, in households where the yearly income is south of \$30,000, the share of broadband subscribers drops to 56%.

That 36-point gap in broadband adoption between the highest- and lowest-income groups is substantially larger than the 24-point gap in smartphone ownership between these groups, the report says.

Educational differences show a nearly identical pattern.

Among other findings: Some 46% of smartphone owners say when using the internet, they mostly do so on their phone, compared to 34% six years ago. During the same period, the share of smartphone users who say a desktop, laptop or tablet computer is their primary device for going online has fallen from 53% in 2013 to 30% today. And roughly one-quarter of smartphone users say they equally use a cellphone or a desktop, laptop or tablet computer when going online, up from 12% in 2013.

Meanwhile, 6 in 10 of the folks without broadband indicated that they have never had high-speed internet service at home in the past, compared to about one-third who have. And fully 80% of non-broadband users say they would not be interested in having broadband at home in the future, while 18% think this is something they would consider.

The survey was conducted from Jan. 8 through Feb. 7 of this year, among a nationally representative sample of 1,502 adults 18 or older.



GO TO THE SUMMIT

Cybersecurity is at the **TOP** of your agenda, and rural broadband providers need to protect their company and customers. The time is now.

Reach the **PEAK** of network protection with the education and resources needed to develop a strategy to stop hackers in their **TRACKS**.

Learn what you need to do before it's too late.

MORE INFORMATION
www.NTCA.org/cybersummit



CYBERSECURITY SUMMIT

OCTOBER 27-29: SALT LAKE CITY, UT

Do More Than Show Me The Money

By Bobbi Harris
CMO
Smart Water Smart City, LLC



Federal grants, state grants, local grants, loans, and grant/loan programs and now the FCC Connect America Fund reverse auction phase two (CAF II) - the list is long and complicated but reportedly designed specifically for “bridging the digital divide.” But will all the funding programs really bring broadband solutions to rural America?

More than 30 years after America Online (AOL) launch an internet craze, many still struggle to get high-speed internet access in parts of this country. The globalization of business, education and personal networks has solved problems that many people never knew existed. We have reached a new level of maturity in telecommunications technology. but technology alone does not solve problems; Telecom technology merely provides us the tools to address them.

We still must address the growing divide between the segments that have access to networks using fast connections and those who don't. Broadband allows speed, access and reach beyond our dreams of 30 years ago. At least it does to those who have access. But will grants, loans, partnerships and reverse auctions really move us forward in the next 30 years?

Certainly, there is great competition for the money. The pressure is building on technology providers and the electric utility industry to address the gaps. Technology is widely available and improving rapidly and as with any new mass deployment and capital investment, the technology has both supporters and detractors. Utilities, cities and states are looking at their options to deploy broadband, and there are many options; Broadband over existing copper lines, private LTE broadband, highspeed fiber, and now 5G through small cell deployments. Each has created a ground swell of champions and a vocal group of opponents.

Copper (DSL) or fiber may be the broadband delivery method of choice for some however, the evolution of fixed wireless access has made it a viable alternative or supplementary solution for delivering high-speed broadband to rural locations. The use of licensed versus unlicensed spectrum must be considered. Unlicensed spectrum may be used by anyone, but under federal regulations, unlicensed spectrum must not interfere with licensed spectrum, and must also accept interference from other devices. New fixed wireless products and technologies address many challenges, including radio size, ease of deployments, reliability and interference from other wireless signals. Technologies like SON (self-organizing networks), massive MIMO, beamforming, beam steering, interference cancellation and others have helped to mitigate many of these challenges.

Wireless broadband service is available from commercial carriers in many areas, and that service may be appropriate for certain non-critical applications, or in cases where the utility has not yet had time to build a utility-grade system. But mission-critical applications require greater security, reliability, and guaranteed speed (lower latency) than commercial carriers provide and certainly many commercial carriers will not see a business case for delivering high-speed broadband in all rural areas. If electric rural cooperatives and IOUs that serve a rural footprint are able to get funding for broadband rollouts for these service territories, they will greatly benefit their customers if they can also provide broadband communication services like internet and TV. Utility networks must be hardened to prevent compromise by human actors and natural disasters, reliable so they work even under emergency conditions, and resilient to quickly recover from setbacks and support power restoration efforts. This level of service is just what rural homes and businesses deserve as they play catchup to urban “smart cities.”

States which invest in or encourage widespread and rapid deployment of rural broadband technology will find in a few years they are ahead in their ability to train their work force and educate residents, attract new business development, and to compete in the global economy. Those that lag or remain on the sidelines, or worse, actively obstruct this rollout of broadband will find their economies incurably behind those who are quicker to move ahead. Strategies for decision-making must include not only a discussion weighing the relative costs and benefits of using wired or wireless technology, but also rights-of-way issues, siting of facilities, local terrain and environment, and other factors that may inform decisions regarding the best technology for a specific community.

Whether delivered via fiber, cable modem, mobile or fixed wireless, copper wire, or satellite, the lack of adequate broadband is most pressing in large geographical areas with low population densities and often reduce economic incentives - where telecommunications providers are still unlikely to invest in and maintain broadband infrastructure and service. Everything from telemedicine, economic growth, education and remote business operations rely on high-speed connectivity. Will the new \$2Billion CAF II funding finally deliver these transformative services?

IN THE SPOTLIGHT

By Randy Turner
Director, Marketing Communications
Walker and Associates



RICH HOFSTRA

Rich Hofstra joins Walker and Associates as Optical Business Development Manager. Rich has over 25 years of experience in Optical Networking with the last 15 years in partnership sales & management positions. Prior to joining Walker and Associates, Rich has held positions at Fujitsu Network Communications, ADVA Optical Networking, BTI Systems and Juniper Networks. Over his career Rich has held roles in development, Product Planning and Management, and most recently in partnership sales and management where he successfully built and managed multiple strategic OEM relationships. In his role with Walker and Associates, Rich will be responsible for business development of optical networking solutions.

rich.hofstra@walkerfirst.com
336-731-5278



GUS VASILAKIS

Gus Vasilakis is currently Vice President Marketing of Walker and Associates, a certified WBE supplier of communications networking equipment, software and services.

In this role, Gus is responsible for Go-To-Market strategies, OEM relationships, and Marketing Communications for the Commercial and Federal Business Units. The diverse active and passive platform teams under Gus, support Walker's top

verticals including Tier 1, 2 Carriers, Regional Operators, Managed Service Providers, Utilities, State and Local government and dedicated teams supporting DoD, civilian, and federal agencies.

Mr. Vasilakis has more than two successful decades of experience in the telecom and networking space with an extensive background in sales strategies and business process, building partner ecosystems to support enterprise and carrier business.

Prior to joining Walker, Gus founded Transform Strategies, LLC, a company focused on partner channel development. Earlier, he served as Ciena Communications' Vice President of Partners, Enterprise, and Public Sector, responsible for developing the North American account base selling strategy, and transformation of the partner team to a vertical center of excellence. In addition, he introduced a new Route-To-Market that included revamping of both distribution and system integrators to complement Ciena's successful carrier and managed service programs.

Mr. Vasilakis also served selling and executive roles at Alcatel/Alcatel-Lucent over a 17-year span, where he won several excellence awards. He also instituted a ground floor program for vertical market specialization, ensuring client success through program management and custom services over technological speed-fee selling of their competitors at the time.

Gus is a Pittsburgh native and holds a

BS in Computer Science and Electrical Engineering from Geneva College in Beaver Falls, PA. He is active on several industry panels and participates on community boards and committees.

gus.vasilakis@walkerfirst.com
336-731-5295



RICHARD LUEBKE

Richard Luebke joins Walker and Associates as Business Development Manager with focus on Electric Cooperatives. In 2008 Richard co-founded Rare Comet LLC - a

consulting group targeting telecom and energy applications in the utility industry. He has been an advisor to municipalities and electric cooperatives on fiber broadband and smart grid projects, and is a frequent speaker and participant in FTTH industry events.

Richard resides in Sunriver, Oregon, where he recently led his community's efforts to upgrade their telecommunications infrastructure.

Previously, Richard spent 20 years in Silicon Valley as an engineer with Intel, HP, and Oracle, with a focus on telecommunications software and services.

richard.luebke@walkerfirst.com
541-508-9902

STEVE QUAYLE

Steve joins Walker and Associates as a Field Systems Engineer. Steve graduated from the University of Central Florida with a Bachelor's degree in Management Information Systems. With over 20 years of working in tech, Steve has worked in service provider environments as an engineer for various value added resellers as a Solutions Architect, as well as being a technical trainer. Having worked most of his career around Juniper Networks products, Steve has achieved many acclaimed certifications, namely, being a double JNCIE (Juniper Networks Certified Internet Expert) in Service Provider and Enterprise. He is also a certified Juniper Instructor which has allowed him to travel all over the world and pass on his knowledge to over a thousand network engineers. In his pass time, Steve enjoys working out, being around water (lakes, pool, ocean) as well as providing nightclub entertainment as an EDM DJ.

steve.quayle@walkerfirst.com
336-731-5412



KATHY SHIPP

Kathy Shipp retired from Walker and Associates this past May. Kathy worked at Walker as a Customer Service Representative providing sales support to the Inside Sales team in Alpharetta, Georgia. She has spent nearly 30 years in the telecommunications industry, working previously at Alltel Supply, Windstream Supply, before joining Walker in 2009. Retirement plans include more time with family and friends, some travel, and pursuing other interests. We wish Kathy the best in retirement, and appreciate all her years of dedicated work for customers.



TREY HALL

Trey Hall, previously Walker's VP of Marketing and Technology, has taken on the newly created role of VP of Technology/CTO for the company. This new role segments the work required to focus on technology suitability assessment, technology participation plan and market penetration strategy. His leadership

now includes Walker's technical sales engineering bench, technical certification plan, OEM selection, proposal enrichment, software monetization and services breadth. Trey's new role is a VP of Technology at Walker, yet with the title of CTO, to help showcase Walker's growing technical competency and influence on the industry.

Join us in congratulating Trey on his new role.

trey.hall@walkerfirst.com
336-731-5275



KEVIN FOSTER - IN MEMORIAM

Our associates, customers and business partners were saddened by the sudden death of Kevin Foster on February 8, 2019. Kevin worked as a Sales Executive in Walker's Inside Sales Department since joining the company in 1998. His expertise in technology, company processes, and his experience working with customers across the country, made him a valued member of the company's sales team. Kevin enjoyed the outdoors, was an avid hiker, and loved spending time with his family. He was known for his wry sense of humor and will be dearly missed by his family and friends. His celebration of Life Service was held Tuesday, February 12 at Oak Grove United Methodist Church in Mocksville, NC followed by a graveside service. He is survived by his high school sweetheart and wife of 31 years, Kim Lagle Foster, his two children Ryan Foster and Bethany Foster, his mother and father, Joyce and C. W. Foster, Jr.

Our deepest condolences remain with Kevin's family as we grieve the loss of this beloved associate and friend.



MARK YOUR CALENDAR

WASHINGTON, DC
OCTOBER 30 - 31, 2019



HELPING COMMUNITIES TAKE CONTROL
OF THEIR **BROADBAND FUTURES**



For More Information:
www.TownsAndTech.com

For Assistance Contact:
Washington@bbcmag.com | 877-588-1649

CONFERENCE SITE

The Westin Alexandria – Old Town
400 Courthouse Square, Alexandria, VA 22314
(703) 253-8600



MARK YOUR CALENDAR



April 27 – 30, 2020
HOUSTON, TX

Marriott Marquis Houston

The Leading Broadband Event for
Multi-Housing, Commercial Properties,
and Communities



877-588-1649 | www.bbcmag.com

Rural Fiber Distribution TAP Architecture: A more efficient approach for deploying a future-focused FTTH network

By Fritz Amt
Network Architect, Retired
CommScope

Bringing broadband service to rural and underserved exurban areas can pose unique challenges to providers. Deployments must cover great distances to reach just a few homes. Rural areas have higher costs per home passed, and require high subscriber take rates to make fiber deployments economically possible. Providers must invest heavily in equipment and labor, so solutions that can reduce expenditures in either of those key categories can make the difference between economic success or failure. This white paper will explore the tap network architecture option to create or expand rural fiber-to-the-home (FTTH) networks.

FIBER-OPTIC TAPS

In a tap FTTH network architecture, a fiber cable is deployed throughout a service area, and fiber-optic taps divert optical signals to subscribers. It's a simple process: the cable is opened, and one of the fibers inside is carefully cut. A fiber-optic tap is spliced into the line, which siphons off a portion of the signal for a subscriber. The tap allows the signal to continue down the line to the next home or business, where the process is repeated. Multiple taps can be spliced onto the line until the signal is exhausted—usually at 32 subscribers. At this point another fiber in the cable is cut, and the process continues. A tap network design is quite different from the design of a traditional “centralized” FTTH network, which typically uses splitters installed in a cabinet configuration to distribute data to subscribers. In this splitter-based architecture, a fiberoptic feeder line runs from the central office or head-end location to a cabinet in the street or service area. The feeder line terminates on an optical splitter in the cabinet, which distributes the signal to subscribers with additional fibers. This hub-and-spoke design gives providers great flexibility, as the cabinets allow easy management of both fiber connections and central office equipment, and can also be in proximity to remote central office equipment.

DIFFICULT TOPOGRAPHY

Of course, network architecture is a crucial decision for providers embarking on

rural installations. These deployments can cover great distances of sparsely-populated terrain, with just three or four homes per kilometer. Land can be mountainous, forested, or desert, with little existing infrastructure. Providers need solutions with design simplicity, to keep labor and equipment costs as low as possible.

EQUIPMENT SAVINGS

The biggest difference between tap network and splitter-based architectures is cabling requirements. For a deployment serving 256 subscribers, the minimum number of fibers required in the splitter-based architecture is 256. These 256 fibers run in several smaller cables from the equipment cabinet. The cabinet is necessary to house the eight 1x32 splitter components, which route optical signals to subscribers, as well as permit fiber access. For many rural deployments, splitter-based architecture is considerably more expensive, as it requires the use of much more fiber cable and distribution equipment.

In comparison, for a 256-subscriber deployment, tap architecture needs a minimum of eight fibers. Two four-fiber cables are run directly into the serving area, without the need of a cabinet to house splitters and connections. Cable savings would depend upon the length of the runs to the actual drop points; but, since four-fiber cable costs much less than 72-fiber cable, savings could easily run to thousands of dollars. With tap architecture, providers have seen large reductions in the number of optical fibers used in a deployment—some as large as 87 percent. Tapped architecture also avoids the need for an equipment cabinet, splitters, mounting pad, and cabinet installation labor.

LABOR SAVINGS

Tap architecture commonly uses four-fiber cables, compared to the 72- or 48-fiber cables used in splitter architecture, which creates considerable savings in splicing and material labor. The number of splices required is further reduced because tap architecture requires no splitters at the entrance to the service

“... providers have seen large reductions in the number of optical fibers used in a deployment—some as large as 87 percent.”

area. In a typical tap deployment, just two splices will be necessary for each two to eight homes: one for the input to the module, and one for the through-leg. This compares to as many as 72 splices required with a centralized architecture.

FUTURE EXPANSION

Some operators believe that, compared to splitter architecture, tap architecture networks are difficult to expand. While it's true tap systems are often designed with minimal fiber use, to save as much upfront cost as possible, designers can use a 1:2 split at launch to increase optic use efficiency. If expansion is required later, this 1:2 split can be removed to add capacity, and additional fiber-optic taps added to change to a higher port count. And, in another expansion strategy, many operators purchase dark fibers along with the initial four-fiber cables, as the economics are best with a full buffer tube of 12 fibers. The cable size doesn't change, and the additional dark fibers provide the highest utility of all solutions, with each fiber good for another 32 homes.

SUMMARY

While several fiber architectures have been developed to support FTTH deployments, tap network architecture is optimal for rural broadband networks. A major benefit of this design is the significant reduction in fiber required to serve a rural area. With the long distances typically involved in rural FTTH deployments, this reduction in fiber count can dramatically reduce up-front network costs, and allow providers to serve areas where deploying a fiber-optic network would have been cost-prohibitive.

CONNECT



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.

Look for us at the events listed here, and refer to the Upcoming Events section of our website, <http://walkerfirst.com>, for additional details.

We look forward to seeing you at these events!

Proud Member of:



AUGUST 2019

NTA Annual Convention	Lake Tahoe, NV
CTCE	Myrtle Beach, SC
Tri State Telecom Conference	Sun Valley, ID
* TechNet Augusta	Augusta, GA
TTA Convention and Showcase	San Antonio, TX

SEPTEMBER 2019

ITA Fall Vendor Showcase	East Peoria, IL
TANE/TAM Broadband Convergence Convention	Rockport, ME
UTC Region 5	LaCrosse, WI
ISE EXPO	Fort Worth, TX
SCTE Cable-Tec Expo	New Orleans, LA
Great Lakes Technology Showcase	Ft. Wayne, IN

OCTOBER 2019

Northeast Telecommunications Showcase (NETS)	Binghamton, NY
* UTC Region 3 Fall 2019	Mobile, AL
TSTCI Annual Meeting	Austin, TX
* KTA-TTA Fall Conference	Bowling Green, KY
MATSS 2019	Kansas City, MO
NASA Ames	Mountain View, CA
ATA Tech Showcase	Anchorage, AK
WSTA Fall Conference & Exhibits	Stevens Point, WI
NASA Kennedy	Cape Canaveral, FL
Berkeley Lab	Berkeley, CA
* BBC Economic Development Summit	Washington DC

NOVEMBER 2019

Ft. Huachuca Technology Day	Sierra Vista, AZ
* SCTBA Fall Conference & Showcase	Columbia, SC
FermiLab	Batabia, IL

DECEMBER 2019

MTA Annual Vendor Showcase	Billings, MT
SDTA Outdoor Plant Workshop	Mitchell, SD
TechNet Indo-Pacific	Honolulu, HI
* CDCA Defense Summit	Charleston, SC

* - Indicates Walker and Associates is an event sponsor

Reduce complexity.

Increase agility.

Maximize IoT potential.

Profit from 5G.

DRIVE AGILE SERVICE DELIVERY WITH OUR SECURE AND AUTOMATED MULTICLOUD.

Learn more at juniper.net/cloud

JUNIPER
NETWORKS

Engineering
Simplicity

ciena

THE ADAPTIVE NETWORK™

The future of networking is here

Transform your business with next-gen networking solutions

Reduce complexity and increase ROI with packet networking solutions

Scale smart with open and programmable infrastructure

Streamline operations and service delivery with a more adaptive network



Walker and Associates, Inc.

PO Box 1029

7129 Old Hwy 52

Welcome, NC 27374