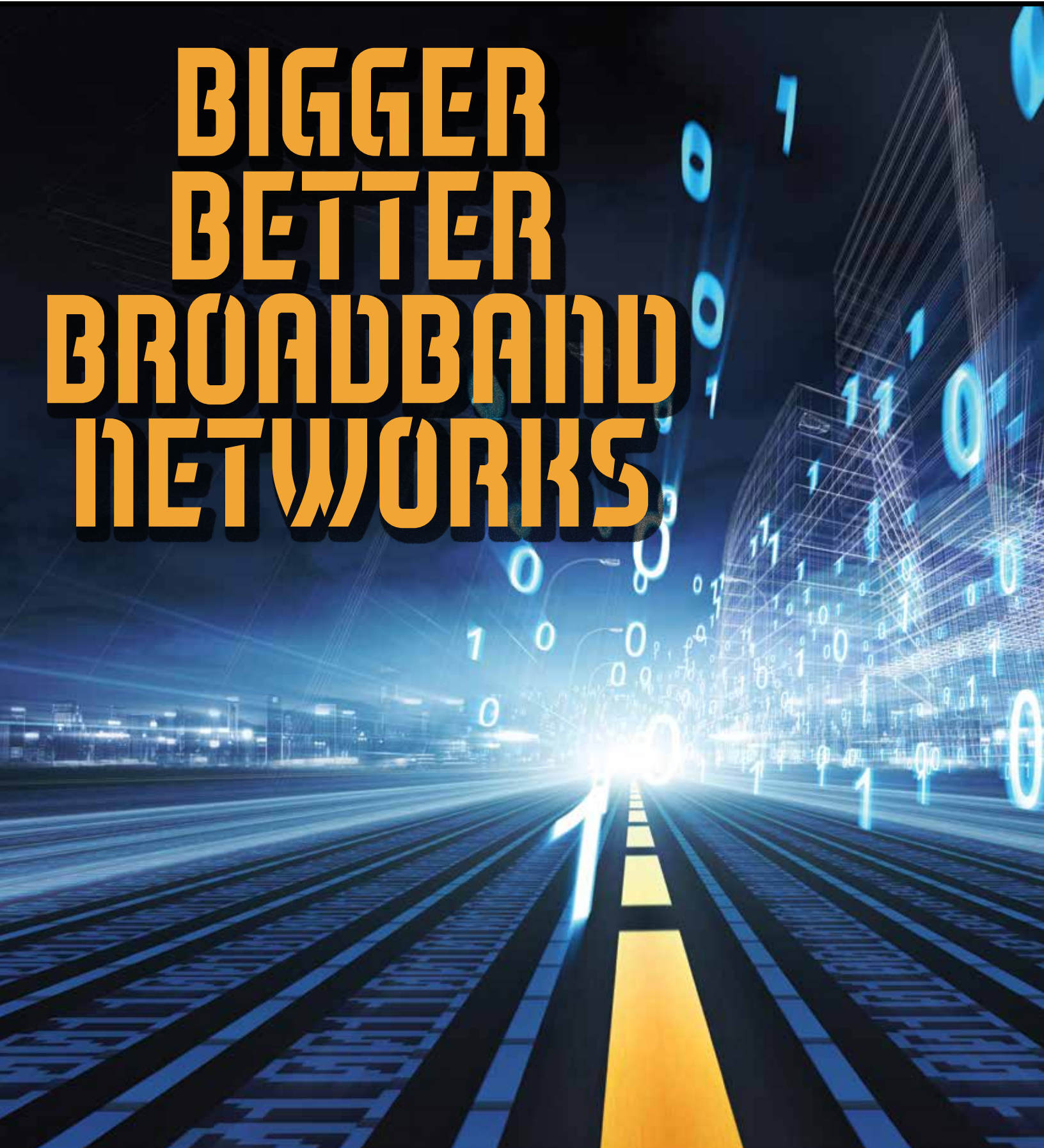


# BIGGER BETTER BROADBAND NETWORKS



# Smart City, Smart Decision

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ready?

What kinds of  
IT infrastructure  
are needed?

What  
services and  
applications  
do we need?

Who will  
benefit the  
most?

Should we lease  
a network or  
deploy our own?

Where do  
we start?

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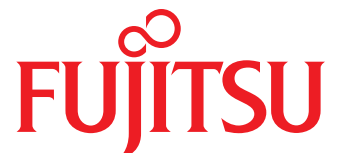
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## Editor's Letter

Broadband services. Increasingly, this is the differentiator between success and struggle. Per Connect America, "Today, 34 million Americans lack an affordable and reliable broadband connection. Of these, 19.4 million live in rural areas. This digital divide means they are unable to take advantage of economic, health and educational opportunities that exist in other connected communities."

My wife and I recently celebrated our 40th wedding anniversary and spent a long weekend in the NC mountains. Scattered across the western part of the state are dozens of small towns in an area roughly the size of Massachusetts. As we explored restaurants, points of interest and locally owned shops, I couldn't help noticing the access and use of technology. Downtown districts, restaurants, the bed and breakfast where we stayed - all seemed to offer free WiFi networks for added convenience. I watched as local mom and pop stores managed transactions on mobile devices, tablets, and with ease pointed us to their websites for additional local information and directions. It was interesting to watch, particularly while doing the final editing of this publication. The access of broadband services was as welcome as the changes in temperature and humidity levels.

This issue of Skinny Wire explores the concept of Bigger Better Broadband Networks from the vantage point of manufacturers capitalizing on advanced technologies that deliver enhanced services through hardware and software solutions, stories of successful broadband deployment projects, and an array of perspectives from industry thought leaders. It is also an issue that underscores the challenge yet ahead in delivering opportunity through fiber broadband networks.

As Amy Washco from Corning points out on page 31, one of the greatest risks to a community's future is a lack of adequate infrastructure. Her observation that "The challenge is planning a community network that can both keep pace and provide a competitive advantage." rings true in communities across the country.

Cathy Cash from NRECA provides insightful reviews of successful electric co-op broadband deployment projects. These are just a sampling of co-ops, utilities and municipalities partnering with other public and private entities to bridge the proverbial digital divide. Other examples are included in Alan Fitzpatrick's article on page 4 that explores five specific uses for public WiFi. His observations challenge cities large and small to consider the option of WiFi as an affordable way to extend broadband services to local populations.

As pointed out recently in Bridging-the-Digital-Divide's online blog, "High-speed internet is no longer a luxury in today's society and business world: it's a necessity." Gus Hurwitz, in his recent column titled Closing the Rural Digital Divide Requires Understanding the Rural Digital Divide, commented that ". . . the positive news is that closing this divide has become an all-hands-on-deck effort for stakeholders in rural America, one that defies caricatured political, technological, and industry divides."

So here's to all of you dedicated to this noble endeavor of bringing the light of fiber to communities across the country, delivering broadband services to the final frontiers of inner cities and rural outposts populated by productive Americans. We salute your efforts, and stand with you as you create opportunities, overcome challenges, negotiate deals, forge new partnerships and inspire new outcomes.

And, you should totally plan a trip to western NC!

*Randy Turner*

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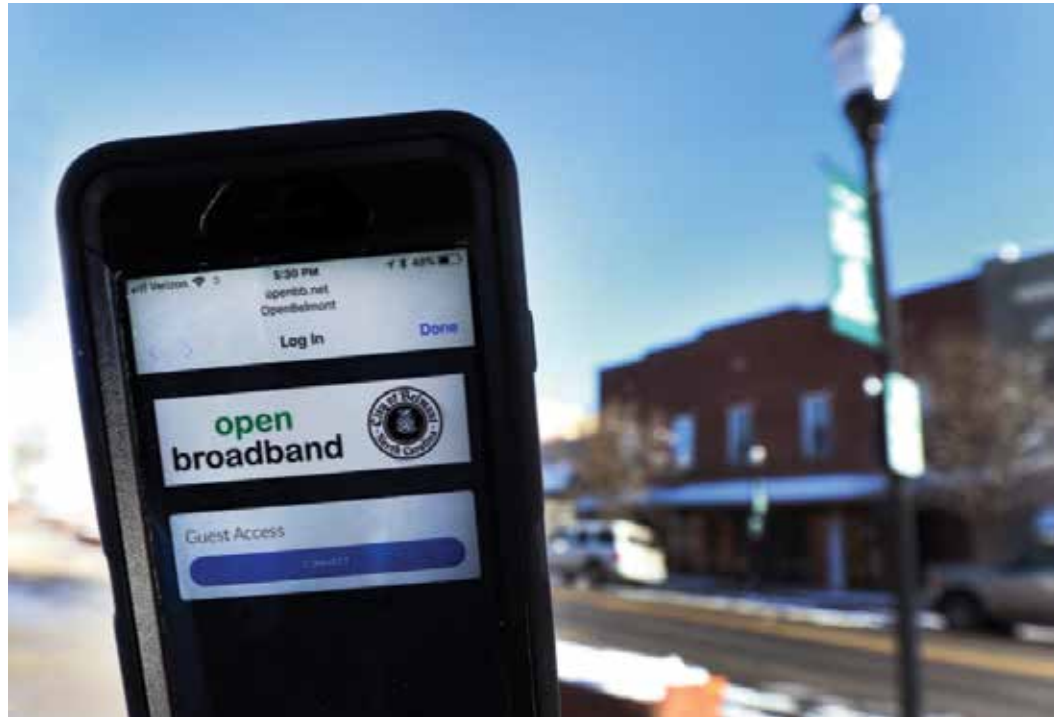
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# Public Wi-Fi Zones Improve Our Communities

By Alan Fitzpatrick  
CEO  
Open Broadband, LLC

Internet access is expected in public locations. I was standing in line at a Waxhaw, NC store yesterday and the woman in front of me was trying to pull up coupons on her phone. The cell coverage was poor and she was frustrated. The cashier told her about the free in-store Wi-Fi. The customer accessed Wi-Fi, retrieved the coupon, saved money, and the store generated goodwill and a positive customer experience. Has this happened to you?

This story is a small example of how Wi-Fi has become a resource in our communities. It is generally free for the user, low-cost to implement and support, offers strong coverage over a defined area, and is easy to access on any device by clicking on the SSID in the dropdown list. Other benefits include improving productivity (work from anywhere), access to education and healthcare resources, and helping to close the Digital Divide. This article provides 5 specific use cases for Public Wi-Fi:



**01 School Wi-Fi Zones**  
We are working with a school district on Wi-Fi zones at two public schools. The district implemented a one-to-one program of devices to students, only to find that many students in that part of the district lack access to home broadband. By building an outdoor Wi-Fi zone around the school property students and parents have a safe location to access the internet after hours. Filtering is easily added to ensure a safe browsing experience.

School buses are now getting Wi-Fi as well. Google has been implementing Rolling Study Halls in various locations in North Carolina (article: <http://www.newsobserver.com/news/business/article208452134.html>). This helps students maximize their learning time, giving them the ability to download critical information before arriving to what could be a home without broadband access.

**02 Wi-Fi in Public Parks**  
Parks can be helpful in closing the Digital Divide. Free public Wi-Fi at a park is a location where students can

access their assignments. It also provides a place where employees can access the internet on the lunch break and parents can access the internet while their children are on the playground. Parks are often used for festivals and other events. Public Wi-Fi allows vendors to connect to the internet for their booth, and it makes it easy for visitors to connect as well.

We are trialing free public Wi-Fi at Romare Bearden Park in Charlotte (SSID: "Open Charlotte") focusing on the picnic table areas along Church street. It is a joint project with Packard Place, a large startup center located next door. Who doesn't want to get out of the office and work outside on a nice day? The Bryan Multi-Sports Complex in Goldsboro, NC is another free public Wi-Fi park we're deploying.

**03 Downtown Wi-Fi Zones**  
One of the most requested services we hear from communities is a free public Wi-Fi zone downtown. It is used as an amenity for residents and tourists, and demonstrates that the town is forward-thinking and knows that residents expect internet connectivity wher-

ever they go. North Carolina's Broadband Infrastructure office wrote a good series of blog posts on the benefits of downtown Wi-Fi Zones, which you can read here: (<https://www.ncbroadband.gov/category/downtown-wifi/>). Wi-Fi can be used to connect devices as part of a smart city architecture.

We've implemented Wi-Fi in downtown Belmont, NC (SSID: "Open Belmont") along north and south Main St. and into Stowe Park (article: <http://www.gastongazette.com/news/20180118/downtown-belmont-launches-free-public-wi-fi>). A customized splash page advertises local merchants and has a link to the city calendar of events. Usage varies, but last weekend 640 unique devices registered on the system.

Belmont visitors and residents also enjoy free public Wi-Fi outside the new TechWorks innovation center, extending from the new brewery down to the Post Office parking lot. In Mount Olive, NC we deployed free public Wi-Fi up and down Center Street. In 2018, for the first time, visitors to the Mount Olive Pickle Festival has access to free internet.



### Affordable Internet for Public Housing

Wi-Fi is a great solution for providing 100% coverage in a public housing development. In Charlotte, the Dillehay Courts neighborhood (consisting of 136 units) is getting broadband across the entire community for under \$5/unit. Residents use a Wi-Fi enabled device to log into their community network and obtain free internet access. The Housing Authority and City cover the cost so there is no paperwork for residents, no individual billing, and no deposits or credit checks. Simply free internet for all.

**“... by 2021 50% of internet traffic will be Wi-Fi ...”**

Other options for low-income residents are available. Spectrum Assist and AT&T Access are low-cost (\$10-15/month) internet solutions for those that qualify (typically SNAP guidelines). These programs are requirements as part of merger conditions for TWC and Direct TV respectively. There are consumer eligibility requirements and paperwork required, and as a result, many residents do not apply and miss out on a low-cost plan. Free public Wi-Fi reduces the friction to getting everyone online.



### Retirement communities

Blanket Wi-Fi access across a retirement community provides the same benefits as it does in public housing; free internet access for everyone just by using the SSID. We are working with a retirement community in Rowan County that needed broadband for 125 apartments,

42 cottages, the administration building, and all the grounds. Wi-Fi is being used to provide an affordable solution that ensures 100% coverage that is easy to access.

Wait, won't unlimited cellular data plans do away with the need for Wi-Fi? In a word, no. Here's why:

- The vast majority of laptops and tablets are not equipped with cellular data cards. These larger devices are needed to write research papers and to code software. A phone won't cut it.
- Your smartphone can be used as a hotspot, but the "unlimited" data plans are only for phone data usage, not hot spot usage. This means hot spots have additional cost and throttled speeds, even on "unlimited" data plans. See this article: <https://www.zdnet.com/article/comparing-unlimited-plans-from-t-mobile-sprint-verizon-at-t/> These plans are fairly expensive, and use as a hot spot drains your phone battery quickly.
- Coverage is better and speeds are faster in a good Wi-Fi zone.

### Wi-Fi will be the most prevalent means to access the internet

According to a report from Cisco (<https://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/mobile-white-paper-c11-520862.html>), by 2021 50% of internet traffic will be Wi-Fi, 30% will be wired, and 20% will be mobile. This forecast is driven by businesses that are offering free Wi-Fi connection to their clients, and as in the story above, customers who leverage Wi-Fi while shopping. Most consumers with home broadband utilize Wi-Fi in their homes to access the internet.

Free public Wi-Fi connections at schools, libraries, parks, and downtown areas can be a solution for people who can't afford home broadband connections and don't want to go to McDonald's. Digital Charlotte built a map of no-cost and low-cost public wireless networks access locations across Charlotte, NC. You can access it here: <http://digitalcharlotte.org/openwifictl/> Wi-Fi is one of the best tools in addressing the Digital Divide. It is a low cost to implement, is easy for users to access, and can provide 100% coverage.

### Measuring Outcomes

Free public Wi-Fi has the visible benefits described above, but a greater value may lie in using data to measure outcomes. I don't mean using data in the creepy, ad-following way like Facebook, but rather measuring how access to free internet leads to measurable improvements in education, jobs, and access to healthcare. Tracking Wi-Fi access can also measure how often a new greenway is utilized. Towns spend a lot of money building them, and knowing how they are being used is key to measuring the return on investment.

Measuring Outcomes of public Wi-Fi sounds like a great title for the next article – stay tuned.

I welcome constructive feedback, questions, comments, and different points of view. Reach me on Twitter @AFitzpatrick1 and connect with me on LinkedIn.



### 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.

# Broadband Networks Need to be More Adaptive to Provide a Quality Customer Experience

By Daniele Loffreda  
Senior Advisor, Market Development,  
State/Local Government and Education (SLED)  
Ciena



There is general agreement that better broadband can generate significant economic benefits in a community. But many public sector broadband projects interpret 'better' as synonymous with 'availability.' While certainly the availability of broadband access at any level is welcome in an under-served community, the quality of service is often the determining factor of whether a customer maintains their service subscription. As many initial broadband deployments in under-served areas are followed by competitive service offerings, loyalty to the initial provider is not guaranteed.

In addition to availability, any local government considering a broadband project must be hyper-focused on providing the highest quality of experience to their business and residential customers. One of the top factors behind failed public broadband projects has been an overly optimistic 'take rate' assumption and inability to retain customers.

Prospective broadband projects must account for the fact that customers are increasingly making their choices and basing their loyalty on quality of experience, in addition to cost.

Customer experience is a major consideration in many state middle-mile projects in which Ciena has been involved. For example, when commenting on the Maryland Inter-County Broadband Network (ICBN), then-Howard County CIO Christopher Merdon commented, "Local institutions, businesses, and citizens now have constant access to our services, which improves their experience when interacting with us. In addition, we can

support our 911 personnel much more effectively with communications services that are always available when they need them most".

This reflects just how essential broadband networks have become in every facet of the daily lives of citizens and businesses. Technology has changed how we engage with each other, share information, conduct business, and consume content. Innovative technologies—like artificial intelligence, machine learning, robotics, cognitive computing, and the Internet of Things—fuse the physical, digital, and biological worlds, and are reshaping the way businesses operate, how students learn, how doctors treat patients, and how citizens engage with government.

And these technologies have a major impact on broadband networks. In the Maryland ICBN example, the existing broadband service could not support the level of operations businesses were trying to establish, according to Christopher Merdon. One Carroll County Economic Development Administrator was surprised by the high-speed network needs of small businesses in the area and the potential for broadband to exponentially grow their businesses and create more jobs.

Citizens and businesses are both creators and consumers of content, using millions of devices that require dynamic bandwidth and access. To achieve the economic benefits of broadband projects, the network needs to be as responsive as possible. To ensure broadband services are affordable, in addition to

high quality, operational expenses must be controlled and cost per transmitted bit must be low.

To remain financially sustainable, public sector broadband networks need to target a range of customers, including anchor institutions like K-12 districts and rural hospitals, enterprise businesses, and wholesale customers like Internet Service Providers. Common network complaints across all customer types have included long service deployment times, network performance issues, and poor response when problems are reported. Regardless of whether the local government decides to operate the network or outsource operations in a public private partnership, manual processes, offline planning tools, spreadsheets, and lack of experienced personnel are often at fault.

When a customer requests a service or new feature, even experienced service providers follow a multi-step manual process involving numerous human assets, siloed network domains, and siloed network equipment from different vendors, each requiring separate network element management systems.

The ensuing complexity can be costly, and require weeks to deploy. When the network becomes congested and service quality decreases, it takes too long to resolve. Given the lofty expectations of customers, the network needs to operate with greater effectiveness and efficiency.

## Can automation help?

With millions of new devices and many thousands of requests for bandwidth,

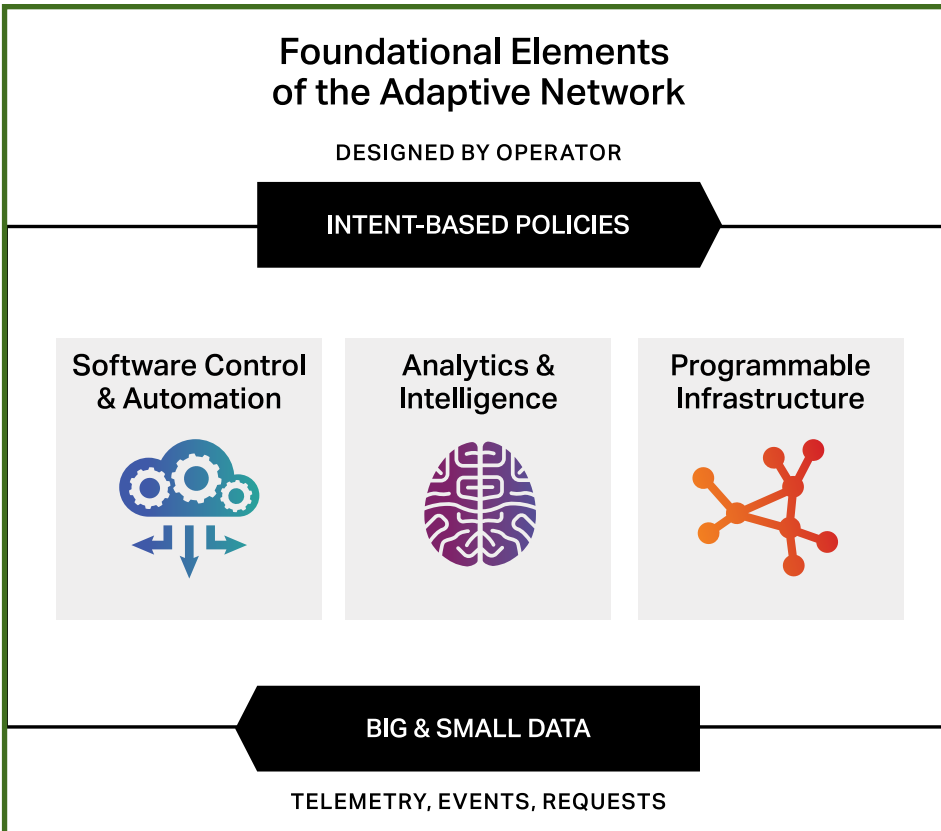
broadband networks need to become more automated, using telemetry and analytics to respond to new requests as needed, with fewer errors and less human intervention. But simply automating processes is not enough. Ciena has worked with 1,300 network operators around the world, including service providers, governments, and enterprises. That experience reveals three key components to delivering a quality customer experience:

Perhaps it is time for a different approach to broadband networking—one that combines automation, intent-based control, and self-optimization into a more adaptive framework. This approach, which Ciena calls the Adaptive Network, involves three key components:

- Programmable infrastructure that can adjust its resources to meet the dynamic demands
- Analytics and intelligence that provide key insights and enable real-time adaptation

2,000 existing miles of fiber already in place throughout the state. They then built connectors to create a network comprising 80 county locations and 1,100 anchor institutions, in addition to points of presence close to 71,000 local businesses and 1 million households.

- Set goals and timeline: Define how many houses, businesses, and government facilities will be connected, at what speed, and by what time-frame. Develop a plan that includes private industry and government working together to find innovative ways to improve public safety, education, healthcare, and economic development.
- Stay lean, grow incrementally: Keep costs as low as possible with a combination of in-house talent and good contractors where appropriate. The Eastern Shore of Virginia Broadband Authority (ESOVBA) focused on hiring people who were highly skilled in multiple areas. As ESOVBA's Executive Director Robert Bridgham phrased it, they needed to "be able to do an awful lot within the organization before we had to start adding headcount."



But leadership and the ability to execute the project are even more important than technology platforms and product management. As Ira Levy, one of the original One Maryland ICBN champions put it, "I have been part of multiple state-wide network builds. All had capable equipment, plenty of funding, initial buy-in, and smart people.... The most successful ones had a driver with the ability to execute on the defined outcomes."

- Greater automation to reduce errors and improve service delivery
- Intent-based control of automation to adapt to dynamic shifts in demand
- Self-optimization to improve responsiveness

- Software control and automation that enable end-to-end control and automation across multiple vendors and network domains

Most of all, the broadband network needs to adapt to customers' demands—and the operator's own requirements.

Sound simple? In the traditional approach to network design, this capability is extremely difficult. Most networks are sectioned into different domains powered by network equipment from diverse vendors. Each vendor has a separate element management system. This creates silos with disparate processes and oversight requirements, adding complexity and cost.

One common critique against public sector broadband networks is that governments cannot operate a network as efficiently or cost-effectively as the private sector. By incorporating the Adaptive Network components above, governments could make that criticism a non-issue.

### Non-technology best practices

Administrative and project management approaches are as important as technology choices in public sector broadband projects. The following are examples of some possible considerations for effective project planning:

- Inventory existing fiber assets: The One Maryland ICBN team identified



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*ware, software and services technologies to help these sectors ensure that their networks have the capacity to support their digital transformation, optimize their cloud strategies, consolidate infrastructure and improve data security.*

*Daniele has more than 20 years of experience helping the public sector leverage Information, Communications and Technology solutions provide greater value to their constituents, improve their operations and generate higher returns on public funds.*



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# Future-Proofing Your New Network

By Steven S. Ross, Broadband Communities Magazine

Planning a new broadband network? Look ahead 10 years, and act on what you see. Fiber is the key to future-proofing any broadband network, of course. But while fiber is necessary, it is not sufficient. Here are the top 10 things to consider.

**Location.** Bringing a network trunk directly across a field is tempting. Railroad rights-of-way have also often been routes of choice. But driverless cars will be the biggest single, um, “driver” of broadband demand in the decade ahead. Your network will soon have to be as close to the roadways as possible.

**Security.** A bad guy can get into anything by working hard enough. For a network operator, that means segregating data so no one segment is worth spending huge amounts of effort to steal. Maybe keep some in the central office and some in the cloud, or multiple clouds. Combine them only when necessary for specific tasks.

**Budget and plan for a seven-year refresh.** Fiber is immune to just about anything short of a tornado, major earthquake or mudslide ... or errant construction equipment. But the electronics depreciate in five years and need updating, on average, every seven. Today, you can spread the future pain by phasing in new technology as you build. Today’s boxes work well with other boxes, more like the way TV sets work, rather than the way the boxes you installed just a few years ago worked.

**Avoid the dark fiber trap.** The United States will require 20 to 25 million 5G microcells. Carriers will have to share them and their fiber backhaul. National carriers will expect locals to provide low-margin dark fiber. Why not offer microcells as well? Better margins, more business stability – and more incentive for local carriers to combine to provide regional 5G and wireline service.

**Regionalization potential.** Start planning now. If you have flexibility in placing your interconnects with regional trunks, think about likely regional partners. The more interconnects, the more reliability. And competition will cut your costs.

**Add customers fast by delaying fiber.** You need transparency and a plan. A



small town may be easy to network, but stringing fiber to outlying areas is a money-loser, and it takes time. The plan will typically involve using in-town profits to subsidize low-density areas. Smaller, local carriers and their local financial backers can live with that. But do the math. You may reach the goal of great service everywhere faster if you substitute, say, point-to-point wireless. The extra revenue from wireless, which spreads overheads and fixed marketing costs across more customers, more quickly, will let you phase in the fiber in less time – three to five years is typical. Lease the equipment you expect to dump, or leave it in place for redundancy. And remember, you can now combine an all-optical network with old cable TV plant and new close-to-customer technology like G.fast.

**Central office resiliency.** Network “action” is moving to the edge, close to the customer. No more manually written patches to get around broken lines and electronics. No more taking the network down for a few hours while you install and test a network-wide patch. Marshall your staff and outside contractors for the new world.

**Field resiliency.** Fiber sellers, as you might expect, are pushing higher fiber counts. Think you need a 12-fiber cable? Go to 24! That’s counterintuitive because the capacity of each strand is increasing. But it makes SDA, software-defined access at the network edge, easier to implement. Let 4,000 people at the high school football game stream

all they want, then rededicate strands back to other customers after the game ends – all automatically. Gets you up and running after disasters, too. Customers will pay extra for that. The labor costs for hanging that extra fiber are almost the same.

**Buy services.** You will always need real people, real close, for good customer service. But maybe not as many, and maybe not for routine network management. These days, networks sense most potential trouble before it happens. A few years from now, a network operator will know from building permits and network traffic created by the local construction firm’s bulldozer that part of your outside plant could be at risk.

**Plan for growth.** Consider adding footprint, adding services, improving reliability. Good people leave to find new challenges if you don’t make things exciting.

All this costs a little more up front. But over the next decade, you will save money and provide better service – and help assure your lenders that you and your community will thrive. Plan twice. Dig once.



Steve is the editor-at-large of Broadband Communities. He can be reached at [steve@bbcmag.com](mailto:steve@bbcmag.com).

# Broadband Expansion With An Eye To the Future

By Prayson Pate  
CTO, Ensemble Division  
ADVA Optical Networking

Everybody who has a smartphone or laptop loves bandwidth. Every operator (including telcos, cable operators, and municipalities) understands this love and is working to add capacity. Still, traditional approaches for increasing broadband are not adequate. We need to see what's coming tomorrow and take the appropriate steps today.

## The Impact of the Cloud

In February this year, Cisco published their Global Cloud index white paper. It documents the current and projected traffic, predicting that "cloud data center traffic will grow at a slightly faster rate (27 percent CAGR) or 3.3-fold growth from 2016 to 2021." A 27% CAGR is impressive, but what's shocking is the endpoint: 19.5 zettabytes per year in 2021!

The driver for the insatiable demand for cloud bandwidth is the applications that either reside there or depend on cloud-centric content. Most people associate the cloud with apps like Facebook, LinkedIn, and YouTube. However, there are also more business-centric drivers, such as SaaS applications, multi-cloud computing, and telecommuting.

## Squeezed at Both Ends

These trends are putting a squeeze on the data networks needed for cloud access. This is true whether the networks are operated by a traditional telco, cable companies or municipalities. The big problem is that there is little willingness to pay more for that bandwidth. In fact, there is a growing expectation for low cost or free internet services.

The pressure on revenue is the biggest for traditional telco operators. The loss of voice

revenue is being followed by price pressure on VPN services, as customers migrate to roll-your-own SD-WAN implementations.

Cable operators face a similar squeeze. Many of their customers are moving away from traditional (and lucrative) video packages. Consumers are moving to internet-only packages and consuming streaming over-the-top (OTT) video. Revenue goes down, and data consumption goes up.

Municipalities are facing a different kind of squeeze. Businesses and young people want high-speed access, along with the digital services associated with smart cities. Municipalities may plan to increase their appeal with abundant fiber, free Wi-Fi, and digital services. But they have no experience with running these types of networks and are reluctant to add the needed staff.

Network operators of all types are looking to expand access bandwidth, increase the value of their networks, and lower costs – all at the same time. Pulling more fiber helps with the bandwidth but can be very expensive to put in place. Plus, just adding more fiber does nothing to increase the value of the operator or to reduce operational costs.

What are the other strategies that may help to address this dilemma?

## Open and Multi-vendor Systems

Single-vendor solutions have been popular because of the ease of operation and the simplicity of the commercial relationship. One check to write and one throat to choke. The downside is vendor lock-in, where the opera-

tor feels that they are being held hostage to the incumbent supplier.

Operators are now taking advantage of new standards to move to multi-vendor solutions. These solutions provide more competition in the acquisition process because no single supplier controls the technology. They also open the door for more rapid innovation because we can upgrade or replace individual components as needed.

There may be concerns about how to integrate an array of suppliers into a functional solution. That's where partners such as ADVA and Walker can help.

## Virtualized Solutions

The cloud is not only a destination; it is a whole new mindset. Solutions implemented in the cloud are software-centric. They take advantage of trends such as low-cost compute, a mix of proprietary and open source components, and especially virtualization. We can now use these cloud tools to deliver access to the cloud.

The primary approach to cloudification of the access network is something called network functions virtualization (NFV). With NFV, we can replace dedicated network appliances (such as routers and firewalls) with software running on a standard server. This approach enables decoupling of the network services from the underlying hardware.

NFV is similar to what we saw with the smartphone. With an open platform, along with the ability to dynamically load apps, we replaced a multitude of dedicated devices: camera,

# “Network operators of all types are looking to expand access bandwidth, increase the value of their networks, and lower costs – all at the same time.”

watch, calendar, atlas, book, etc. More importantly, the smartphone and its apps opened the door to innovations that nobody predicted. One of my favorite examples is a laundry app that enabled my college student to check the status of the washers in the basement of the dorm. Not an earth-shattering app, but a good indication that lowering the barrier to innovation spurs creativity.

Likewise, with NFV we can provide innovative services and applications without having to change the hardware in the network. We can also scale network functions to meet changing demands. Next-generation technologies like the internet of things (IoT) and 5G are designed to use NFV as a basis for their implementation.

## Compute Everywhere

Of course, these virtual network functions (VNFs) will need somewhere to run. Modern network design includes not only an abundance of fiber but also facilities to support servers distributed throughout the network.

Traditional telco operators are looking at initiatives such as central office re-architected as a datacenter (CORD). CORD is intended to re-use existing central offices as a home for racks of servers hosting VNFs. In other words, a mini-cloud. Pushing compute further out in the network will enable hosting for 5G infrastructure, providing a new revenue opportunity for those service providers.

Likewise, cable operators have deployment locations that are capable of hosting servers. Operators are using these locations to evolve cable headends. Specifically, they are implementing a separation of the cable plant from the applications used for subscriber management and internet access. What's more interesting is how the presence of distributed compute can open new revenue opportunities. For example, the proximity of these locations to end users means that high bandwidth and low latency connections are available. This is exactly the type of resource needed to enable augmented reality and virtual reality (AR/VR) applications that are creating consumer excitement.

Finally, municipalities are making the move to digital services for their constituents. These services can improve responsiveness and also provide new revenue opportunities. For

example, many municipalities are moving to smart parking meter systems that don't require physical machines at every spot. The next step is to provide apps that guide drivers to open spots – and direct police to expired sessions. Smart systems can also be used to optimize utilities such as water (smart meters), yard waste collection (which can become on-demand), and traffic control. All of these applications require compute resources distributed throughout the network for optimum performance.

## Building for the Future With the Cloud

As we work to address the need for broadband for cloud access, we should look beyond the immediate demands. We need to look out to the horizon to see what's coming. We need to move towards an architecture and implementation that will meet both the near-term needs as well as the long-term growth of the cloud and its applications. We need to take the cloud as not only a driver for broadband access but also as a model for how to build and deliver functionality. Doing so can help operators get ahead of the curve.



*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.*





CORNING

## A Smart Move

Big-city amenities aren't just for residents of big cities anymore. Towns of all sizes are planning the transformation from traditional to smart cities, a move that's mutually beneficial to municipal leaders and the citizens they serve.

By creating a clear vision, collaborating in new and innovative ways, and refocusing financial priorities, the smart-city model will bring new life and vibrancy to our world, ushering in an era of enormous potential and growth.

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# Making the Connection: Fiber Broadband

By Heather Burnett Gold  
President and CEO  
Fiber Broadband Association

According to new research from the Fiber Broadband Association and RVA, LLC, fiber broadband is now the second-most popular broadband access technology in the United States. Thanks to growing consumer awareness and the diligent work of network operators deploying fiber, the technology is more popular in this country than it ever has been. This past year saw a record number of fiber-marketed homes in the United States; 4.4 million new homes are now marketed by fiber broadband, up from the previous peak of 4.2 million new homes marketed in 2008.

Fiber has not suddenly become a better mode of accessing the Internet; those of us in the industry have known for years that fiber is the fastest, most reliable, and most future-proof option around. It features upload speeds 2.8 times better than competing technologies and up to 61.3 percent less time waiting for online content to load. Overall satisfaction with fiber broadband is also, on average, 50.7 percent higher than with DSL and cable services, and those who live in fiber-fed buildings report being satisfied with the residential property about 17 percent more than their peers in non-fiber-fed buildings do, according to another study from RVA, LLC.

We do not, however, operate in an all-wireline bubble. We know that wireless data demand is on the rise. We know that 5G is coming. For 5G to deliver on all of its promises and to make our lives better, there are some serious infrastructure needs that must be met—and we can meet those needs with fiber. Our key here: helping others to understand just how vital fiber broadband is in the first place, and how critical it is to invest in fiber broadband networks.

Here at the Fiber Broadband Association, we believe that just as people need fiber broadband to connect with what's important online, our industry needs to continue helping people connect the dots when it comes to the importance of fiber broadband.

That need drove us to develop our Fiber Broadband Starter Kit. This is a resource for helping consumers, providers, policymakers, advocates, and members of the media alike engage with what makes fiber so special and how to deploy it fast and at the lowest cost. Contents include guides on making communities fiber-ready, research on the benefits of fiber broadband, and up to date information on vital, practice topics such as funding and policy.

***“ . . . high-speed Internet is a factor for 88% of people deciding where to buy a home, and for 91% of people deciding in which community to live.”***

That need also led us to develop our one-of-a-kind fiber service provider certification program. Just because we know that network operators that connect their customers with fiber are delivering best-in-class service doesn't mean that the world at large knows it, too. Fiber broadband providers are bringing the best to the businesses, communities, and families that they serve. Helping these providers get credit for what they already do doesn't just help individual providers; it sheds light across the connectivity ecosystem, for both the technical and the not-so-technical among us to understand why fiber broadband is such a big deal.

The benefits of broader fiber broadband awareness are clear. A 2015 National Multifamily Housing Council (NMHC) survey of 120,000 apartment renters found that high-speed Internet was the highest-rated home feature—beating out features such as soundproof walls, in-unit

washers and dryers, and more. Thanks to RVA, LLC, we also know that high-speed Internet is a factor for 88% of people deciding where to buy a home, and for 91% of people deciding in which community to live. When people are aware that fiber broadband is the best and fastest option, it becomes a major pull factor, one that can bring more money into communities: fiber broadband-equipped properties have an 8% greater rental value and a 2.8% greater sales value than properties without fiber. When comparing a home with fiber broadband and a comparable home without fiber broadband, people need an average of an 4.6% discount to consider the non-fiber broadband option.

The aforementioned research from RVA, LLC also found that, when it comes to cities, there is a correlation between fiber broadband and smart city activity. Cities with fiber broadband have, on average, 37% more deployed small cells and just over 35% more smart city applications, giving them a running start in the race for 5G readiness—after all, small cell networks, essential to 5G, need fiber to connect individual small cells. When you think about fiber broadband from this point of view—part of the larger tapestry of preparing for the next generation of network connectivity—it's all the more pressing for more of us in the industry to make sure fiber broadband gets more time in the spotlight. Not only do we set our communities up for success and connect them to more of what matters, we are also preparing them to be successful in tomorrow's digital economy.

That may seem like a lofty goal for a humble fiber optic cable; but as any fiber broadband deployer will tell you, when you bundle good things together, you can build something great. We all need to work together to make sure that more people and more communities understand and value fiber broadband for what it is: a golden opportunity for accelerating the connected future.



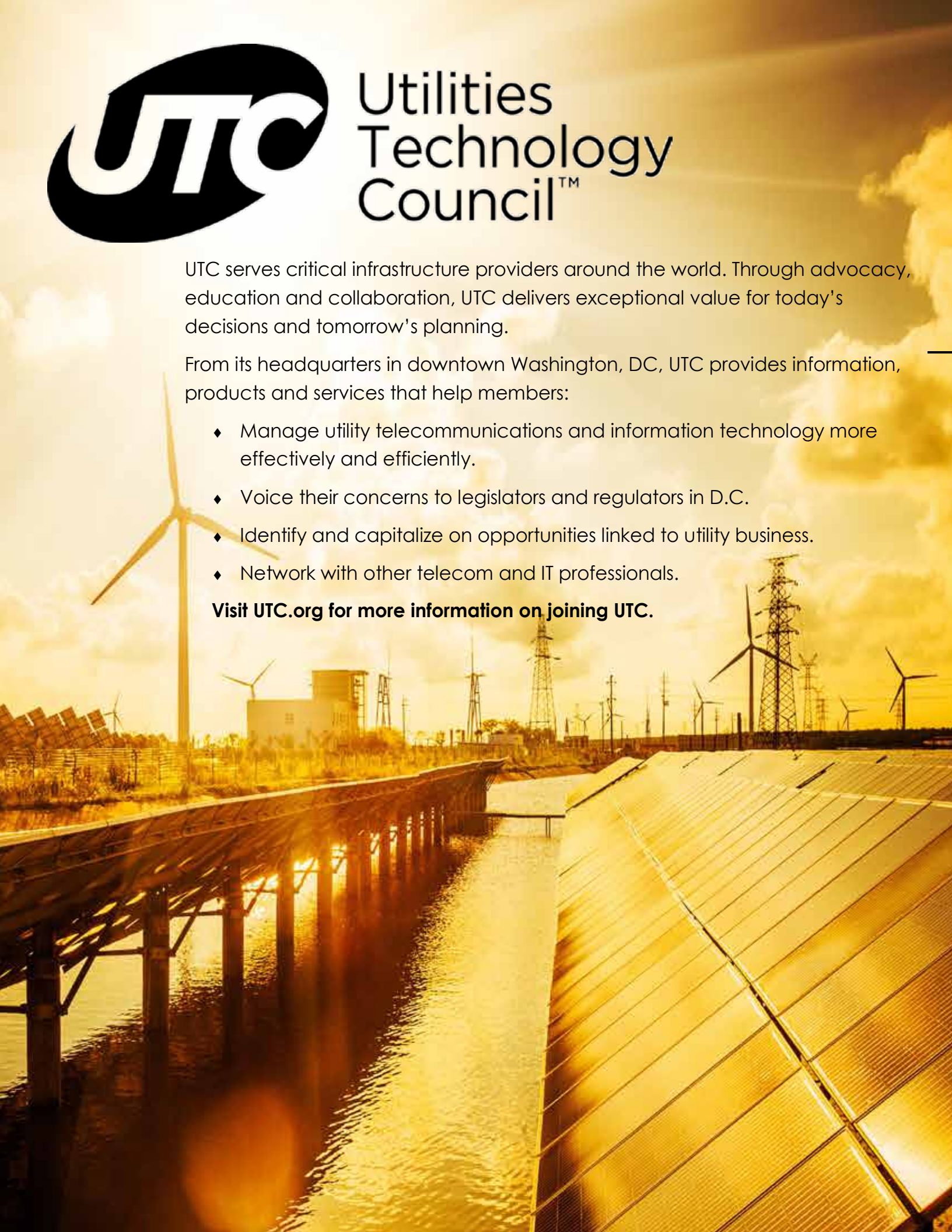
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# Get Smart: Why the Future of Your City Depends on Smart Infrastructure

By Mitch Drake  
Broadband Executive Engagement Leader  
Fujitsu Networks Communications

The single biggest factor in determining the fate of your city's digital future is its technological infrastructure. Because we live in an internet-based, digital age, if your city wants to be at the forefront of progress, economic development, growth, and relevance – it must invest wisely.

The right kind of infrastructure – high-speed fiber and wireless broadband – is essential. By comparison, the strength of a building lies in its foundation. A poorly constructed foundation can't be counted on to support the load of the entire structure. Likewise, your city's broadband infrastructure must be a rock-solid foundation so it, too, can provide the critical platform to deliver enhanced services, innovate and enable a smart city. Those cities that have invested in a broadband infrastructure view it as an asset, just as valuable to their community as its other public infrastructure – water, streets, sewer lines, or gas/electric utilities.

Today, incumbent carriers aren't upgrading networks or extending broadband services fast enough for unserved or underserved smaller and rural communities. As a result, many communities are left to lease aged, copper-based networks. Unfortunately, these communities' economic fates become dependent, in part, upon the incumbent carriers' network modernization timetables. By not being able to take control over their destinies, many cities adopt a wait-and-see approach which puts them at a big disadvantage to other, more proactive cities. It puts the city and its residents behind the technology curve and forces them to play the catch-up game.

Modern cities require modern infrastructure. In order for your city to solidify itself as economically viable, competi-

tive, and a desirable place to live, you must undergo a digital transformation. Doing so is the catalyst for a fundamental reshaping of your city's digital future. With a modern broadband foundation, you will have the primary building blocks for cloud infrastructure, sensors, smart services and applications. All of which give your municipality an edge as you evolve toward a smart city – a smart infrastructure with the connected connectivity, data, artificial intelligence (AI) and the enhanced capability to solve pressing civic issues.

## The Drawbacks of an Outdated City Communications Infrastructure

Being deprived access to the most up-to-date technology can make your city feel old-fashioned and pose an inconvenience to your residents, anchor institutions, and businesses. A leased, copper-based network can be rife with challenges, including limited bandwidth capacity, a lack of intelligence to inform, and interoperability complexities when rolling out smart city technologies. Not to mention that copper can carry far less data at far slower speeds than fiber – which means many of the cloud- or Internet-based technologies associated with smart infrastructure cannot effectively be operated or hosted.

Bottom-line, an outdated infrastructure is a limiting factor. For example, it can be a deterrent for attracting outside business investments, tourism, people migration, and job growth.

## How Can a City Leverage Smart Applications?

Connected applications offer your city numerous possibilities to take advantage of a smart infrastructure. Your city personnel can use the data you've collected from connected infrastructure to make informed decisions about what makes

your city run best – and this is what ultimately makes a city smart.

There is a wide range of smart city applications available today, including:

- **Active security:** Increase your level of smart protection with technologies like facial and license plate recognition, gunshot detection, perimeter patrolling, and crowd counting. They give your security officers greater situational awareness on recognizing potential hazards, understanding when a situation is escalating, and knowing how to respond appropriately.
- **Parking and Transportation:** Smart parking technology can detect parking space availability, automate metering, dynamically price spaces, issue tickets, and collect payments.

Also, by leveraging connected cameras coupled with AI, traffic engineers can better manage traffic flows and synchronize signals. This capability provides the smarts necessary to lessen congestion, reduce air pollution, and ease commuting stress.

## Co-creation Brings It All Together

When you're ready to make the bold step forward on your digital transformation journey, you don't have to go it alone. As your innovation partner, we'll take a collaborative approach to plan, design, integrate, and implement your vision from concept to reality – whether that's building a multivendor broadband network from scratch or upgrading it with smart infrastructure, including operating and maintaining it. Working together, we'll co-create a unique solution that delivers real outcomes – real success to your community, including public safety, economic opportunity, operational efficiencies, and civic engagement.

# Advanced Link Monitoring

## Unlocking Fiber Plant Value, Optimizing MTTR, Enhancing Security

By Tom Coburn  
Product Line Manager  
ADVA Optical Networking



Fiber is the established choice for connecting core sites. Now, it's also becoming the dominant medium for access to enterprises, public buildings and cell sites. The communication and data services transported over those fiber networks are crucial for our working environments and our social lives. Network unavailability caused by damaged fiber can create major problems and even threaten the operation of critical infrastructures. Immediate action is indispensable.

Field forces need to be able to distinguish between issues caused by active devices and those caused by passive cables. Advanced in-service fiber monitoring solutions are the most efficient way to identify the root cause of link outages.

### Time for Change

The value of proactive, in-service fiber link monitoring is clear. It simplifies failure isolation, enabling fiber network providers to take immediate, targeted action while also preventing false alarms and unnecessary truck rolls. This shortens the repair cycle, reduces the non-availability of a fiber link and also speeds up installation and commissioning of new fiber services.

Time is of the essence during any network failure. Fiber monitoring enables fast failure isolation and rapid restoration of

services. Higher network availability is a major benefit for customers, enabling them to meet stringent business continuity requirements such as Service Level Agreements (SLAs). Fiber degradation and insertion of bending couplers for eavesdropping can be identified by analyzing real-time attenuation data. Advance Link Monitoring reduces fault isolation from hours to seconds or minutes, greatly accelerating network problem resolution and restoration of services.

### Why Proactive Fiber Monitoring?

- Degradations are identified before services are affected.
- Precise root-cause analysis avoids unsuccessful repair attempts.
- Localizing failures shortens repair cycles.
- Real-time information assures service quality.
- Maintenance-free demarcation does not consume power.

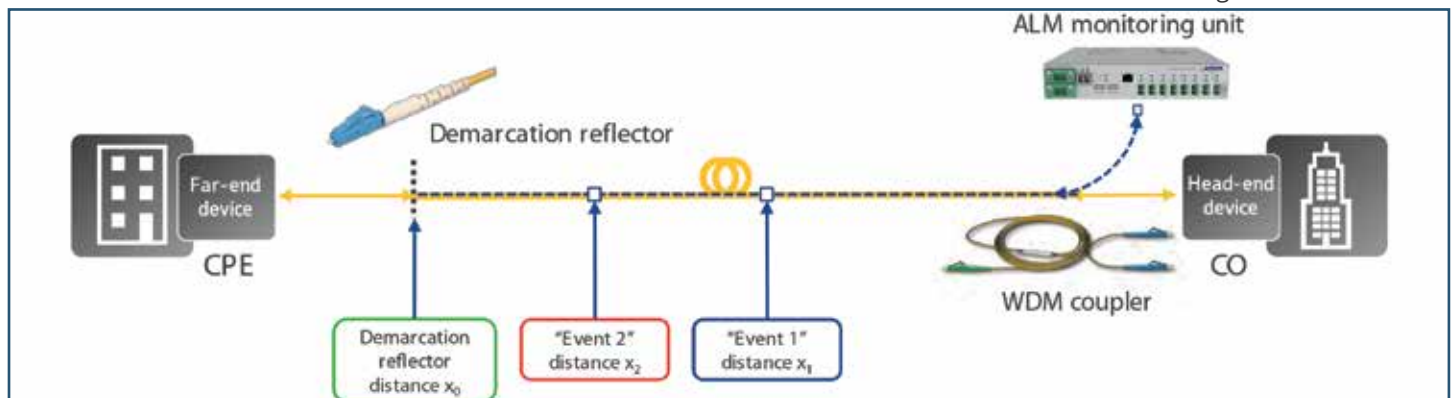
### A Range of Different Devices or a Single Assurance Solution for All Services? – Your Choice

Today's communication networks are built on a connectivity infrastructure applying a range of interfaces, such as OTN for

high-capacity, fixed bandwidth connectivity, Ethernet for packet connections, CPRI in the mobile fronthaul network or 3G-SDI for 4K native video signals. Advance fiber monitoring is agnostic to the communication service, a single assurance technology can be applied with any technology providing value across a variety of customer and service types.

### Who Benefits From Fiber Monitoring?

- Dark fiber providers: Fiber providers can offer a higher value service, providing real-time fiber integrity information.
- Dark fiber customers: Fiber monitoring enables fast root-cause failure analysis, shortening repair cycles.
- Communication service providers: Fiber failures are located without additional truck rolls, enabling efficient and targeted action.





- Mobile network operators: Transparent, non-intrusive monitoring of fiber
- links opens up the possibility of connecting mobile cell sites with any radio access technology.

### Simple and Efficient

Enabling link monitoring is simple and involves coupling an optical measurement signal into the fiber. There is no interaction between the measurement signal and the user data. Fiber monitoring is fully transparent to user services. This measurement signal is used to calculate the loss profile of a fiber link in real time. Analyzing the reflected light provides detailed information about the loss profile and disturbances on the link. With such precise information, the operational team can immediately identify and locate any problem on the link with resolution of the fault as low as less than one meter in many configurations.

### Securing a Connection With Link Monitoring

Fiber optical transmission systems are potentially at risk of being intercepted. An attacker might introduce a bending coupler or a splitter into a fiber link in order to gain access to the optical signal and to the user data being transmitted. The insertion of those coupling devices adds attenuation at a discrete point on the link. Such suspect signatures can be used to detect malicious attacks. Monitoring improves the integrity of fiber links and secures communication against eavesdropping.

### Network Management and Monitoring Integration

Geographic Information System (GIS) Service Providers and their customers require full visibility of network integrity. Geographic information systems show their fiber infrastructure clearly and simply. A fiber monitoring solution adds real-time health information, enabling them to instantly detect and locate any failure or degradation. Fiber Monitoring solutions provide management interfaces such as open API for easy integration with the GIS system applied by the provider of the fiber infrastructure. The graphical user interface makes fault isolation an easy task even for service teams less familiar with the technologies applied to monitor the links.

# Broadband Internet Penetration Pegged At 82% of US Households

Fully 84% of US households now get some type of internet service at home, up 10% points over the past decade, according to a Leichtman Research Group (LRG) study. While internet service usage is only up a point over the past 5 years, the type of service used is changing.

Broadband now accounts for virtually all (98%) of home internet service. As a result, 82% of US households now have a broadband internet service, per the report, which is up from 76% in 2012.

Earlier figures from LRG indicated that the broadband subscriber market surpassed the pay-TV subscriber market in size during Q2 2017.

Along with growing use of broadband, a significantly higher share of adults are now using smartphones to access the internet. This latest study found three-quarters of adults now accessing the internet via smartphone, up from 44% in 2012. (Smartphone penetration tops 80% of adults, per recent research.)

About two-thirds of US households now have internet service at home and also access the internet via smartphone. Some 16% only get internet at home (and don't access via smartphone), while 7% only access the internet on a smart-

phone, and don't have home internet service.

Data from comScore indicates that – regardless of their incidence of broadband penetration – about 1 in 8 Americans accesses the internet solely via mobile devices.

In other highlights from the study, LRG reports that:

- Broadband penetration is higher among households with incomes greater than \$50k (91%) than among those with income below that threshold (72%);
- More than 9 in 10 households (91%) access the internet via home service and/or on a smartphone, with that figure up from 85% in 2012; and
- Some 85% of households features at least one laptop or desktop, with the vast majority (93%) of these households having home internet service.

*About the Data: The results are based on a Leichtman Research Group survey of 1,203 adults (18+) from throughout the continental US. The telephone survey was conducted in Q4 2017 with a margin of error of +/- 2.8%.*

*Reprinted from <https://www.marketingcharts.com/digital-81804>*



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# Lawmakers Split Over How To Expand Rural Broadband

BY Maya Lora  
The Hill  
Published 7.17.18

Lawmakers on Tuesday sparred over ways to bring more investment to rural broadband services.

The House Energy and Commerce Subcommittee on Communications and Technology heard from experts on the problems with building out rural broadband.

Rep. Marsha Blackburn (R-Tenn.), the subpanel's chair, said government needed to complement private investment not compete against it.

She criticized a Democratic bill from Rep. Anna Eshoo (Calif.) and others, the Community Broadband Act, that would allow local communities to invest money in building their own networks.

But Republicans have questioned allowing local government funds to be used for broadband without better oversight.

"One of the bills that does cause me concern is the Community Broadband Act which I think would threaten to undo much of the progress that is being made across the country," Blackburn said.

"And the bill is essentially a further-reaching version of the FCC's failed 2015 municipal broadband order which basically preempted the fiscally responsible measures that Tennessee had put in place regarding municipal networks."

Eshoo defended the bill.

"This is holding back local communities from creating a choice; in most cases, it's much cheaper, too," she said.

Eshoo said state legislatures are "screwing" local communities that want to invest in their own networks. She said many Americans, even those in some parts of Silicon Valley — the center of the country's tech industry, have trouble accessing broadband.

"When at least a third is either underserved or not served in the second decade of the 21st century, that's a major issue for our country," she said.



All of the panelists pushed for more competition in broadband services.

Suzanne Coker Craig, a former commissioner in Pinetops, N.C. and a small business owner, said residents in her town benefitted when a neighboring locality build up their own municipal broadband network.

But Craig said, the state legislature placed restrictions on the ability to share that network with other towns.

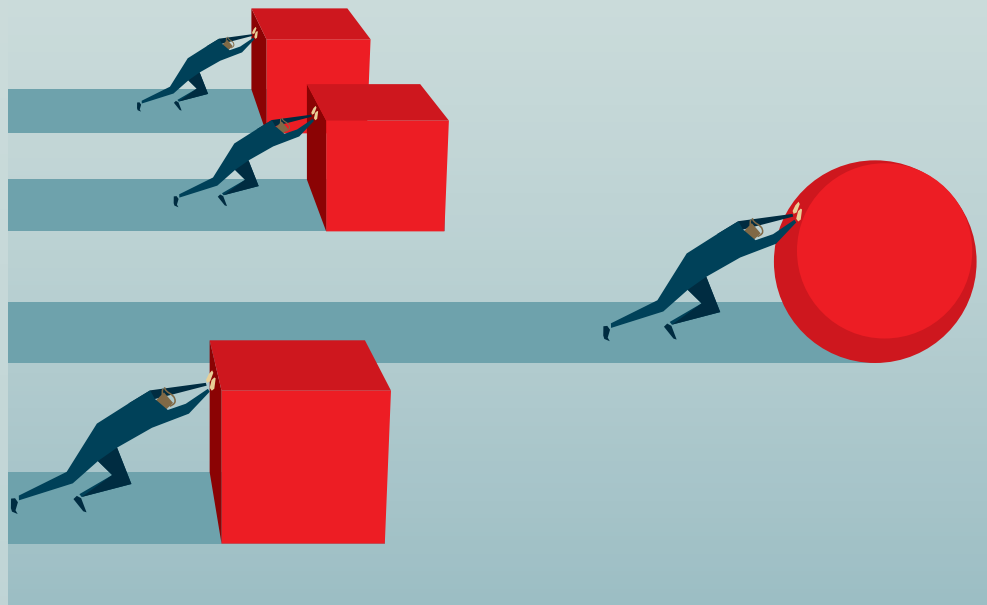
"Our own state legislature has constantly fought to disconnect us and take away the best economic, educational and lifestyle benefit we have had in 50 years."

"I think that these state legislatures are undermining local municipalities from coming up with their own solutions," Eshoo said.

***"When at least a third is either underserved or not served in the second decade of the 21st century, that's a major issue for our country,"***

# Want Broadband Deployment? Stop the Competition Cut Off

By Chip Pickering  
CEO  
INCOMPAS, and a former  
Republican Member of Congress  
from Mississippi



In the interest of national security and our economic future our nation must unite to promote Gigabit Goals for every American, regardless of their zip code. This requires an ambitious, national deployment agenda. The Federal Communications Commission (FCC) has expressed just such an agenda, and the Administration has placed particular focus on connecting rural communities to broadband. At INCOMPAS we heartily support their efforts to speed both wired and wireless connectivity.

Over the past year there have been a number of positive steps in that direction. In March, the FCC, in an effort led by Commissioner Brendan Carr, passed the Wireless Infrastructure Streamlining Order, designed to speed the deployment of small cells and 5G.

Chairman Pai wisely set-up the Broadband Deployment Advisory Committee (BDAC) to work on the FCC's deployment agenda. BDAC has endorsed One Touch, Make Ready policies that speed the deployment process surrounding pole attachments.

And in January, Congresswoman Anna Eshoo (D-CA) and Congressman David McKinley (R-WV) introduced a bipartisan bill – “Dig Once” – that takes a similar approach to streamlining the broadband deployment process and integrating it with all new publicly-funded infrastructure projects.

For Americans who want faster speeds at lower prices, this is all good news. But despite these encouraging efforts,

our nation still falls woefully short of our connectivity goals. Today, almost half of all Americans have only one choice of broadband provider, and three-fourths have at most two choices.

The key to a successful national deployment agenda has been, and always will be, competition policy. It drives new innovation, consumer benefits and infrastructure investment.

But sadly, America's original monopoly, AT&T, continues to throw buckets of cold water on these efforts. After lobbying to raise prices on small business customers and schools, and filing lawsuits against local deployment efforts, AT&T is back again with a new chapter in their competition-killing saga.

In May, AT&T's big telecom trade group, USTelecom, filed a petition at the FCC that is a poison pill to competition. The petition, if granted, would allow incumbent providers to escape their obligations under Section 251 of the Communications Act which require them to provide wholesale access to unbundled network elements (UNEs) and certain services. These methods of wholesale access are critical to providing a means of competitive entry that spurs fiber build and innovation.

## Price Hikes and Competition Killers

This ‘competition cut off’ will immediately raise prices that impact consumers and small businesses by 15 percent, and threatens to put many small, local broadband builders out of business. It will also curtail fiber deployment, putting

America's goal of building faster, more affordable broadband networks at risk.

The USTelecom petition is designed to threaten the very business models of companies that are often the only competition to the incumbent in any given market. While this move may seem so brazenly anti-competitive it's beyond the pale – this isn't the first time we've seen such an egregious action taken by big phone companies.

In fact, we witnessed this playbook before in big telecom's destructive changes to the Business Data Services (BDS) market. In that proceeding, big telecom convinced the FCC to change the definition of a competitive market to say “one” provider is deemed sufficient. Yes, you read that right – one is now a competitive market.

Both the BDS ruling and the new ‘competition cut off’ petition clearly run counter to the Department of Justice's concerns about the lack of competition in the broadband business market.

## Wholesale Means Business

Multi-location customers, from nationwide retail chains to local banks with several branches, have turned to competitive broadband providers to help solve customer service problems. Wholesale access allows businesses large and small to connect and grow with greater ease.

While the wholesale provisions of the Telecom Act don't get many headlines, they've helped some of America's leading brands thrive. Ask any COO from a

*“ . . . when a competitive fiber builder enters a market, generally the third or fourth entrant, the incumbent providers increase their speeds and lower prices.”*

company who's had success with a competitive provider how they feel about the prospect of paying more or being forced back to an incumbent provider with limited network vision.

#### **Rural Communities Hit Hardest**

The petition also runs afoul of the Trump Administration's goals of increasing rural broadband investment for forgotten communities who need it most.

Companies like IdeaTek in Kansas use UNEs to provide service to customers in traditionally underserved and rural communities. In fact, in some locations, IdeaTek is the only broadband provider for that community.

You see, incumbents neglect these rural areas even though they are capable of providing broadband service as evidenced by competitors offering the service using UNEs. If you think incumbents are suddenly going to start offering services on these networks when they didn't bother to before, then I have some swampland in Florida to sell you. If AT&T's petition is successful, entire communities, especially rural ones, will be cut off - unable to connect with the jobs and economy of the future.

#### **Competitive Access: The Bridge to New Networks**

Make no mistake, new network building will take a significant hit without competitive access. Some of America's brightest broadband stars, like INCOMPAS member Gorge Networks of Oregon, use wholesale access as a critical bridge to fiber construction and infrastructure

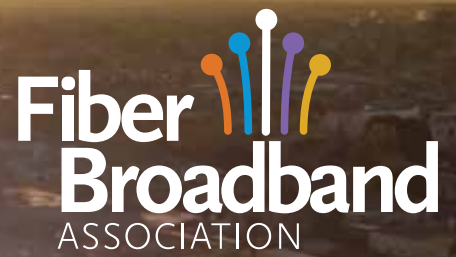
investment. The wholesale market serves as an entry point to build up a customer base. Once that customer base is substantial enough, resulting capital is invested into building fiber to the home. And we are talking state of the art, high speed Gigabit networks of the future.

This is good for everyone. We've seen time and time again - when a competitive fiber builder enters a market, generally the third or fourth entrant, the incumbent providers increase their speeds and lower prices.

Look, new competitors have always had to pull old telecom kicking and screaming into the future. But with the new attack on competitors' wholesale access, we're witnessing exactly what lengths incumbents will go to just to avoid building or upgrading networks.

The FCC has fully endorsed a broadband deployment agenda to help bring faster, lower-cost networks to all Americans, including underserved rural communities. Cutting off competition and eliminating a wholesale market that incentivizes new fiber deployment runs counter to those goals.

The AT&T 'competition cut off' petition delays the future and will freeze broadband deployment while burning consumers and small businesses with higher bills. Cutting off access and kicking the little guy where it hurts is anti-business, anti-competition, anti-consumer and anti-innovation. We urge the FCC to reject big telecom's competition cut off.



*Accelerating the Connected Future*

As the only all-fiber trade association in the Americas, we're committed to accelerating the connected future.

Members of the Fiber Broadband Association have access to specialized tools and resources to expedite fiber deployments, build stronger industry partnerships, and gain real-time knowledge about policy issues relevant to them—value and benefits you won't find anywhere else.

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# FIBER CONNECTORS: WHEN A SPECK OF DUST LOOMS AS LARGE AS AN ICEBERG



By Tomas Yanaz  
Solutions Marketing Manager, Metro and Transport  
VIAVI Solutions

When the RMS Titanic floated out of its drydock in 1911, its architect and owners hailed it as “unsinkable” and the most advanced ship of its time. But on the fateful night of April 14th, 1912 those claims were put to the test, and the Titanic sank, doomed because of an iceberg no one saw coming until it was too late.

A highly touted technological advancement in human ingenuity and engineering literally sank because of frozen water. Ironic. It's also ironic that something as advanced as an enterprise network can be derailed by microscopic specks of debris, and yet, that's exactly what happens when you allow contaminated fiber end faces into your data center. An efficient network is the back bone of any successful business, and there isn't room for connectivity issues or downtime.

Multiple studies have shown connector contamination is the single greatest cause of fiber-related failure—and the industry knows this. So why are contaminated end faces still such a problem?

In most cases, following a stringent “Inspect before you connect” process every time you work with fiber can minimize contamination and prevent costly repairs.

## Evading the “icebergs” in your network

The most critical element to safeguarding quality fiber connections is ensuring a proper end-face condition; essentially, watching for your network's icebergs before they become a problem. Network uptime and signal performance utterly depend on perfectly aligned and thoroughly clean end faces. When working with fibers only a few microns wide, any contaminant can be catastrophic.

Contaminants exist all around your network, whether it's dirt, dust or oil. These contaminants interfere with light transmission along your fiber, causing back reflection and insertion loss—all of which means your network isn't working the way it should. The allowable margin of error is tiny, and proactively inspecting and cleaning end faces, organizations will enjoy

reduced downtime, optimized signal performance and minimal network equipment damage.

Here are some of the most common sources of fiber connector contamination:

- Dust Caps – These can still be contaminated from the source of production or mishandling
- Bulkheads – This is where most particles can reside due to not inspecting before connecting
- People – Mishandling fiber is always a factor to keep in mind when servicing your optical network
- Environment – Whether it's dust during new construction or outside in the weather, contaminants are everywhere
- Test Equipment – Test leads should always be inspected, and if necessary, cleaned prior to testing to prevent cross contamination

## Inspect Before You Connect - a repeatable process for repeatable success

It doesn't matter whether the connector is brand new out of the box or has been in the field for years. Always—always—inspect before you connect. These preventative measures when installing and maintaining your network will save you both money and time.

- Inspect First – Even if you are dealing with a new connector, inspect it with a tool specifically designed for the purpose. You only want to clean the connector if it's necessary
- Clean (if necessary) – Make sure to clean both sides of the connection – even if they are difficult to reach. If you find contaminants, use a cleaning tool and solvent with an optical-grade wipe to get the job done. Don't ever try to save money by reusing wipes. If you do, you're just creating new problems by being penny wise and pound foolish
- Re-inspect – Once you've cleaned each connector, inspect them again with a probe microscope to make sure all contaminants are gone
- Connect – With both sides cleaned, inspected, and then cleaned again if necessary, it's time to plug in with the assurance that all contaminants are gone

## Conclusion

Considering the importance of network uptime, equipment reliability and signal transmission speeds, recognizing the importance of clean connectors is a must for optimal performance. Remember, something as simple as a block of frozen water took down the most modern and supposedly unsinkable Titanic. A speck of dust can do the same to your network, sinking your company's productivity into an abyss.

For more info on fiber inspection including articles, product info, the IBYC video series and more, visit us at [viavisolutions.com/inspect](http://viavisolutions.com/inspect).

An aerial photograph of a modern residential development. The houses are arranged in a grid-like pattern around a central lake. The houses have light-colored walls and red-tiled roofs. The lake is a vibrant blue. In the foreground, there are large, semi-transparent geometric shapes in shades of orange, green, and teal. The CommScope logo is in the top left corner.

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## THE BEAUTY OF FIBER - Lessons from a small co-op's big broadband project

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

Josh Webb learned how to splice fiber to the sound of sirens warning of rocket attacks.

"It makes for an interesting work experience," he says of his four-month stint as a contractor in Afghanistan.

Now he drives a BARC Connects truck over the back roads and rolling hills of Rockbridge County, Virginia, to check on a splicing crew.

A large red fox trots across an open pasture cordoned by a split rail fence under a sky puffy with clouds. "Now," Webb says with a smile, "I get to look at this every day."

Webb is the head fiber technician for the broadband subsidiary of BARC Electric Cooperative in tiny Millboro. He grew up on the co-op's lines in Bath County, which still needs no spotlight.

New businesses bypass this rugged part of the Shenandoah Valley, bounded by the Blue Ridge Mountains to the east and the Appalachian and Allegheny mountain chains to the west. Young adults tend to pursue their dreams outside these rural vales. Webb sees broadband internet access

from co-op fiber as a way for rural communities to retain their populations and sustain their way of life.

"You will have broadband and not have to leave here," he says. "It will allow [for] more people who want to stay in Bath County and work from home." BARC Connects is already creating jobs, including Webb's.

He returned from Afghanistan to a fiber-optics career in Roanoke, Virginia. In 2015, he applied to work on a right-of-way-crew for BARC Electric so he could go home, but he was rejected as over-qualified.

When BARC Electric launched its for-profit broadband subsidiary BARC Connects and prepared to build in 2017, CEO Mike Keyser gave him a call.

"I was the second person hired. Being able to build something from the ground up is a pretty big deal," Webb says. "I saw the potential to climb the ladder, plus it got me closer to my hometown."

### MONEY MATTERS

BARC Electric's service territory is hardly unique when it comes to the broadband gap. NRECA data shows that about 6.1 million households in or in proximity

to electric cooperative service territories are without broadband service, which is defined by the Federal Communications Commission (FCC) as at least 25 megabits per second (Mbps) to download data and 3 Mbps to upload.

The electric cooperatives pursuing broadband through fiber to the home are delivering internet access at the fastest speeds available anywhere—up to 1 gigabit, which can download a two-hour high-definition movie in 25 seconds.

By 2024, when the \$70 million broadband build is scheduled to be complete, all of BARC Electric's 10,000 members and many non-members will have access to highspeed internet, Keyser says. And the project will not only be paying for itself but turning a profit.

BARC Connects began selling broadband service for internet, TV, and phone in July 2017. It offers free service drops to the first 1,850 customers who pay a \$100 deposit and sign a two-year commitment. Construction costs for a drop average about \$2,000 per location. By March, more than 900 had signed up—many of whom are taking higher speeds.

"We assumed most of our members

would take the minimum speed of 50 mbps, given how much faster it is compared to their current service. We were pleasantly surprised to see a lot of them electing speeds of 100 mbps or greater. That shows how starved our members are for fast internet," Keyser says.

The co-op started in 2015 with a \$240,000 grant from the FCC Connect America Fund, to be awarded over 10 years. The next year, BARC Connects got a \$20 million smart grid loan from the U.S. Department of Agriculture's Rural Utilities Service.

BARC Connects expects to see profitability in two to three years from its phase-one build and true returns nine to 10 years into the project.

With a seemingly unlimited demand for high-speed internet in BARC's service territory, Keyser can already foresee a day when BARC Connects' revenue outpaces the co-op's electric service revenue.

"Imagine getting the best internet, phone, and TV experience possible with the personalized service and responsiveness we provide on the electric side," he says. "Our service excellence is a huge competitive advantage that becomes a game-changer when you combine it with a fiber-to-the-home network."

#### **AVOIDING ANOTHER 'BLACK EYE'**

As with many U.S. electric co-ops, BARC Electric is experiencing little or no growth. On average, there are 130 new meters served and 130 service terminations a year.

With this in mind, the co-op's board of directors recognized fiber's economic benefits to the co-op and the community. "When they approved the pilot phase, the board had one directive: Speed up phases two and three," Keyser says. "They don't want our members to wait any longer than is absolutely necessary."

BARC Electric, which has just 6.5 meters per mile, leveraged an open-access fiber network built by Rockbridge County to serve the city of Lexington, which receives electricity from Dominion Power, the investor-owned utility headquartered in Richmond. That created a 10-customer-per-mile density for the initial fiber build-out.

BARC Connects operates out of a former redbrick schoolhouse, donated by Rockbridge County in exchange for the promise of fiber to the home. A Calix E7 Optical Line Terminal cabinet,

which manages the fiber signals, is out back. Community solar panels fill the front yard. Large spools of fiber, along with reels of the silver wire that's strung between poles to form the network backbone, are fenced in a field. Stacks of fresh-cut pine replacement poles recline nearby.

This isn't BARC Electric's first run at broadband.

The co-op teamed with International Broadband Electric Communications to do broadband over power lines in 2010. That company went out of business at the end of 2011.

"It was a black eye," says Keyser, who joined BARC Electric in late 2010 after serving as CEO of the American Samoa Power Authority. "We had hitched our wagon to their horse. To the customer, it was presented as a BARC Electric service. But we couldn't control any of it."

It was then that Keyser resolved "if we do broadband again, we do it ourselves. We control the entire customer experience." An online crowdsourcing effort measured interest, and with member enthusiasm and board support, BARC Electric took the plunge.

"No cable company or big telco is going to build out our area," Keyser says. "We're the only hope for our members— just as we were when the co-op was founded."

#### **'THE BEST EXPERIENCE'**

Most residents in this Virginia mountain region connect to the internet through dial-up, Digital Subscriber Line (DSL), or satellite. BARC Connects will offer fixed residential and commercial packages beginning at 50 Mbps download/10 Mbps upload. Multiple downloads within a home or a business at the same speed, and without data caps, also will be a new experience.

"If a customer has a bad internet connection now, they are going to be blown away," says Gary Sickler, general manager of BARC Connects. "People in this area now experience 10 to 15 minutes to download the local newspaper. With fiber to the home, they will have it in seconds."

Sickler was Keyser's first hire for the broadband subsidiary in February 2017, preceding Webb, the head fiber technician. Now it has two fiber technicians, a system administrator, an administrative assistant, and a sales director, with plans to hire more as the service takes off.

A 20-year veteran of the IT world, Sickler recalls the internet of the 1990s, which was considered "just for fun."

"Now it's a necessity. People need it for home, schools, online banking, shopping, and communications with loved ones. The user of the internet has changed so much. It's become a lifeline," Sickler says. Progress in the first 12 months bodes well for the BARC Connects project. A 60-mile northern fiber ring to connect the co-op's substations was built in five months. Construction on the 20-mile southern ring began in March. The entire phase-one build-out will encompass more than 400 miles, and by late fall, as many as 4,500 residents will have broadband access— many for the first time.

BARC Electric replaced all of its old, weathered utility poles to build the fiber rings and ensure strength and ground clearance. About 15 to 20 percent of the fiber installation will be underground, which will require state permits and rights-of-way approvals.

BARC Connects' two data centers—the central aggregation points—are in Lexington and Ashburn, Virginia, which has a major internet hub. The data center involves hardware, circuits, and software design, and it must be robust and have power and hardware redundancy to withstand failure.

When a broadband fiber consumer uses Google, posts on social media, or sends an email, the information goes across the fiber to switches in a cabinet, and then it's on to the data center that sends it out to the worldwide web.

BARC Connects hired Conexon, which specializes in building fiber in rural communities, as its fiber network designer, and hired a contractor to build the network. (Visit REmagazine.coop to read a sidebar about Conexon and its deep co-op connections.) "As part of our commitment to superior customer service, the customer's gateway and Wi-Fi router is included for no additional charge," Sickler says.

A technician will do a Wi-Fi analysis at the service location to find weak spots and provide the means to strengthen the signal.

"We test speed so the customer is getting what they paid for when the technician leaves their door," Sickler says. "We really want to give our customers the best service experience possible."

*Cont'd on Page 28*

BARC Connects can "ratchet up speed for customers in seconds. There is no need for a truck roll to a house for an upgrade to increase the speed," he says. "That's the beauty of fiber."

Co-Mo Electric in Tipton, Missouri, pioneered cooperative broadband in 2011 when it built a model to deliver high-speed internet to all of its members. BARC Electric's entire board and management team visited Co-Mo in August 2017, around the time that Co-Mo was completing its fiber build-out.

"High-speed internet was life-changing for Co-Mo members. I see a parallel story happening here at BARC," Sickler says. "It has been an overwhelmingly gratifying experience for me over the past year. But there is so much more to do."

### **SURVIVAL OF ELECTRIC SERVICE**

Co-op leaders know that installing fiber network communications creates a smarter, more reliable, and more efficient electric system.

"Today, we rely on customers calling in their outage, and to pinpoint an outage, we patrol sections of line," Keyser says. "With fiber, we will have sensors embedded in both the fiber network and

electric grid. We will know outages have occurred and where before customers even call us."

The perks of fiber are clear for both electric and broadband service, but the locally owned and operated co-op business model is also a boon. Members had told the co-op they were tired of frustratingly slow internet speeds and "gotcha" pricing from regional internet providers that had no stake, or even an office, in the community.

"Any modern co-op is going to need fiber for communications going forward. If we're going to build fiber to electric facilities, it's not that much of a leap to provide fiber to customers at the same time," Keyser says. "The capacity is already there. That's one of the reasons why it makes so much sense for electric co-ops to get into this."

Overall, he says, "we have nothing to lose. The service territory is struggling. People are moving out because there are no jobs. The bigger risk to our survival is not doing anything."

And broadband should increase the number of new members and energy sales.

"Broadband is real important to the survival of the electric side. You need growth on the electric side," Keyser says. "That's what companies look for when moving somewhere: Are the electric rates reasonable, and is there access to high-speed internet? We will be a one-stop shop for both of those needs."

For Josh Webb, co-op broadband is personal.

"When I was growing up, you aspired to a job at BARC," he says, but when he graduated from Bath County High School, there were no openings. "That was the whole reason why I left."

Webb will continue to commute from Roanoke to his job building broadband for BARC Connects until he and his wife can buy a home in the rural community they love—inside the first phase of the project.

"I don't want to bring the big city to the country," Webb says. "But broadband service will allow employers to expand their businesses and advance more than they've been able to do in the past. It created my job, and I hope we can create a few more."

## **LESSONS LEARNED**



BY CATHY CASH  
Senior Writer/Editor  
NRECA  
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RE Magazine

BARC Electric Cooperative's broadband roll-out hasn't been all smooth sailing. Below are some words to the wise from BARC leaders to co-ops considering a fiber-to-the-home project.

### **Go to the Density**

Start in the densest population area of those committing to your broadband service. That could mean blending in areas outside

your electric service footprint. Let the immediate payback from the initial phase help pay for expansion into less-dense areas.

Lexington, Virginia, home to Washington & Lee University and Virginia Military Institute, gets its power from an investor-owned utility and has internet options from national companies. But customers who have signed up say they believe the co-op has better service and competitive prices.

"We did a competitive analysis of other service providers and their speed tiers. Our goal was to create a strong value proposition for customers to switch over to us," says Gary Sickler, BARC Connects general manager. "We focused on offering significantly faster speeds and free managed Wi-Fi."

### **Sell It**

Co-ops delivered electricity 80 years ago when big utilities refused to serve rural America. Now these co-ops are reigniting that trusted relationship with broadband. But this time, marketing will be required.

As a broadband provider, "you have to think like a competitive business and market yourselves," says Mike Keyser, CEO of BARC Electric. "Get out and sell it."

Crowdsourcing online proved inexpensive and effective in getting early commitments. Coverage by local media also helped get the word out. BARC's marketing strategy also includes a superhero husky dog mascot named Butch, and the company slogan, "More Byte," to distinguish the co-op from competitors.

### **Save Where You Can**

A broadband subsidiary does not need gleaming offices or an address on Main Street. A functional space with room for spools of fiber, replacement poles, trucks, and equipment will

# Brace Your Co-op for the Broadband Challenge

BY CATHY CASH

Senior Writer/Editor

NRECA

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An electric co-op may have the poles and lines, but co-op broadband requires new skillsets, resources, and timelines to avoid delays for members who have committed to this new service.

"We put in lots of long hours, weekends to make it happen as quickly as it did. We all wanted this to be a success," says BARC Connects General Manager Gary Sickler. "If you're doing broadband 8 to 5, don't plan on being operational in a year."

Tips to consider when embarking on broadband:

1. Give your co-op plenty of time to build its IT network.

"The planning fallacy is a real thing," says Mike Keyser, BARC Electric Cooperative CEO. "Build a lot more time into your build-out plans than you want or expect. Everything takes longer than you think it will."

The RFP process to hire a builder for your fiber network could take several months. Get a design in place, and allow ample time for the reviews and decision-making.

do.

BARC Connects bought an old school to house its headquarters for \$1 from Rockbridge County with the promise to preserve the building, create jobs, and deliver broadband. The front yard now sports 550kW of fully subscribed co-op community solar.

## Co-op Advantage

Building a broadband subsidiary for your co-op members and beyond is a major endeavor. Keep in mind the co-op advantage. Co-ops already own trucks, substations, poles, wires, and other equipment. Upgrades for entering the broadband space improve overall service. By replacing all its poles for broadband, BARC Electric increased reliability and inventory knowledge. Co-ops have a rich history of partnering and are willing to share lessons learned and strategies that can help others weighing the broadband business.

Plus, for-profit internet service providers have no anchor customers. "We all have a tremendous competitive advantage. The electric utility is the single-biggest customer of our internet subsidiary. It's like building a shopping mall and having Macy's already committed," Keyser says.

## Being Local is Key

BARC Connects has a 24/7 call center yet customers should have all the tools and know-how to enjoy their service before

Set up the necessary field equipment and data centers in advance. Pre-order fiber wheels, strand, hooks, replacement poles, and other equipment to avoid build delays.

"Once you have the design down, have the equipment and people in place competent to support it," Sickler says.

2. Create a solid customer management system.

A broadband customer management system (CMS) to do billing, receive orders, and store customer data must be built. This can require months to complete and it will involve training personnel, quality assurance testing, and customization for billing. "Broadband bills in advance while electric bills in arrears, so if you're planning to use your current customer information system, this needs to be considered," Keyser says. "In our case, it made more sense to have a separate CMS and billing system for broadband."

3. Get the right personnel.

Hiring staff with solid telecom experience can be a challenge in rural areas. That may involve contracting, recruiting, and convincing skilled workers to relocate. Call center reps must know the products backwards and forwards.

"Invest in the right type of technicians. That is not always the cheapest option," Sickler says. "You have to have the right personnel in place to make it happen. Don't skimp."

the installer leaves.

"The installer will review with the homeowner how to log into the router, how to check voicemail, how to do three-way calling," Sickler says. "The technician will work with customers so they will feel confident with working their TV service."

Build on the co-op's reputation for great customer service when offering broadband, Sickler says. Most internet customers aren't used to getting personalized attention and care from their provider. High-quality service can be a major selling point for a co-op's broadband service.



# From Telephony to Broadband: GVTC's Quest to Elevate the Customer Experience

By John Hill  
GVTC Manager Communications - eCommerce and  
Paula Novodvorschi  
GVTC Communications Coordinator

The year was 1951. Guadalupe Valley Telephone Cooperative was established to provide telephony services to small, rural communities in the Texas Hill Country and South Central Texas where larger, more established telephone companies would not. Flash forward 64 years, and the company is led by CEO Ritchie T. Sorrells, a man with a vision—to bring high-speed communications services to small communities, helping attract economic development and improve residents' quality of life. He took the helm of newly rebranded GVTC and started his quest to transform the company from focusing just on telephony to a more progressive broadband company. He was staking the company's future on its world-class fiber-optic network. This network was going to expand its services to include broadband, digital cable TV, and security services.

To date, GVTC has invested over \$260M in expanding its fiber-optic network to include far north San Antonio, the Texas Hill Country, and South Central Texas. It is this world-class network that enabled GVTC to be the first to deliver 1Gigabit speeds in its service area. Aside from extreme speeds, GVTC also introduced SpeedSync®, a symmetrical broadband service that has continued to experience significant growth and penetration since it was introduced two years ago.

There will be four networked devices and connections per person globally by 2021, according to the latest annual visual networking index forecast by Cisco. However, in North America, there will

be 13 networked devices per person, up from eight in 2016. With more and more devices using the same broadband connection, latency and bandwidth challenges advanced communications providers, like GVTC, need to anticipate. By continuing to invest in research and development to enhance existing offerings and provide new ones, GVTC has been able to respond to these network challenges. In fact, GVTC has been able to stay ahead of the curve by staying connected with its customers.

## Digital Engagement

Transitioning from solely traditional marketing, GVTC has expanded its engagement channels with its customers to online chat and various digital and social media channels. Aside from digital engagement, GVTC has also been moving toward a more targeted and personalized customer-centric approach. How? By analyzing customer data and using it to develop more tailored product offerings and a more personalized customer experience based on customer demographics and behavior.

As other industries continue to make strides in improving customer experience, as evidenced by customer service rankings, most telecommunications providers have been content with the status quo. Telecommunications, Cable and Internet service providers continue to come in last across a wide array of industries, according to the 2017 Temkin Experience Ratings (US) . And, there hasn't been significant change over the last five years.

## Creating Fiercely Loyal Customers

This is GVTC's differentiator. Recently embarking on a company-wide initiative to significantly raise the bar for a positive customer experience, GVTC has made significant strides in training their staff, partners and vendors to help roll out its Creating Fiercely Loyal Customers Initiative. This stems from GVTC's quest to nurture fiercely loyal customers by making them advocates for the company. GVTC has set out to make a significant impact on improving the customer experience, determined to be an example of a communications provider not willing to settle for average.

GVTC's customers have continued to evolve and their lifestyle requirements have become more sophisticated over the past decade. They want to enjoy their idyllic homes in the Hill Country with the modern conveniences typically found in major metropolitan cities. It is this responsive, customer-centric approach that has contributed to a consistent increase in GVTC's customer base and a strong customer retention rate.

## Member Dividend Program

To further thank fiercely loyal members for "choosing local," the GVTC Board of Directors has approved the implementation of the GVTC Member Dividend Program launching June 1. Thanks to this new program, active GVTC members who are eligible will receive a monthly dividend on qualifying services that will be applied to their monthly bills.

GVTC will be trimming active member

payments by 20% every month\* on qualifying services simply for being a loyal member of GVTC. This percentage, based on purchases of qualifying services, means the more members spend on GVTC products, the larger their monthly dividend.

Unique to Texas telecom cooperatives, this program sets the bar for superior customer appreciation and member loyalty. Our goal is to show our Fiercely Loyal Customers how committed we are to serving them—in every way that we can.

#### Netflix ISP Index

A huge achievement accomplished just this past April was GVTC's inclusion in the Netflix ISP Speed Index. Ranked third nationally, the Netflix ISP Speed Index is a measure of primetime Netflix performance of Internet Speed Providers (ISP) around the globe exclusively. I'm proud to say that GVTC placed higher than the largest national competitors and continues to be recognized as one of the very best at delivering a top-notch Netflix experience.

Several other publications, such as Broadband Communities Magazine, have recognized GVTC's desire to effect change and be a leader in transforming the customer experience through a combination of first-class advance communications products and superior customer service. It is difficult to surpass the achievement of 10 consecutive years of being designated as a Top 100 Broadband Provider in America. GVTC's first-class advanced communications services, specifically SpeedSync® and continuous improvement and deployment of Fiber-To-The-Home technology, remain key differentiators. Important to note, GVTC is also

still the only telephone cooperative to make this prestigious list.

The NTCA – Rural Board Association presented the Smart Rural Community Showcase Award to GVTC and 12 other companies that demonstrated extraordinary achievements in promoting rural broadband networks and their broadband-enabled applications in rural communities. GVTC was honored for its efforts in successfully leading the formation of a private/public partnership to promote broadband-supported economic development and attracting two oil-related businesses to the area, including a call center and a pipeline supplier.

First-class advanced communications products, superior customer service, and a customer-centric philosophy are the essential components to being victorious in GVTC's quest to elevate the customer experience. One could argue that if GVTC does not complement these components with a social responsibility to its customers, its goal to transform and elevate the customer experience is not complete.

Here's where The GVTC Foundation plays a crucial role in ensuring that GVTC does, in fact, fulfill its goal. The GVTC Foundation's mission is "to profoundly enhance the quality of life in the communities we serve, through charitable contributions and volunteer service in support of our program goals." Funds raised by The GVTC Foundation support yearlong initiatives that give back to communities in upper north San Antonio, the Hill Country and Gonzales areas. The GVTC Foundation also grants two students well-deserved scholarships of \$20,000 each. The Ritchie T. Sorrells Scholarship is given to the high school student who demonstrates exceptional

leadership at school and in the community. The Ola Armstrong Scholarship focuses on volunteerism. And, finally, employees and their friends and families are also provided with opportunities to participate in these programs and put GVTC's mission into action, with more than 92% of all employees contributing to donations every month. The Foundation has donated over \$2.6 million dollars to charitable organizations throughout the GVTC service area.

We've come a long way from our roots. And, we'll continue to evolve together with our customers. They are the key to our continued success.

*\*GVTC Member Dividends are payable at the discretion of the Board of Directors ("Board") of Guadalupe Valley Telephone Cooperative, Inc. ("GVTC"), consistent with GVTC's Board policies. Member Dividends are distributed on the GVTC bill to current active members with a valid Social Security Number (SSN) or Employer Identification Number (EIN) on their GVTC account, subject to certain restrictions. Member Dividends are not payable as cash, transferable or assignable. Member Dividends are subject to federal income tax, and GVTC will issue an IRS Form 1099-DIV to the member annually. Other restrictions may apply. The Member Dividend program may be modified or eliminated at any time by the Board. See [www.gvtc.com/MemberDividend](http://www.gvtc.com/MemberDividend) for more information.*



***"We could have simply kept on with business as usual, as evidenced by a strong bottom line and continued growth, but we chose to do more for our customers, to provide better value. One could ask why we decided to step out of our 'comfort zone' and tackle the daunting task of working to improve the customer service ranking of our telecommunications company. My answer is this, 'We do what other companies won't.' Why? Because we are not afraid of change. We know our customers have diverse needs that evolve. If we are not evolving with them, then we will cease to exist." ~ Ritchie Sorrells, CEO***



# Powering The Network Solutions

## AC-DC

### Voltage/Power Range:

120/240 VAC Input; 12, 24, 48 VDC Output,  
150 Watts - 14 kW

**Components:** Rectifiers, Battery Chargers,  
Power Modules, Power Supplies, DC UPS,  
Power Management

**Systems:** Hot Swap Rectifiers Shelves with  
Distribution and Monitoring

**Power Plants:** Rack Mount Systems with Batteries

## DC-DC

### Voltage/Power Range:

24 and 48 VDC Input; 12, 24, 48 VDC Output,  
8 - 55 amps

**Configurations:** Rack Mount

## DC-AC

### Voltage/Power Range:

24, 48 or 125 VDC Input;  
120/240 VAC Output, 800 - 1600 Watts

**Configurations:** Rack Mount

## DC Power Distribution

### Voltage/Power Range:

12, 24, or 48 VDC Input; 100 - 900 Amp VDC Output

**Type:** Circuit Breaker, Fuse, Automatic Re-Boot

**Configurations:** Rack Mount

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Remote and Local Monitoring; DC Voltage, AC  
Voltage, Alarms, Batteries, Security, Cameras  
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Power Management &  
Low Voltage Disconnects



Batteries  
&  
RPS Turnkey Systems  
Available  
(Contact Factory)



Public Safety DAS Power Enclosures



Site Power Monitoring



# Lack of Infrastructure: The Greatest Risk to a Community's Future

By Amy Washco  
USCAN Distribution Marketing Manager  
Corning

The world is shrinking. Technology has enabled personal and business connections exponentially and the Internet of Things and the promise of 5G is driving explosive growth of communications networks. Bandwidth required to meet demand is fostering a more competitive global economy not just where we work, but where we live.

Now more than ever, communities across the United States are faced with developing a plan to compete within this global economy. Success will require a well-planned municipal ultra-broadband infrastructure. The challenge is planning a community network that can both keep pace and provide a competitive advantage.

There is risk in building and operating an ultra-broadband network. The greater long-term risk to a community's future is not building and operating an ultra-broadband network. Communities offering this infrastructure have a tremendous marketing advantage. They are attracting

and retaining experienced employees and companies that employ them.

## Critical Considerations

**Economic Development:** Ultra-broadband alone doesn't ensure a community's economic success, but future development will be hindered. Gross metropolitan product (GMP) growth for communities with a 60%+ penetration of FTTP was 64% higher than those with less than 25% penetration according to research by the Fiber Broadband Association.<sup>1</sup>

**5G:** We're living in a wireless world. Next gen wireless technology (5G) is in progress and requires a fiber-rich ultra-broadband network to function properly. 5G could create up to 3 million jobs and add approximately \$500 billion to U.S. GDP<sup>2</sup> according to a study performed by Accenture consulting firm.

**Population Retainment/Recruitment:** Millennials and Gen Z literally teethered on technology. From VR to gaming to eLearning to the latest binge worthy

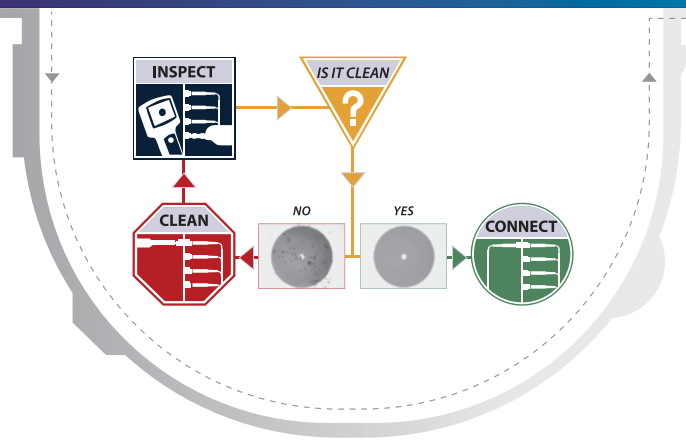
series, more and more this digital community is choosing to live and work in geographic areas that support and enable their technology-driven environment of choice.

## The Path Forward

The question around municipal ultra-broadband doesn't seem to be "if" but "when." This technology is available now and is proving to be a community success indicator in the global economy. The challenge for communities of all sizes is in evaluating how to keep pace. The path forward isn't easy and may differ by community. While there's risk in deploying and operating an ultra-broadband network, the greater risk is failure to plan and execute for the future economic success.

*1RVA - 2017 State of Broadband Update, <http://glenechogroup.isebox.net/fiber-connect-2017#>  
2Accenture - New Research from Accenture Strategy highlights Economic and Societal Impact of Investing in 5G Infrastructure, <https://newsroom.>*

Contaminated connectors are the #1 cause for troubleshooting in fiber optic networks.



## Do you Inspect Before You Connect?

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# Broadband Deployments - Lessons from the Field

By Bob Lockhart  
Vice President of Cybersecurity, Technology, and Research  
UTC

There is wisdom in breadth. Ask one utility how a project went, you will get a helpful answer. Ask two utilities, you will get two helpful answers. Ask all the members of a trade association how their projects went – you will get wisdom. This article examines key success factors identified by UTC member utilities in their broadband upgrades.

First and foremost, remember that other utilities are your family. They want to help you. Ask other utilities what they are doing, what they have learnt. You can access those utilities via your trade association memberships such as the Edison Electric Institute (EEI), the American Public Power Association (APPA), the National Rural Electric Cooperative Association (NRECA), and the Utilities Technology Council (UTC).

The foundation of a successful broadband expansion project is a solid request for proposal (RFP). Without a well-scoped and thorough RFP, you likely face a procession of unpleasant and expensive surprises during testing and deployment. Other utilities that are farther along the curve will already have written an RFP. They will know what worked for them, and what did not. So ask your peers about their RFPs. Exercise caution, though: you must not discuss restraint of trade issues (pricing, specific features, terms of service). Just remember to ask your in-house General Counsel what topics are off-limit and respect those boundaries, and you can discuss RFP content with your peers.

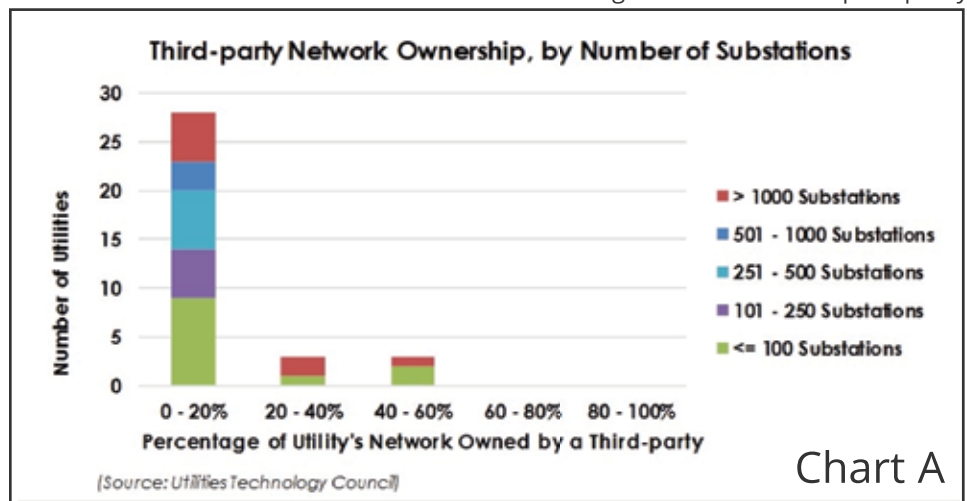
Include stakeholders from all affected departments in constructing your RFP and expect arguments. Like any require-

ments definition, arguments are an encouraging sign that stakeholders are engaged and thinking hard about what is needed for success. The worst thing that can happen to an RFP is that its definition goes smoothly.

Notwithstanding the 5G hype, UTC's member surveys show that utilities will continue to build out and operate their own private networks – mostly wired, but with wireless telecommunications where that better suits a use case. Chart A, below, from UTC's Utility Network Baseline shows that utilities shy away from third-party ownership of their control networks.

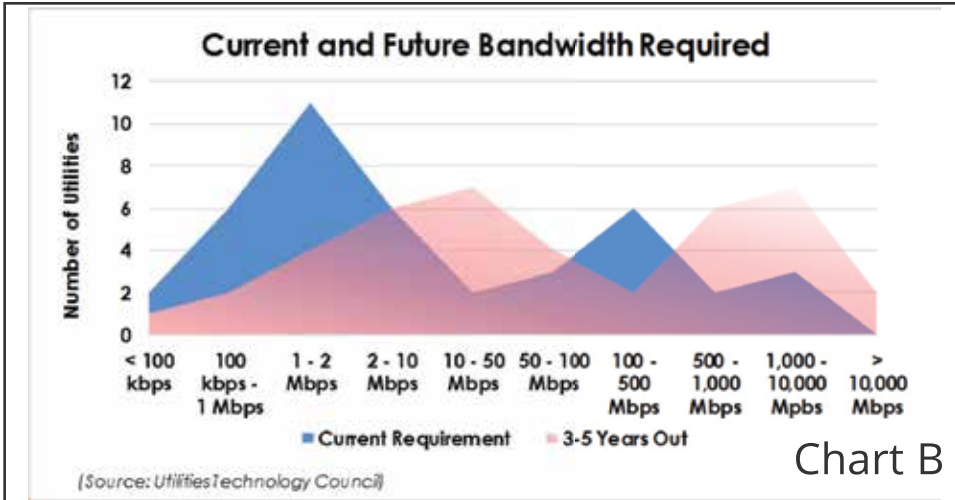
relaying. Carriers may not adequately prioritize service restoration for utilities during or after a disaster. In the same survey, only 15% of utilities reported that their telecommunications service provider had prioritized utility service restoration equal to first responders. Yet those first responders require reliable power to operate during disaster recovery.

Utilities must look far into the future to avoid having to run multiple broadband projects. Perhaps the largest change driver will be distributed energy resources (DERs), today mainly in the form of residential photovoltaic generation. What will the situation be when residential solar generation achieves price parity



Very few utilities in our survey had outsourced more than 20% of their OT network, and no utility had outsourced more than 60% of its OT network. A recurring comment from UTC members is that the latency in commercial telecommunications services is insufficient to support mission critical work such as protective

with utility-scale generation and government subsidies are no longer needed? Balancing that distribution grid, settling cryptocurrency-denominated energy transactions between consumers, managing energy consumption beyond the meter – those and other business scenarios hint that future bandwidth require-



***“ . . . the latency in commercial telecommunications services is insufficient to support mission critical work such as protective relaying.”***

ments may not simply be an extrapolation of today's situation.

SCADA device volumes are growing massively. Large UTC member utilities are forecasting as much as 3x growth in the number of SCADA devices over the next five years. And the new devices will capture and transmit increased and more varied data than legacy SCADA devices do. Responses to the survey cited earlier showed a substantial increase in bandwidth needed over the next 3-5 years:

In Chart B, above, the solid blue area represents surveyed utilities' current bandwidth requirements. The pastel red overlay represents those same utilities' projected bandwidth needs 3-5 years from now. The pastel red peaks trend to a 10x increase in bandwidth over today's needs shown in blue. Grid modernization projects have a 5-to-10-year duration – future needs are most often based upon existing projects.

UTC member utilities upgrade their telecommunications in a phased approach, starting with low-volume, simple use cases that are insulated from end-consumers. Communicating to several thousand utility-sited assets is less daunting than communicating to several mil-

lion consumer endpoints – even if the broadband project only extends as far out as customer data backhaul. End-consumer use cases are fraught with the risk of adverse public relations if things go wrong. Getting the kinks out of the deployment process with in-house use cases, before going public, can ward off the bedlam of a consumer deployment gone wrong. Still, even the best laid plans can go awry – utilities learn with each implementation that no matter what happened in the lab, something new crops up in the field. It is imperative to have a well-drilled and well-staffed incident response process for the broadband rollout.

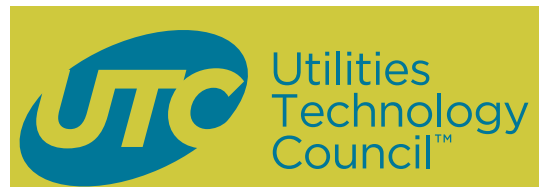
The final consideration for broadband expansion – or any modernization project – is perhaps the toughest of all: staffing. The skillsets needed are changing. As packet-switched networking gains hold, network technicians can no longer retreat to the physical layer – at the very least, data link knowledge becomes necessary and those technicians find themselves ascending the OSI model. That training must be planned, funded, and acquired. IT and OT departments must collaborate as utilities' processes and data become intertwined. Managing that culture change – moving from depart-

mental silos to a collaborative utility – is not for the faint of heart. Even basic terminology must be agreed: groups that have not previously worked together need a basis for coherent discussions about their joint projects. Both IT and OT will be asked to share data that neither is comfortable sharing. Data governance is a good start to manage that sharing but change management may be the greatest challenge.

UTC members have shared with us a number of challenges in their network upgrades and grid modernization projects. Their wisdom yields five non-technical strategies for a successful broadband expansion: learn from other utilities, get the RFP right, expect to own most of your network, look far into the future, and handle change management with your staff. Nothing can guarantee a great project. But strategies like these can orient the project toward success.



Bob Lockhart is the Utilities Technology Council's Vice President of Cybersecurity, Technology, and Research. In that role he manages the association's programs of work for IT/OT convergence and technology initiatives, plus all of UTC's market research activities. Mr. Lockhart has eight years' experience in control systems cybersecurity, with over 25 years' total experience in information security. He was previously Navigant's Research Director for transmission, distribution, smart metering, demand response, home energy, software, telecommunications, data analytics, and cybersecurity. Before becoming a market researcher, Mr. Lockhart had a 31-year career in IT outsourcing with EDS. He has held a current CISSP certification since 2002.



**ABOUT UTC**

The Utilities Technology Council (UTC) is a global trade association dedicated to serving critical infrastructure providers. Through advocacy, education and collaboration, UTC creates a favorable business, regulatory and technological environment for companies that own, manage or provide critical telecommunications systems in support of their core business.

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# Creating a Win-Win Customer Experience: How to Empower Your Subscribers and Accelerate Your Revenues

By Alexandra Harris  
Strategic Solutions Marketing Manager  
ADTRAN

As broadband service providers, you recognize the need to improve network scalability and the flexibility of your access infrastructure, but equally critical is the quality of experience you provide your subscribers. This is ultimately a determining factor in customer loyalty. Given the right tools to focus on subscriber experience, you can not only improve operational efficiency and lower your cost of service delivery, but truly elevate attentiveness to your customers, all while accelerating a path to increased revenue.

## Orchestrate Success in a User-Driven World

Web-scale companies like Netflix and Amazon have changed the way customers view service delivery. Customers want their needs addressed instantly, and the traditional service delivery process just doesn't fit that model. The current approach to service delivery involves a variety of network provisioning, management and monitoring challenges. These include manual swivel-chair operations prone to human errors, systems that are too tightly coupled and not easily modified, and lengthy installation times and service delivery intervals, just to name a few.

To compete with the cloud-based providers, you need a different approach to service delivery, one that supports a user-driven service model with microservices and open APIs, provides advanced analytics, and relies on software-centric operations and virtualized service delivery. By using this approach, resulting installation and activation times will be much shorter and more cost-effective, while the overall quality of experience will be greatly improved.

Imagine instant service activation for homes and businesses. Customers can attach to the network and choose their services independently, thus eliminating the time and coordination required for traditional service turn-up. Or, picture a cohesive end-to-end service activation workflow with 100 percent service equipment inventory accuracy and zero-touch provisioning. It's all available today.

## Address Growing Broadband Service Expectations

As you're facing more demanding service expectations from your customers, understanding their needs and ensuring customer satisfaction has never been more important. You might consider using as much data as possible about your network and subscribers to continually improve business operations and reduce customer churn. By proactively alleviating customer service issues through network analysis and subscriber insight, you can considerably personalize your subscribers' experience.

Every subscriber uses his or her network differently, so effectively determining what factors are affecting their broadband experience is paramount. What if you could gain real-time insight into subscriber usage or network status to actively troubleshoot problems and eliminate truck rolls? Think about the value of identifying billing system inconsistencies or improperly provisioned circuits that are cutting into your revenue. Or, imagine having a global view of network and traffic patterns to plan network upgrades before bottlenecks happen. Easy-to-use reporting on network data and subscriber behavior is available now that offers all of these advantages and more.

## Capitalize on the Connected Home

Smart home technologies are transforming the way homeowners use their Wi-Fi networks. If not managed effectively, applications tied to home security and automation, 4K content streaming, or gaming can lead to poor subscriber experience. Ultimately, subscribers care about unrestrained access to their content, and it's up to you to make sure every element of the network is enabling that experience.

On any given day, your customer service teams probably take many calls from subscribers saying, "My Wi-Fi doesn't work!" Although a common complaint, there are a host of issues that could be causing faulty connectivity, and unfortunately you're left trying to diagnose the problem remotely or send a truck out to

possibly replace devices unnecessarily. The bottom line is that when subscribers report issues with their home networks, you can't easily distinguish between home connectivity problems and potential network issues.

More than anything, you need clear visibility into the subscriber home network following the initial deployment of residential equipment. With residential device management tools available today, you can view real-time residential equipment stats and perform network troubleshooting remotely from a management portal, saving a costly truck roll for only those times when it is essential.

## Extend Whole Home Wi-Fi Coverage

Superior residential subscriber experience requires providing customers with Wi-Fi capacity that is able to adapt to their every need. A whole home, mesh Wi-Fi solution with ubiquitous coverage presents the best path to ensuring that caliber of network performance. It is essential to rely on quality managed devices that feature capabilities like self-installation, self-healing mesh, and self-forming connections with other devices. These device considerations are significant to ensure high-quality residential connectivity, and when coupled with the management capabilities described above, offer you with a new world of revenue opportunities for the connected home.

## Monetize the Subscriber Edge

Superior customer experience is no doubt among your highest priorities. As software-driven, API-centric architectures grow to dominate service delivery, ADTRAN can help you boost the management and monetization of your subscriber experience in ways you may have never imagined. Our Mosaic Subscriber Experience Suite enables you to implement a user-driven service model to address the ever-increasing service expectations of your subscribers and dramatically improve their customer experience.

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# CVEC Opts to Go it Alone on Broadband Build-out

BY CATHY CASH  
Senior Writer/Editor  
NRECA

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Central Virginia Electric Cooperative (CVEC) is launching its own broadband fiber initiative after millions of dollars in incentives for high-speed internet access were left on the table.

What happened?

"We had nobody, no company or group of companies, that provided a fully responsive solution," says Gary Wood, president and CEO of the co-op headquartered in Lovingston.

So, armed with a feasibility study and board approval, CVEC has begun a five-year, \$100 million fiber build-out to serve its 36,000 members with gigabit-class broadband internet.

"What was driving this was our need for the electric service to have better communications from substations to down-line equipment for reclosers," Wood says.

In 2016, CVEC released a request for information for a partner to make broadband available to every member across its 14-county territory. As an incentive,

the co-op offered to waive annual pole attachment fees of \$1.2 million.

Nobody bit.

Now a co-op broadband subsidiary is in the works, and initial member connections are expected by year's end.

"Since we were unsuccessful in finding a partner, we will put it in across the entire system to serve members as well," Wood says.

CVEC will seek support from state and county economic development funds as well as federal programs such as the U.S. Department of Agriculture's Rural Utilities Service and the Federal Communication Commission's Connect America Fund.

A number of CVEC-served counties want broadband solutions to improve schools, home values, and tax bases, Wood says.

"We have had no load growth since 2009," he says. "Part of that is the economy, but also it does not help when you don't have the services in place for an area where people want to live. It's about how

to keep rural living as a viable choice for families. We know there are people today who turn down home purchases in our territory when there is not good broadband."

Mid-career professionals in rural America want a chance to run a business or update their credentials online. Young people want the option to work anywhere.

Wood knows this firsthand. His daughter is in the art and technology fields. His son works in Shanghai, China. "He didn't have to go that far, but his job depends on having good internet access," Wood says. "That is the nature of where society is heading."

In the end, co-ops are well-suited for the job, he notes. For-profit companies cannot wait years for a return on investment.

"Co-ops, we're going to be here. We're used to putting in an investment over a long period without return. We understand what to do to drive costs down," Wood says. "We're a good fit for this."

## Jane Brightwell Recognized With Prestigious AFCEA Award

By Randy Turner  
Director, Marketing Communications  
Walker and Associates

Jane Hefner-Brightwell, VP of Walker and Associates' Federal, International and RBOC (FIR) Sales Department, received the General James M. Rockwell AFCEAN of the Year Award. The award was presented by DeEtte Gray (l), incoming chairwoman of the board, AFCEA International, and Lt. Gen. Robert M. Shea, USMC (Ret.) (r), president and CEO, AFCEA International, pictured above, in Baltimore, MD during the AFCEA Defensive Cyber Operations Summit.

Ms. Brightwell serves as the AFCEA Regional Vice President, of the Carolinas

Region, providing valuable leadership to the organization, particularly as she has advocated for women in cyber initiatives in recent years.

The General James M. Rockwell AFCEAN of the Year Award is AFCEA's premier award, given for exemplary service to AFCEA over the past year. Winners are selected by an appointed committee. Criteria for nomination includes being a senior representative of the C4I community, who has made significant current contributions toward furthering the goals and objectives of the Association.



Ms. Brightwell has worked at Walker and Associates in a variety of roles since 1997. Her educational achievements include MBA from the Babcock Graduate School of Management's Executive Program at Wake Forest University, MA from George Washington and BS in Journalism/PR from the University of South Carolina. As VP of FIR Sales, Jane Brightwell is responsible for the development of the focus markets Federal, International, RBOC and WBE/Diversity.



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# Rural Communities Take Broadband Into Their Own Hands

Original Air Date: March 3, 2018 8:09 AM ET  
Heard on Weekend Edition Saturday  
BENNY BECKER  
Re-publication granted by Beeny Becker,  
WMMT & Ohio Valley ReSource



**SCOTT SIMON, HOST:** A lot of us take high-speed internet for granted, but about 40 percent of rural Americans live where there are no options for broadband. From WMMT, Benny Becker reports on one community in Appalachian Kentucky that's struggling to get its residents connected.

**BENNY BECKER, BYLINE:** I met Gemelia Lewis early last year near her home in Linefork, Ky. It's a little valley tucked away in the mountains of Letcher County, an Appalachian community with a strong sense of heritage.

**GEMELIA LEWIS:** This is the house where I grew up.

**BECKER:** Her grandfather built this house, and Lewis has stayed home to help take care of her parents. She has a background in accounting but has had a hard time finding steady work.

**LEWIS:** I was actually offered a job where I could work from home, but I couldn't take the job because there's no internet.

**BECKER:** From her house, Lewis had no options for broadband internet and not enough cellphone signal to get online or even make calls. The lack of connectivity has been hard on her family. Homework is almost impossible for her younger son, who's visually impaired. The school has loaned him an iPad that he can use to zoom in on the text in his assignments...

**LEWIS:** But he can't do that here because we don't have any internet at all. I feel like he's getting left behind because he doesn't have what he needs to get his education, and that's not fair.

**BECKER:** Across America, 23 million people live in rural areas where there's no broadband internet. The federal government has spent billions of dollars trying to expand access, but much of that has gone to large telecom companies. Those businesses make more money when they maximize customers,

**Millions of people living in rural areas don't have access to broadband Internet. It's expensive to build networks from scratch so local communities are trying new ways to get people online.**

so they often target more densely populated areas. Christopher Mitchell directs the Community Broadband Networks Initiative in Minnesota. He advocates for local efforts to expand internet access, and he wants Congress to do more.

**CHRISTOPHER MITCHELL:** It was estimated it would cost \$350 billion to connect every last home in America. If most of that came through loans, you're looking at less than a \$10-billion-per-year program for something that I think would supercharge the economy for decades to come.

**BECKER:** Many communities say they're not willing to wait. More than 750 have already built their own broadband networks. That includes urban areas like Chattanooga, Tenn., and Concord, Mass., but also rural places like Powell, Wyo., and Bellevue, Iowa. Last year, Letcher County, Ky., decided to follow that model. Officials created a broadband board to try to bring affordable internet to isolated areas like Linefork. Harry Collins chairs the group.

**HARRY COLLINS:** Let's face it - that pipe dream in the sky of the new interstate ain't going to roll right up through Linefork. But this group can bring you the information highway, and that's what we're here to do.

**BECKER:** The board applied for a \$1.5 million federal grant to install a fiber optic network, but it was denied. Now the board is trying something different - a network that's quicker and cheaper to build.

**DON WHITE:** Wireless broadband - so no cables, no phone lines.

**BECKER:** That's Don White of FiSci Technologies. Last year, White helped install wireless broadband in another part of Letcher County.

**WHITE:** It's a very viable approach to providing broadband into areas that are tough to get connectivity to.

**BECKER:** The Letcher County Broadband Board estimates it could build a wireless network this year for \$700,000 if it can find the money. And that's a problem for many rural communities already struggling from a declining population and many years of job losses. For those living in Linefork, there has been some good news. A small local provider expanded its network, and for the first time, a few people like Gemelia Lewis now have a fast internet connection at home.

For NPR News, I'm Benny Becker in Whitesburg, Ky.

**SIMON:** And that story comes to us from the Ohio Valley Resource.



To listen to the audio version of this broadcast, go to <https://www.npr.org/2018/03/03/590546371/rural-communities-take-broadband-into-their-own-hands> or click the play button above

# In the Spotlight

By Randy Turner  
Director, Marketing Communications  
Walker and Associates



**ANGIE HUNT** has been promoted to the role of Inside Sales Manager for the Walker and Associates North Carolina headquarters location. Angie has provided leadership in a range of roles during her 23 year career at Walker, and brings sales, sales support, and operational experience to customers and her new direct reports. Her determination, keen sense of teamwork, and broad range of experience will serve her well in her new role. Congratulations Angie!

Angie can be reached by email at [angie.hunt@walkerfirst.com](mailto:angie.hunt@walkerfirst.com), or by phone at 336-731-5420.



**JIM WILKEY** joins Walker and Associates as a Regional Account Manager responsible for sales in Illinois, Indiana, Kentucky, Michigan and Cincinnati Bell in Ohio.

Jim resides in Terre Haute, Indiana with his wife and three daughters. He graduated from Indiana State University with a Bachelor of Science (B.S) degree in Computer Science and began his career in the telecommunications industry with Applied Computing Devices (ACD) as a Software Design Engineer focused on engineering and design of industry leading software solutions for Fault, Configuration, Performance and Inventory Management supporting a variety of technologies and network equipment manufactures. He held senior engineering and product management positions and later joined Applied Digital Access (ADA) as a Senior Product Manager following the acquisition of ACD. He joined Telecommunication Techniques Corporation (TTC) as a Solution Sales Executive prior to the merger with Wavetech Wandel Goltermann (WWG) that formed Acterna and later acquired by JDS Uniphase (JDSU). He was a Solution Sales Director at Accedian Networks and Netrounds focused on Carrier Ethernet, NFV/SDN and virtualization solutions prior to joining Walker. He is a Senior Sales and Marketing profes-

sional with over 30 years of experience in the telecommunications industry and has worked with communications service providers, mobile operators and MSOs across North America, Europe, Mexico, South America and the Caribbean.

He brings to Walker an extensive background in engineering, marketing and sales of communications test and measurement, performance management and service assurance solutions.... along with a passion for technology and to help customer's solve their most critical business problems.

Jim can be reached by email at [Jim.Wilkey@walkerfirst.com](mailto:Jim.Wilkey@walkerfirst.com) or by phone at 336-731-5423.



**MARK STURGIS** is Walker's newest Field Sales Engineer. Mark brings a diverse background of telecommunications industry experience from previous Systems and Sales

Engineering positions with several OEMs. Beginning his telecom career in the US Air Force, Mark moved on as an Installation Engineer for MCI's first optical transport networks. His most recent was as a Sales Engineer at BTI Systems/Juniper Networks designing Integrated Packet Optical Transport solutions for the Service Provider market. Other key roles throughout his 30 year career include Sales Engineer for both Nortel Networks and Allied Telesis; Contracted Instructor for Global Knowledge and 14 years as Systems Engineer/Project Manager for a large Systems Integrator. JNCIA, MEF 2.0.

He lives in High Point, NC with his wife, and can be reached by email at [mark.sturgis@walkerfirst.com](mailto:mark.sturgis@walkerfirst.com), or by phone at 336.731.5354.



**CHRIS WALKER** was promoted to Federal Inside Sales and Proposal Manager earlier this year. All the federal inside staff, which includes sales and sales support, report to him.

In addition, he has responsibility for the federal proposals, GSA and SEWP contract administration.

Chris can be reached at [chris.walker@walkerfirst.com](mailto:chris.walker@walkerfirst.com), or by phone at 336.731.5476.



**CURT GARRETT** recently joined Walker and Associates as Regional Account Manager covering Texas, Louisiana, New Mexico, and Oklahoma. He joins the Walker team with over

30 years of experience in the telecommunications industry. During the last 14 years his career includes 11 years with RAD and three years with Alcatel-Lucent (now Nokia). His expertise and primary focus was on Network Infrastructure - Microwave, IP/MPLS, WDM, CPE and Professional Services.

Curt can be reached by email at [curt.garrett@walkerfirst.com](mailto:curt.garrett@walkerfirst.com), or by phone at 336-731-5431.



**DON DAVIDSON** recently took a new assignment at Walker and Associates as Services Implementation Manager, His primary responsibilities in his new role include managing internal process and tracking systems, providing project implementation support including RFP and RFQ responses and scheduling site surveys, engineering, installation, provisioning, test and turn-up through direct and remote engagements for broadband network services projects. Services will include projects that provide broadband network deployment management from design, material requirements, installation, provisioning, test and turn-up of the full network. Other services managed include contracted engineering, professional services to provide network management support, managed services providing NOC services, other specific project installations such as timing, power, or infrastructure builds.

Don can be contacted at [don.davidson@walkerfirst.com](mailto:don.davidson@walkerfirst.com), or by phone at 336-731-5413.

**MICHAEL BECKHAM** is Walker's new Broadband Network Services Field Engineer. Mike will primarily be responsible for completion of site surveys, assist in engineering, design and lab support, field installation when applicable, shipped inventory validation, test and turn-up support and working directly with customer and contractors to ensure quality control standards are maintained. Services performed include projects providing broadband network deployment management from design, material requirements, installation, provisioning, test and turn-up of the full network. Michael's other services include contracted engineering, professional services to provide network management support, Managed Services providing NOC services, other specific project installations such as timing, power, or infrastructure builds.

Michael can be reached at [michael.beckham@walkerfirst.com](mailto:michael.beckham@walkerfirst.com), or by phone at 336-731-5384.



**PETE THOMAS** recently retired from Walker. Pete's career in telecom spanned nearly 40 decades. In recent years he worked for Walker as Director of East Region Field Sales, managing a team of sales professionals responsible for customers in 27 states. His notoriety in the industry made him a valued member of Walker's leadership team, and he will be missed greatly by associates, customers and Walker's manufacturing community.

During Walker's Mid-Year Training Conference in June we took time to honor him and acknowledge his work at Walker as well as his storied experience in the telecommunications industry. You can check out his LinkedIn profile to get a better idea of his work, but if you ever have time to take him out for a cup of coffee to get his perspective on life, work, and balance, do it. It's one thing to retire with all the professional pieces in place. An even greater story is when the personal pieces fall together as well. Pete is that kind of leader. He will be missed at Walker, but we wish him all the best as he takes time to pursue at a more leisurely pace the things that matter most. View a brief video we created to send him off at <https://www.linkedin.com/feed/update/urn:li:activity:6419551549361577985>.

Happy Retirement, Pete Thomas!



**EMILY WILSON-CRAVER** joins Walker's Marketing Communications Department as the Marketing Events Manager. Her role includes managing regional and national

events for commercial sales, in addition to regional and national events for federal sales. She is also responsible for managing industry association memberships, lead generation programs and marketing events budgets.

Emily comes to Walker with a varied background in event management, including work with the NASCAR industry. She worked for Richard Petty's Driving Experience division, managing event promotions and logistics.

She is originally from Troy, AL (she insisted we insert "ROLL TIDE ROLL" in her bio sketch), and now lives in Lexington, NC with her husband and daughter. Working from Walker's corporate office, she can be contacted at [emily.wilson-craver@walkerfirst.com](mailto:emily.wilson-craver@walkerfirst.com), or by phone at 336-731-5270.



**PAM SMITH** has been promoted to Strategic Federal Account Manager to cover DISA, White House Communications and several other key accounts. Pam previously worked in Federal

Inside Sales for Walker, and now reports to Joe DeFranco, Director of Federal Sales. Pam resides in Maryland working from her home office. She can be contacted at [pam.smith@walkerfirst.com](mailto:pam.smith@walkerfirst.com), or by phone at 336-731-5448.



**HAYDEN HOEBEKE** recently joined Walker as a Federal Inside Sales Executive, specifically supporting Pam Smith. Hayden previously worked with other SEWP contract holders; IMMIX, Copper River and Akira. Hayden graduated from Roberts Wesleyan College in Rochester, NY, where he graduated with a Bachelor of Business Administration. His experience with DISA makes him a strong addition to Walker's federal team. Welcome Hayden!

Hayden can be reached at [hayden.hoebeke@walkerfirst.com](mailto:hayden.hoebeke@walkerfirst.com), or by phone at 336-731-5357.



**Today, too many Americans live in a digital desert.** The problem is particularly acute in rural America where too many communities are being left behind.

**34 million Americans** lack a broadband connection.

Of these, **19.4 million** live in rural areas and their lack of broadband access means they are unable to take advantage of economic and educational opportunities.

- **Six and a half million students lack** access to high speed internet and rural areas often pay more for the service they do have.
- **Seventy percent of America's teachers** assign homework or research that requires a broadband connection. That means millions of children are not able to access the tools they need to thrive in school and beyond.
- **Rural students score lower in math** than suburban counterparts and that gap widens between kindergarten and eighth grade.

Inadequate broadband access discourages online commerce and limits Americans' ability to use new technology in critical fields such as agriculture and healthcare.

- **Telemedicine could save lives** and thousands of dollars annually for underserved patients and rural hospitals that in many cases are struggling to survive.
- **Broadband access brings the promise** of precision agriculture, which helps farmers optimize irrigation, fertilizer and pesticides for increased crop yields.

The bridging of the urban-rural digital divide could unleash tremendous potential for the lives and livelihoods of millions of Americans.

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**Connect Americans Now (CAN)** has a plan to eliminate the rural broadband gap by July 4, 2022.










Unlocking a technology model that uses a combination of television white spaces spectrum, wireless technology, LTE fixed wireless and satellite coverage will achieve the mission while reducing operating costs by roughly 80 percent compared to fiber cables alone.

The Federal Communications Commission (FCC) has the ability to make this goal a reality by ensuring the continued use of the spectrum needed for this all-of-the-above technology model.



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# 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, exhibiting at conferences and expos, and directory advertising.

Look for us at the events listed here, and refer to the Upcoming Events section of our website, [www.walkerfirst.com](http://www.walkerfirst.com), for additional details.

We look forward to seeing you at these events!

## Proud Member of:



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Tri-State Telecom Conference	Jackson, WY
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* ISE EXPO	Denver, CO
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TechNet Augusta	Augusta, GA
SDTA Annual Meeting	Brookings, SD
MTA Annual Meeting	Kalispell, MT
SEPTEMBER 2018	
TAM Convention	Rockport, ME
Modern Day Marine	Quantico, VA
OCTOBER 2018	
Northeast Telecommunications Showcase(NETS)	Wilkes-Barre, PA
NFOC Conference	Philadelphia, PA
* UTC Region 3	Williamsburg, VA
* UTC Region 8	Denver, CO
ANMTA Fall Conference	Santa Fe, NM
MATSS 2018	Kansas City, MO
NASA AMES	Mountain View, CA
KTA - TTA Fall Joint Conference	Bowling Green, KY
* Oregon Connections Telecommunications Conference	Hood River, OR
* SCTE Cable-Tech Expo	Atlanta, GA
NASA Kennedy Space Center Business Opportunities Expo	Port Canaveral
Berkeley LabTech	Berkeley, CA
NOVEMBER 2018	
CCAP Expo	Ridgecrest, CA
Fermi Lab	Batavia, IL
* TechNet Asia-Pacific	Honolulu, HI
DECEMBER 2018	
CDCA Defense Summit	Charleston, SC

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