Skinny Wire

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Insights for ICT Professionals

The Telecommunications Act of 1996:

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Editor's Letter

My career in telecommunications, and with Walker and Associates, began in 1995, just a year before the landmark legislation known as the Telecommunications Act of 1996 was signed into law. I clearly remember its impact as the competitive local exchange company industry boomed, before going bust only a few years later. Those early years of the legislation seemed only a tease of what lay in store for the industry. Leading the way was the new technology known as VoIP, which would revolutionize communications networks, and usher in the competition intended by the 1996 act. As its adoption dramatically increased in the early years of the first decade of the 21st century, it upended the business models of traditional carriers, changed pricing models for consumers, and opened the doors for cloud technologies that would later emerge.

While it is fun to walk down memory lane and play "remember when", a more productive direction is looking forward. The Telecom Act of 1996 paved the way for us to get where we are. Knowing what we know now, can we catch a glimpse of what may lie ahead? Some of our contributors in this issue might agree.

Chip Pickering, CEO of INCOMPAS and a member of the Telecommunications Act Subcommittee, provides a poignant perspective in his article on page 6. He was deep in the work of crafting this landmark legislation, yet he asks the important question "Is our work finished?" It is a valuable read.

And, the excellent interview between Broadband Communities Magazine and Mignon Clyburn that begins on page 12 is a must read. Her perspective as a past FCC Commissioner gives her a unique vantage point. Along with INCOMPAS CEO Chip Pickering, Clyburn now leads the INCOMPAS BroadLand campaign, focused on making "internet for all" a reality for millions of American families and small businesses, rural and urban, that lack competitive broadband alternatives that bring faster speeds and lower prices. Sounds like a page from the Act itself!

Industry leaders from associations such as Fiber Broadband Association, NTCA, WISPA and UTC also contributed in this issue, each offering their own take on how the Telecom Act of 96 influenced success and shortcomings along the last 25 years. At a time when funding programs for broadband expansion have never been higher, it is an important time to assess what worked and what didn't. Listening to their insight as they lobby for their industry segments is an important step.

And this issue wouldn't be complete without paying tribute to a real pioneer in our industry, Walker and Associates co-founder, Virginia Walker. Virginia passed away June 5, and her 94 years were full of accomplishment. For 51 years she was immersed in the industry, spanning such milestones as the 1982 divestiture of the Bell System, the Telecommunications Act of 1996, the rise and fall of the dot com era, and the dawn of a new century. She leaves us richer, better, blessed.

Knowing how we got where we are is always an interesting study, and provides insight into how we move forward. It's been 25 years of adventure. Time to move ahead to more innovation, more competition, more leadership and more success!

Randy Turner

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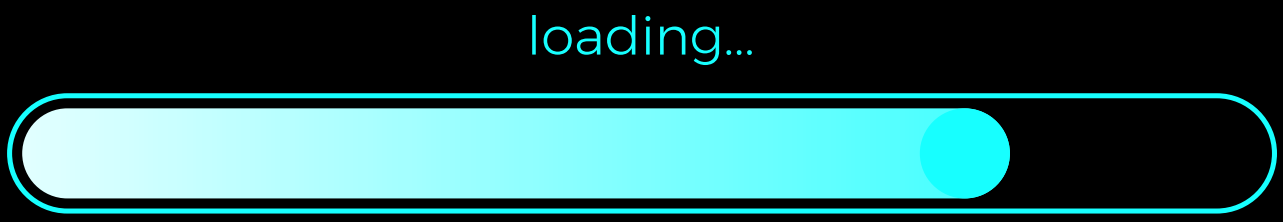
25th Anniversary of The Telecommunications Act of 1996 – Time for A Refresh

By Gary Bolton
President and CEO
Fiber Broadband Association



Eighty-seven years ago, President Franklin Delano Roosevelt signed the Communications Act of 1934 into law. The 1934 Act provided the legal framework for governing communications in the United States at a time when telephone service, both local and long distance (to the extent it existed), was considered a natural monopoly. With this Act, the Federal Communications Commission was created, and interstate telephone service was subject to common carrier rate-based regulation.

The monopoly world of telephone service remained in effect until the 1970s, when MCI and Sprint finally gained entry into the long-distance telephone business. As a result of antitrust litigation, in the early 1980's, the Bell System was broken up, with the seven "Baby Bells" divested from AT&T. And 15 years later, as the Internet emerged in the 1990's, we saw first major overhaul of the 1934 law, referred to as The Telecommunications Act of 1996, which opened local markets and affirmed the FCC's policy of distinguishing between regulated telecommunications services (referred to by the FCC as "basic services"), and unregulated information services ("enhanced services"). A lot has happened in the 25 years since the '96 Act, but it is clear that the industry, regulation, and most importantly our lives have been changed forever.

Back in 1996, our world still revolved around "plain old telephone service," even though the Bell System had been broken up in 1984. Long distance competition had taken root, but local markets were just beginning to open. As the Internet emerged in the mid-nineties, we plugged 14.4 Kbps analog modems into our phone lines to connect our PCs to the Internet, and thought a whole new world was opening up when 56 kbps modems became available.

We have long moved away from the analog PSTN (Public Switched Telephone Network) to a digital, packet centric world. Today, voice services (VoIP) are just another application on the Internet, video calling globally is the norm, and the Internet is not something we "dial-in" to, but it has become the fabric of our lives. And high-performance broadband connectivity reaches most Americans. As we celebrate the 25th anniversary of The Telecommunications Act of 1996, it is a good time to look back and reflect on the significant positive impact this legislation has had on opening up local markets and encouraging significant capital investment that has resulted in our networks proving invaluable as we work, learn and live at home during the COVID emergency.

The '96 Act required local government to let in competition, opening up local markets. As the Act was signed into law, we witnessed an immediate gold rush of new market entrants and a wave of innovation and investment, fueled by the tailwinds created from the emergence of the Internet. Within 8 years of the Act, Verizon announced its plans to invest $18B in deploying fiber optics across its nationwide network. The Verizon investment eventually led to entry by Google Fiber and many other fiber providers and, and we now have 55M homes that have access to fiber broadband across our nation. While we did see the dot.com bubble burst in the early 2000's, resulting in a number of CLECs (Competitive Local Exchange Carriers) going bankrupt, their investments were not wasted as those assets stayed in the ground. XO Communications, for example, heavily invested in fiber networks and those fiber assets were eventually acquired by Verizon who built upon that investment. We also saw the cable industry rapidly re-purpose and rebuild their networks to create cable modem broadband services during this period, leading to a significant market share advantage for more than two decades.

The 1996 Telecom Act spurred massive investment. Capital investment as a percentage of revenue increased from 21 percent in 1992 to 27 percent in 2001 as a result of what the FCC called the virtuous cycle. At that time, Internet traffic was doubling every 100 days and Wall Street's overvaluation of "dotcoms" – spurred in part by Worldcom's fraud -- resulted in a severe market correction. While market forces culled out non-sustainable businesses, the fact remains that the opening of markets and more competition resulted in the necessary investment to build the network we enjoy today.

The Times Are A-Changin'

But given the very significant changes that have occurred in the 25 years since The Telecommunications Act of 1996, now is the time to address the outdated parts of the Act. And while the networks held up well under the real-world "stress test" caused by the pandemic, it revealed how critical a reliable and robust Internet is to our lives. Thus, we must set a goal to bring future proof, all fiber networks to all Americans, paving a path for future services, such as smart grid modernization, public safety and 5G. To achieve this, a new Telecom Act needs to achieve the following:

" . . . we must set a goal to bring future proof, all fiber networks to all Americans, paving a path for future services . . ."

1. We must continue to encourage and facilitate new market entry, which is a key driver to providing choice for consumers.
2. We must reduce broadband deployment barriers, including by implementing such policies such as "one touch, make ready".
3. We need to get rid of the overhang of Common Carrier Regulation (structured in 1934 for a monopoly asset) to removed disincentives to investment and innovation. To put it simply- Common Carrier Regulation is a square peg in a round hole when most markets have multiple providers offering advanced telecommunications and broadband service and are open to further entry. And the flip-flopping, depending on which party controls the FCC, to rely on such Title II regulatory authority to impose "net neutrality" regulations has to come to an end.
4. We must support deployment in all areas that fall on the wrong side of the digital divide.
5. We must aggressively address Affordability and Adoption with long-term solutions.

We also should consider how to better integrate privacy, cybersecurity and supply chain considerations into our communications policymaking.

We are long overdue for Congress to revisit The Telecommunications Act of 1996 and make the necessary changes that will spur continued investment, innovation and serve all Americans for the next twenty-five years.

Gary Bolton
President and CEO
Fiber Broadband Association

Gary Bolton serves as president and CEO of the Fiber Broadband Association — the largest trade association in the Americas dedicated to all-fiber-optic broadband. With more than three decades in the telecom industry, Bolton joined the Fiber Broadband Association as president and CEO in 2020 after serving on the association's board as vice chairman, treasurer and vice chairs of public policy and marketing committees.

Walker and Associates, Inc. Joins Nokia Global Partner Program to Help Power Utilities Accelerate Digital Transformation

Walker and Associates, Inc., announced earlier this year that it had signed a channel partner agreement with Nokia.

As a result of this relationship, Walker and Associates will market and distribute Nokia's product line of Industrial-grade Private Wireless solutions alongside the industry-leading Wavence™ microwave packet radio portfolio to help utilities be future-ready for new demands and business models.

Based on proven 4.9G/LTE technology and the world's first private 5G standalone solution, Nokia Industrial-grade Private Wireless is easy to deploy and provides a smooth upgrade path to future releases of 5G. Nokia draws on cutting edge platforms and decades of industry experience to support 260+ private wireless networks for customers across a variety of enterprise segments

Nokia's industry-leading Wavence™ microwave packet radio portfolio provides a best-in-class microwave in traditional bands (6-42 GHz) and E-Band (80 GHz), leveraging Nokia Bell Labs innovation. It gives the maximum efficiency thanks to 100% Carrier Aggregation, including all 5G backhaul use cases across different frequency bands.

Gus Vasilakis, Vice President of Marketing, Walker Associates, made the announcement: "Nokia's leading range of private LTE wireless broadband and innovative packet-optical microwave solutions help utilities worldwide to modernize and optimize power grids. Walker is delighted to help our power utility customers realize their digital ambitions now and prepare for future grid control advancements."

Vikas Trehan, Head of Partner Sales – North America, said: "The Nokia Global Partner Program is a key part of our sales force – and strengthens our primary route to market for utility opportunities. We are pleased to welcome Walker to our program to help drive new growth and develop new customer relationships in the utility market."

The Competition Constitution: How Bipartisanship Defined the Telecom Act of 1996 and Lights the Path to the Future

By Chip Pickering
CEO
INCOMPAS

Landmark. Transformative. Forward looking. As we celebrate the 25th birthday of the Telecommunications Act of 1996, these are some of the most frequently used words to describe it.

But one word was, and always will be, at the top of my '96 Act list: bipartisan.

When I speak with people today—Members of Congress, staff, journalists or voters—it's hard for them to wrap their heads around the idea of a such a major, consequential piece of legislation passing by overwhelming margins in both the House and Senate.

You have seen the photos from the magnificent Library of Congress with giants like House Speaker Newt Gingrich and Senate Majority Whip Trent Lott, standing with President Bill Clinton and Vice President Al Gore, with Clinton holding a digital pen. Keep in mind this was just a few short months removed from a bitter federal government shut down that divided our nation. It made the moment of unity all the more special.

But to truly understand how the bipartisan compromise was forged, you have to look deeper to less glamorous conference rooms in basements of Congressional office buildings, where Members and staff spent countless hours of many months (indeed, several years and Congressional sessions) hammering out the details of a roadmap that would make the United States the global leader in the technology sector, and build the greatest economic engine in human history.

" . . . one of the most important pieces of legislation to come out of Congress in the past 50 years. "

As a staffer working for Sen. Lott, it was one of the great honors of my life to be hunkered down in those rooms, surrounded by mountains of pizza boxes, negotiating alongside men and women from both parties. We all had different ideas, but ultimately came together around one core goal.

MAKE COMPETITION THE LAW

It was a moment we had been building toward for a long time. Conservatives like myself believed free market principles should guide telecommunications policy. We had watched Ronald Reagan successfully break up AT&T. We saw competition come in and prices go down. A new network, one that would become the backbone for the internet economy, emerged.

Leading Democrats, like then Rep. Ed Markey and Rep. Anna Eshoo, with whom I would go on to serve alongside in the House on the Energy and Commerce Committee, had long championed the needs and rights of consumers who had seen artificially inflated telecom prices hurt consumers and small businesses in the pocket book.

Moving from monopoly systems to networks governed by competition takes work. President Ronald Reagan didn't magically end Ma Bell's dominance, and in truth, it's a fight that continues today. But the legislative conversations that build toward the '96 Act started with the 1992 Cable Act. It allowed and enabled satellite television competition, a move that shifted us from satellite dishes the size of a barn door to the 12-inch model. Competition in television brought more channels, more creative content and more choice.

Next Congress moved to make more licensed spectrum available through competitive auctions, which would help facilitate the explosion in the wireless marketplace and required competition from the start. Congress leaned on competition policy like interconnection, interoperability and portability, which would come to define the wireless marketplace, where multiple competitors supercharged innovation and lower prices drove massive consumer adoption.

From there, the '96 Act negotiations took shape around the idea of allowing segmented long distance, local phone carriers (yes, hard to believe that was a thing) and cable to compete against one another. Back then, the idea of creating a wholesale marketplace to allow resale of services at discounted rates, was a unifying proposition. It worked in other markets, and helped to enable smaller, start-up players to compete on price, customer service and innovation.

And innovation has been key. Because when you look at the network innovations that have reshaped the telecommunications industry–Ethernet, VOIP, cloud and fiber–all those innovations came from smaller competitive providers looking to shake up the marketplace.

The Act also included the E-Rate program, because Members wisely saw the benefit of digital education. Wiring all our schools and libraries has had a transformative impact on neighborhoods large and small and helped us prepare our workforce for massive change. Ensuring that these anchor institutions, and the kids, seniors and families who rely on them, always have access to the fastest speeds is critical, and the evolution of the E-Rate program has only become more important because of COVID-19.

Finally, the '96 Act also included Section 230, language that ensured that new internet companies would have liability protection and the freedom to innovate and grow without fear of legal teams

from giant incumbent players—from all industries including telecom, software, hotel and travel—burying new ideas before they got out of the gate.

If you watch the floor speech when the '96 Act moved through the House and Senate, two unifying themes emerge: Competition and the need for the U.S. to be the global leader in the race for new technology and the jobs it brings. That is what Senator Fritz Hollings, Senator Larry Pressler, then-Rep. Ed Markey, Rep. Tom Bliley Jr., Rep. John Dingell, Rep. Jack Fields and many others wanted—the opportunity for the jobs of the future to be made in America. And that is exactly what happened—our technology sector is the envy of the globe.

Today, the '96 Act is still sturdy and strong, flexible and forward looking. Independent Senator Angus King called the Act, one of the most important pieces of legislation to come out of Congress in the past 50 years.

IS OUR WORK FINISHED? ABSOLUTELY NOT

Tens of millions still lack broadband connectivity. Hundreds of millions are still being denied competition and cost-saving broadband choice – especially at home. And while the United States led the world in the tech space over the past quarter century, the race isn't over. Other nations are investing heavily into tech and building superfast symmetrical gigabit speed networks.

But competition has always been the cure for complacency. And just as we need to remain vigilant in protecting our constitution and democracy, we must heed the call of the bipartisan '96 Act to prioritize competition and continue to create opportunities for all innovators from every corner of the nation and connect every American to broadband.

" Competition has always been the cure for complacency."

That is what the bipartisan leaders in 1996 were counting on—that we would continue to put policy above politics, faith in each other and unite around our commitment to building a better future filled with opportunity for all Americans.

About the Author

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

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

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

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

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

The act's legislative history reflects the goal of Congress: "to accelerate the deployment of an advanced capability that will enable subscribers in all parts of the United States to send and receive information in all its forms—voice, data, graphics, and video— over a high-speed switched, interactive, broadband, transmission capability."

The CLEC Crash of 2000

By Doug Dawson
President, Founder
CCG Consulting

2021 is shaping up to be one of the most unusual years in the history of the telecom industry between the pandemic, giant grants, and supply chain issues. But for those who've been in the industry for a while, 2000 was also a memorable year. This article tells a brief story of the telecom crash of 2000, which shaped the industry for the following two decades.

The telecom crash was the eventual culmination of the changes made with the passage of the Telecommunications Act of 1996. Among other things, this law created the new CLEC industry by requiring the large incumbent telephone companies to sell access to their networks in the form of unbundled network elements (UNEs) and resale. Congress had passed this law to promote competition in the local telephone business in the same way that the divestiture of AT&T had introduced long-distance competition a few years earlier.

The Act worked better than envisioned. Within a few years, there were hundreds of new CLECs including a few dozen with large financial backing. It seems that everybody thought they could make money by selling services over the facilities of the large telcos. My consulting firm was founded in 1997 in reaction to the 1996 Act. My math showed that there was a relatively small margin to be made from collocating and selling service over telco copper and an even smaller margin from reselling telco services. Yet somehow, CLECs were finding the funding to create giant CLECs that would operate in multiple markets, with the idea that economy of scale would make up for the small margins. Many of the CLECs understood margins to be small and some had business plans that planned to eventually build fiber facilities to replace some of the leased telco copper.

In the late 1990s, the expansion of CLECs turned into an economic craze. The driver of the craze was the high stock prices earned by the first few CLECs that went public. Part of the reason for the high valuations was that telecom companies were riding the coattails of the many dot-com web-based companies that were also going public at the time and gaining huge valuations. The high stock prices and valuations in the industry convinced investor groups to build a CLEC business plan to also go public. The expansion craze quickly grew to be irrational. At one point I remember counting eight CLECs with published business plans to each capture a 15% to 20% market share in Atlanta. It was becoming quickly obvious to industry insiders that the CLEC growth craze was impossible and unsustainable.

One issue that drove the craze was vendor financing from vendors like Lucent, Nortel, Cisco, Motorola, and Alcatel. These vendors offered large lines of credit to many up-an-coming CLECs to buy tens of millions of dollars of electronics. The vendors clearly bought into the craze and were convinced that many of the larger CLECs would be able to meet their business plans. Within just a few years there were dozens of CLECs with plans to go public, and the combination of vendor financing and enthusiastic investors pushed the CLECS forward. The funding was often irrational. My consulting firm had one CLEC client that had a solid business plan to serve the Washington DC and Baltimore markets – places they knew well after years of being a Verizon agent selling to businesses. This CLEC was pushed by investors to go public and was forced to adopt a business plan of expanding to almost a dozen markets within just a few years. Unless the company agreed to the fast expansion it wasn't going to get funded for serving the two markets where it could have been successful.

The magnitude of the dot-com and CLEC craze was mind-boggling. From 1995 until March 2000 the NASDAQ grew over 400% in total valuation, fueled mostly by these two industries. As happens with all overheated industries the reality eventually caught up with the exuberance. As some of the original dot-com and telecom companies started to miss earnings expectations, the stock market took a pause. In March 2000 the first decline in stock prices occurred and this quickly mushroomed into catastrophic losses. As analysts took a harder look at the business plans of the dot-coms and the telecom companies, the value of the stocks plummeted.

As a result of the 20000 crash, some major existing telecom companies like Worldcom, NorthPoint Communications, and Global Crossing failed and closed. Telecom vendors lost huge value with Cisco stock dropping 86%. Dozens of new CLECs failed outright. The losses by 2002 were staggering. Half a million people lost jobs. The Dow Jones communications index lost 86% of its value, the wireless index lost 89%. The NASDAQ quickly gave back all of the gains.

The crash affected every aspect of the industry. My consulting firm is a good example. CCG Consulting was founded in 1997, directly in response to the 1996 Act. Our original business plan was to help CLECs get started along with helping carriers open new markets. We got lucky in that we leveraged our familiarity with the small telco market to help telephone companies and other small CLECs expand into nearby markets. We helped only a few of the high-flying CLECs and no client was more than 5% of our business. At the peak of the market, there were probably 100 consulting firms that had hung out a shingle since 1996, including a few that went public along with their CLEC clients. When the market crashed, our firm had to downsize, but we survived and only a tiny handful of consultants made it through the 2000 crash.

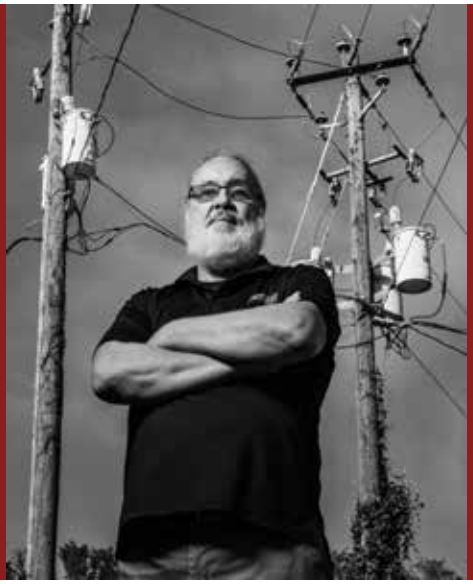
There was some good news that came out of the telecom boom. Numerous companies built middle-mile fiber routes during the expansion years, and at the time of the crash, the fiber routes between Washington DC and New York City were only at about a 2% utilization. The excess fiber went on to sustain the broadband growth for the next two decades and has just recently started to show signs of saturation.

"The magnitude of the dot-com and CLEC craze was mind-boggling. From 1995 until March 2000 the NASDAQ grew over 400% in total valuation, fueled mostly by these two industries."

But there were many negative impacts of the telecom crash. Probably the worst outcome, other than the failure of multiple CLECs, was that the big telcos regained control of the industry. The marketing battle between cable modems and DSL started in earnest around 2000. It became quickly apparent that cable technology was going to win the speed battle, and we've seen a migration of DSL customers to cable companies ever since.

Instead of dozens of hungry CLECs to compete against the cable companies, the market saw predictable competition from the telcos. The idea of real local competition didn't resurface until a decade later when Google Fiber and a handful of municipalities began competing with fiber against the duopoly providers.

Anybody that was in the industry at the time of the crash remembers the sense of doom that hung over the industry. It seems that there were negative headlines almost every day for several years after March 2000. Companies failed or declared bankruptcy. Vendors folded or were forced to merge to keep afloat. The big telcos crowed about their victory over the CLECs and began tightening the noose and restricting the ability to compete for the CLECs that somehow made it through the crash. Since then, cable technology has won the broadband battle. I think, however, that the next cycle of competition has begun and we've reached the inflection point where fiber networks will start winning customers back from cable providers.



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

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

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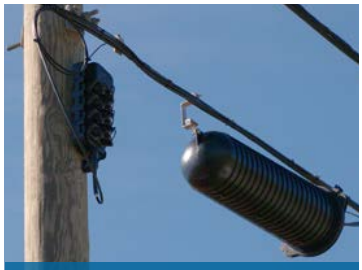

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Walker Bids Farewell To Its Legendary Co-Founder and Matriarch, Virginia Walker

By Randy Turner
Director, Marketing Communications
Walker and Associates

Virginia Walker was always a fixture in the company she and her late husband, Chris Walker, co-founded in 1970. During its earliest days, she managed all back office tasks while he traveled on sales calls. His direct work with customers generated plenty of work for her, ranging from managing orders, handling customer service calls (both inbound and outbound), ensuring delivery of product, bookkeeping, and more. And, she was managing a household that included four young children! They each learned to take on helpful roles as well, doing filing, keeping the office tidy, and learning what it meant to have a family owned business.

Following Chris's death in late 2000, Virginia assumed the mantle of CEO, leading the company through its darkest days as the telecom industry reeled from the dot-com bubble burst, industry scandals, the tumult following 9/11, and emergence of new technologies that ushered in dramatic changes. Typical of her nature, she jumped right into the work at hand, made sure associates knew they had the support and resources needed to be successful, attended industry events, communicated with the company about progress and strategies, and connected with the supplier base to demonstrate steadiness at the helm. Her younger son, Mark Walker had already assumed the role of company president, and his siblings, Rick, Laura, and Chrystie remained involved as Virginia kept the course to see the company return to stability alongside the industry.

In 2009, under Virginia's leadership as CEO, the company acquired the non-affiliate operating assets of Windstream Supply, scoring not only increased marketshare in the company's selected markets, but by also onboarding valuable talent. Virginia and Chris had built the company on the belief that associates were a cornerstone of success, and that the method of putting the right people in the right places always led to successful customer outcomes. This represented an additional opportunity to connect talent with business objectives as these new associates rolled into the Walker family.

It was only in 2014, when the company reached its 44th year of business, that Virginia made the decision to pass the leadership torch to her youngest daughter, Chrystie Walker Brown. Virginia turned 88 that year! Even in retirement, she kept in touch with the business, its associates, and company business partners. Until the end, she remained a vital part of the Walker and Associates story.

In December, 2020, the Fiber Broadband Association honored Virginia with their annual Chairman's Award. This award celebrates the outstanding contributions of individuals in the industry who have advanced the fiber-to-the-home (FTTH) industry. Katie Espeseth, Vice President of New Products, EPB and Fiber Broadband Association Board Chair stated "Virginia's leadership and determination are an inspiration to all women, and it was my pleasure to honor her at this forum."

The company came together Monday, June 15, to celebrate her memory, joined by Virginia's children and grandchildren. It was a beautiful tribute and a special time of reflection. Current and past associates paid tribute to her leadership, her kindness and her legacy. She will always be remembered for her contributions, but she will be most revered for the quality of life she lived.

In her comments, Chrystie Brown quoted poet May Angelou as a testament of her mother's commitment to honoring those with whom she came in contact: "I've learned that people will forget what you said, people will forget what you did, but people will never forget how you made them feel." Her son, Mark Walker, described his mother as "an oasis of peace."

"Virginia's leadership and determination are an inspiration to all women, and it was my pleasure to honor her . . . "

Virginia's selflessness over the years, her easy connection with people, and her strength of character carried her well throughout her 94 years. Even to the end, she had a genuine way of prioritizing others above herself. Her gifts of goodness and grace will be remembered by family, friends, associates, business partners, caregivers, and anyone blessed to have been a beneficiary of her deep-rooted belief that dignity is a gift we all have the power to bestow on others.

A memorial video is available at https://www.youtube.com/watch?v=mJGc7501IWM&t=21s

In lieu of flowers, memorials may be directed to Trellis Supportive Care, 101 Hospice Lane, Winston-Salem, NC 27103.

Q&A with Mignon Clyburn: On How the 1996 Telecom Act Unleashed a New Era of Competition

Former FCC Commissioner Mignon Clyburn has had a long history as a champion of telecom competition. During her FCC tenure, she was a proponent of key broadband measures, such as net neutrality, pole attachment reform, municipal broadband and telehealth. Along with INCOMPAS CEO Chip Pickering, a former Republican member of Congress from Mississippi, Clyburn now leads the INCOMPAS BroadLand campaign, focused on making "internet for all" a reality for millions of American families and small businesses, rural and urban, that lack competitive broadband alternatives that bring faster speeds and lower prices.

While the BroadLand campaign is new, its genesis can be traced to the landmark 1996 Telecom Act, which celebrated its 25th anniversary earlier this year. Clyburn reflected on how the 1996 Telecom Act provided a template to enable competition and new innovations.

Broadband Communities had the opportunity to speak with Clyburn shortly after INCOMPAS announced the formation of the BroadLand initiative. Following are highlights of the conversation.

Broadband Communities: The Telecommunications Act of 1996 became law in February 1996. Now that we reached the 25th anniversary earlier this year, what has it meant for the communications industry? And what are lessons from the last 25 years that can inform the next generation?

Mignon Clyburn: When you talk about the significance of this silver anniversary, I would sum it up in one word: competition. It made competition the law. It has kept a promise to consumers and businesses that there will be more choices going forward, better customer service, lower prices and access to innovation. The Telecom Act of 1996 codified the commitment to lead the world in network growth to give consumers an overall better experience.

Let's look at what has happened. Look at what the mobile broadband space has done. It has opened the doors of opportunity. This includes everything from my nine-year-old niece, who can recite half the songs on TikTok, to how I embarrassed my father, James Clyburn (House Majority Whip (D-S.C.), via social media when I uploaded him in front of a barbeque grill. He is not known for grilling.

If you think about what the world looked like 25 years ago, a lot of these things were not possible. The Telecom Act has opened incredible windows of opportunity for big players, but also for smaller players who are now big players. When we think about the big names we knew back then, they were household words. But I didn't post the video of my dad grilling on any of those players' platforms. That video now has 80,000 views. I use that homegrown example to show that the baton has been passed to other players. It has enabled access to other opportunities and access to new information.

We now have access to people, no matter where they are or whether they have the same or similar platforms and connections. This is a U.S. milestone, but we can't ignore that the Telecom Act recalibrated what the world that knows today. The Telecom Act had international ramifications that we're continuing to build upon and continuing to modify in ways to make sure the opportunities before us are more widespread and more ubiquitous. Though it has opened some doors, there are some doors still stuck in some parts of this country. We're forced in real time to reflect and say, "Did this do exactly what we wanted it to do?" The answer is yes, but then there's a "but" behind that. This is why INCOMPAS embarked on the BroadLand initiative.

BBC: Did the Telecom Act drive new competitors in the telecom market? What could have been done better?

MC: It's always easy to ask that question. I always say bills are snapshots in time. People look at lawmakers as if they're genies and they are not. They look at laws as if they are all powerful and they are not. Hindsight is 20/20. There are some players that might say that they would have loved a few more guardrails here and there. Just looking through today's lens, there are local leaders and entrepreneurs who say they want more protections here or there. Also, I would say that The Telecom Act in and of itself was very enabling. It did not assume that this would be a one-size-fits-all experience by way of technology or by way of community interest. There still are tremendous opportunities for us to tailor via regulatory next steps, public-private partnership (P3) opportunities, and community empowerment.

If you were to force me to say one word about the Telecom Act other than competition, I would say: unleash. It unleashed boundless opportunities. It allowed and enabled us to face several challenges. I think if you were to look at that scale, it has done way more positive by enabling next steps. We would have not had conversations about broadband or the digital divide if it wasn't for this legislation. There are very few perfects. I am sure there are some, but the 1996 Telecom Act has enabled us to be our better selves and have access to better opportunities. It is a valid question, but I think the mystery behind it all is the challenge and opportunity.

BBC: One of the key provisions of the act was the E-Rate program. Though E-Rate offers funding to bring connectivity to schools, students still struggle with little or no connectivity at home. What can be done to help bridge the homework gap?

MC: No one is going to fix it all. E-Rate, the Emergency Connectivity Fund (ECF) and other reforms that we have seen since the Telecom Act at the FCC have paved a way for us to learn more and see the benefits of investing more. Just think about if we did not launch the Telecom Act of 1996, would we have seen and planted those seeds of more opportuni-

"We would have not had conversations about broadband or the digital divide if it wasn't for this legislation. There are very few perfects. I am sure there are some, but the 1996 Telecom Act has enabled us to be our better selves and have access to better opportunities."

ties via these programs? Would we have been at the point where we could say, 'Look at what's worked and what we still need?' I don't think there would not have been an Emergency Connectivity Fund, or at least not in its current form if we did not set up a template when it comes to that.

Snapshots in time are good and allow us to plant the seeds of possibility and to keep building. Regardless of who came up with the phrase "Build Back Better," it is a motivational North Star not because of the politics, but because of the opportunities and the potential. It recognizes that the foundation was a solid one.

We need to meet the needs of children and seniors – we're talking about continual learners and people who need continual access to health care. Also, there's a need for businesses to be able to apply for funding online. We're building from the Telecom Act and hopefully subsequent acts and subsequent programs will continually do it better. I give credit to the George H.W. Bush administration's "Points of Light" concept. When we speak about what the times call for, I think the '96 Act was an incredible opportunity for us to see what's possible through legislation, recognizing that businesses are organic partners. At the end of the day, it's about improving subsequent generations in terms of access to opportunities.

BBC: Are there incentives the FCC could provide to help providers extend services to homes to support a hybrid or all-remote learning environment?

MC: One of the things you are seeing and hearing is that no two communities are the same. Communities have different needs and the ability to have tailored solutions is critical. Though we need to write a prescription, we must always know that what I need in the not-so-affluent community in Columbia, South Carolina, is not what's needed 20 miles up the road in the same county, where there are even more significant challenges. The things that I need here are not the same, nor are they the same as what's needed in Los Angeles, for example.

What we are seeing now is an emphasis on empowering, enabling and encouraging public-private partnerships. What we do know is that no matter what the funding apparatus is or what is budgeted, we're not going to be able to fix it all through an appropriation model. We're not going to be able to identify it all from Washington, D.C., so these local leadership partnerships are important.

We see it in Los Angeles, which is working with Microsoft and Starry, to look at what's going with low-income housing units.

We talk about broadband for all. We all recognize that broadband not only fuels opportunities by way of providing more access for children, but also for seniors. Thinking about my twilight years, this is empowering for me.

The 1996 Telecom Act will continue to be the compass in terms of competition, partnerships and opportunities. There are too many places in South Carolina that lack sufficient broadband. I have been to these communities. When I first got on the FCC, I could not come home without someone telling me, 'We need broadband.' Too many people don't have access because affordability is an issue. We can't ignore that.

The "build it, they will come" mentality must be accompanied with the other barriers to access. We must build networks efficiently, but providing access to the infrastructure via affordable platforms and services is important, too. We have a chance to right the wrongs of the past and an opportunity to build a better future. That is what is I am seeing. I have never been more positive about the series of next steps in my 19 years of regulatory experience. We're not debating the basics. That's why I remain positive and why I am part of the BroadLand campaign.

BBC: You mentioned public-private partnerships (P3s). While there are various methods to structure those between provider and community, how could P3s get broadband into more households and businesses?

MC: Public and private partnerships are drawing attention to areas that have been attempting to heal themselves. When I talk about different positions being off the table, it has enabled all of us to see more potential and do things together. I think there were some businesses that wanted to serve – including members of INCOMPAS – but there were barriers in place.

There are communities that want to do more things, but there were real or perceived barriers in place. With all of us having our lenses either recalibrated or adjusted, I think you're going to see more P3s. The reason is because there are members, such as those in INCOMPAS, that have the expertise and the wherewithal, but they need more of the other element to make it to scale, affordable and accessible.

Because of what we're seeing in Congress and because of what was birthed through the Telecom Act, more of us see that we can do this in a collaborative way and do it more efficiently, quickly and less expensively. There will be a growth of P3s in ways and forms that we did not see before. That's another reason why I am so positive working on the INCOMPAS BroadLand initiative.

Two to three years ago, the support for P3s was not there. Now we're having fewer arguments about what communities need. I am not going to argue over what speed is what, but I know that it's not sufficient. If grandma is talking to her medical provider, a third grader is doing homework and a parent is attempting to reskill, that's a lot of bandwidth demand in that home that – especially if they are income-challenged – they don't have. Finally, we're seeing how we can get the speeds and infrastructure that household needs.

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Sacred Wind Communications: Delivering on the Promises 25 Years Later

By John Badal
CEO
Sacred Wind Communications

Sacred Wind Communications, Inc. is one of the newest Rural Local Exchange Carriers (RLEC) in the country, founded in 2006, and one of around 2,500 Internet providers doing business in the U.S. Operating a regulated phone company while providing unregulated (of sorts) broadband service through an affiliate has been a privilege while a feat not meant for those adverse to change. Using an interwoven mix of fiber, copper and fixed wireless systems atop an IP platform, the company was able to extend voice and broadband service to over 3,000 square miles of Navajo tribal lands in New Mexico that were virtually unserved. Such are the benefits of operating a diversified and scalable network, its customers found Sacred Wind ready for the Covid-19 pandemic, and tribal and local governmental jurisdictions outside of its operating territory are currently seeking its counsel.

On the 25th anniversary of the passage of the Telecommunications Act of 1996, one might ask whether the impact of the Covid-19 pandemic on the world would have been worse without the Act. Or, for that matter, would the medical remedies for the virus have been discovered so quickly without the information and communications infrastructures that were enabled by the Act? But, before those members of the 1995-1996 Congress take credit for the world's quick response to the pandemic, let's look back at the telecommunications landscape of those times.

The Internet, originally a creation of the Defense Advanced Research Projects Agency (DARPA), would have remained an interesting laboratory experiment between universities without the nearly ubiquitous fiber routes that had been awaiting the World Wide Web. The accelerated growth of fiber in the U.S. was a direct result of the competition for long distance markets led by MCI and Sprint against the AT&T monopoly. From a rural telecommunications company's perspective, that competition, leading to the breakup of Ma Bell, and culminating in the Telecommunications Act of 1996, blew the doors off of business as usual. Not that there was any mention of RLECs or any kind of a road map toward rural information services in the Act. On the contrary, entire sections of the Act were dedicated to the Bell companies' leasing of unbundled network elements in competitive markets and entry into manufacturing, creation of eligible telecommunications carriers, and provisions to stimulate competition. There are essentially only two components in the Act that signaled to the RLECs safeguards or even growth for rural carriers: the first, an assurance that the principle of Universal Service would be maintained[1], and the second, a mandate that advanced services and pricing should be comparable in rural areas to those of urban areas.[2]

Unfortunately for many rural customers, there was no indication in the Act of how they were to receive comparable access to advanced services at comparable rates. Rural areas, especially those of the Bell Operating Companies, just had to wait as competition and new services exploded in the late 1990s, benefitting large and medium sized markets. In hindsight, our policymakers should have constructed a better path to comparable service access in rural areas by creating financial incentives to have RLECs acquire neighboring unserved rural areas. By way of USDA low interest loans, FCC Universal Service Fund support, and a special dedication to properly serve their rural communities the RLECs knew how to reach underserved areas. But, outside the Act and concurrent with the larger market dynamics stimulated by the Act, the FCC had begun to freeze the creation of new "study areas", which disincentivized the very rural service problem solvers (the RLECs) from providing their network solutions to areas beyond their own service territories.

Change came to rural areas, therefore, more as an indirect than a direct consequence of the Act, driven by the very technological advancements in our industry that spurred the breakup of

[1] Section 254.(b).(4) "EQUITABLE AND NONDISCRIMINATORY CONTRIBUTIONS.—All providers of telecommunications services should make an equitable and nondiscriminatory contribution to the preservation and advancement of universal service."

[2] Section 254.(b).(3) "Consumers in all regions of the Nation, including low-income consumers and those in rural, insular, and high cost areas, should have access to telecommunications and information services, including interexchange services and advanced telecommunications and information services, that are reasonably comparable to those services provided in urban areas and that are available at rates that are reasonably comparable to rates charged for similar services in urban areas."

AT&T, that mandated equitable ratemaking in rural areas (which was structurally incongruent for the Bell Companies), and then was further aggravated by the FCC's adoption of new Universal Service Funding (USF) mechanisms intended to promote competition. For example, mobile wireless telephony, exploding at first as a supplemental, not replacement, service in the 1980s, spread slowly in rural areas, but the impact of the FCC's inclusion of mobile service in its USF funding programs began to change the math behind the rural carriers' financial model. It wasn't long before mobility, followed soon after by the thing called the Internet, upended traditional consumer behavior and the entire telecommunications and information industries. In some areas, including many tribal lands in the U.S., though, change didn't arrive.
In the face of the inadequacy of technologically-driven opportunity in the more remote rural areas of New Mexico, Sacred Wind Communications was created, but only after months of discussions and negotiations with carriers responsible for underserved areas in the state, followed by a two-year state regulatory process, and a, thankfully, shorter FCC proceeding involving waiver petitions from FCC rules that discouraged such new acquisitions of underserved exchanges.

"With less than thirty percent of Navajo households accessible to even voice services Sacred Wind had to build an entirely new infrastructure and one designed for Internet capacity carried over one of the largest fiber to fixed wireless networks in the country."

With less than thirty percent of Navajo households accessible to even voice services Sacred Wind had to build an entirely new infrastructure and one designed for Internet capacity carried over one of the largest fiber to fixed wireless networks in the country. Sacred Wind's network was designed to be expandable and scalable, configured for continued microwave expansion to reach additional unserved areas and supported by high capacity fiber routes to ensure compliance with ever increasing customer demand and FCC requirements. It was that design that enabled the company to answer a new demand for service in March, 2020. The superintendents of three separate school districts contacted Sacred Wind with requests for service for hundreds of students' homes in northwest New Mexico lacking broadband service. Over the next several months the schools and Sacred Wind formed a collaboration unlike any experienced by a traditional telecom company, sharing and comparing network maps with student locations, planning WiFi hotspots and temporary tower installations, and drafting distance learning grant applications.

It is that expandable design that has enabled Sacred Wind to successfully bid for unserved areas in two FCC auctions and to reach other parts of New Mexico using a combination of USDA, state and company resources. The innovative company continues to be at the center of broadband development discussions at the state legislature and among executive offices as New Mexico has recently established a broadband office and is working to develop a three-year plan to cover the entire state.
At 25 years, the Telecommunications Act is more than a bit geriatric. Technology continues to make it so. The advanced information services referenced in the Act are known today by other names and are seen in different forms. 5G wireless,

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Mr. Badal is a co-founder of Sacred Wind Communications and is the CEO and Chairman of the Board. He served as President for Qwest Communications in New Mexico from August 2000 to October 2004. He left Qwest specifically to resolve the "IT Divide" issues facing the Navajo reservation and other tribal areas. Sacred Wind Communications has been in existence for over thirteen years, and has received four awards: in 2007, the NM Internet Professionals Association's Industry Innovation Award; in 2009, it was voted in a national American Express/NBC Universal "Shine A Light" contest "The Most Inspiring Small Business in America;" in 2012, the New Mexico Excellence Award; and in 2016, the Best Telecommunications Consulting Business in Albuquerque.

Prior to his employment with Qwest he was a regional director of governmental affairs for AT&T until his retirement in 1998, when he began a consulting business, Border States Policy Group. His company helped develop telecommunications policy for governmental jurisdictions in New Mexico and Arizona and specialized in promoting and designing wireless broadband systems for rural areas.

He received his undergraduate and Master's degrees from Temple University, Philadelphia and conducted doctoral research under a Fulbright Grant in Peru from 1974-75. He speaks 3 languages fluently and is somewhat conversant in Quechua and French, and is learning Navajo.

He served in the U.S. Army's 8th Special Forces Group in Panama, trained in radio communications and combat engineering. He is married and has four children and four grandchildren.

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Rural Electric Cooperatives: Axis of Community Development

By Juniper Networks

Electric co-ops, which are member-owned, were established in the 1930s to provide electricity to rural America. In the last few years, co-ops have addressed a modern utilitarian need—fast, affordable Internet. Indeed, a variety of challenges face today's rural electric cooperative. First, many have a grid network that's underpowered for advanced applications and security to meet current demands.

Additionally, in many small communities, broadband is unavailable, underserved, or else oversold. It can be difficult for electric cooperatives to make the right decision about adding this kind of service due to expense and uncertainty. That uncertainty is made more complicated since membership may be shrinking or lacking required services. Rural electric cooperatives are often managing multiple networks, which increase complexity of modernization projects, coupled with security concerns. And finally most lack a clear path forward with no path to AI and automation.

Remedying these challenges is no small task, yet it is possible. Creating one network, engineered for simplicity and AI-Driven automation that enables any application or service begins with planning for a common platform for:

1. IT Business: AMI, Finance, Engineering, HR, etc.
2. OT Operations: SCADA, DER, Fault Detection, etc.
3. IIoT Future: Grid Sensors, IEDs, etc.
4. Smart Community Broadband

When modernizing their networks, electric co-ops and ISPs face a fork-in-the-road decision whether to build a flat Layer 2 network or a distributed Layer 3 network. A Layer 2 network offers the short-term appeal of ease, but as traffic grows, there are often scalability issues.

A smart community network delivers significant advantages. Jackson Electric, for example, a rural electric cooperative in Matagorda Bay, Texas, known for its miles of Gulf Coast beaches and fresh oysters, blue crab, and shrimp, stepped up to challenges presented in 2020 by the Covid-19 Pandemic. At its foundation, a Layer 3 architecture simultaneously accommodates advanced metering infrastructure (AMI) to support its electric business as well as Internet traffic. With a Layer 3 architecture, member-to-member Internet traffic stays in the local domain, rather than being hauled to the core network and back to the member, as would be necessary in a flat network. This delivers a better user experience and reduces unnecessary traffic on the backbone.

Smart Community Broadband means member-to-member communications for advanced community services and extending internet to multitenant facilities and public venues with AI-Driven Wi-Fi. Examples include Students to Schools, Clinics to Patients, Public Safety to Schools, B2B, Parks, Apartments, Docks, Member Internet - FTTH And Private LTE/5G.

Learn more about Juniper's solutions for rural electric cooperatives and the Jackson Electric success story at https://www.juniper.net/content/dam/www/assets/case-studies/us/en/jackson-electric-cooperative.pdf.

WISPs Prove Telecommunications Act of 1996 Worked

By WISPA Staff

Spoiler alert: The Telecommunications Act of 1996 worked.

How could it fail when its framers created it "to provide for a pro-competitive, de-regulatory national policy framework designed to accelerate rapidly private sector deployment of advanced telecommunications and information technologies and services to all Americans by opening all telecommunications markets to competition"?

25 years later, the deregulatory arc since the days of Carterfone, Hush-A-Phone, MCI and the breakup of Ma Bell continues through the '96 Act's deregulatory push. It opened up locked-down, local communications monopolies so that nascent or underdog competition could gain entry and, with the advance of technology, provide solutions that were missing in the marketplace.

Its roots might surprise some of this publication's younger readers. The '96 Act came about as the internet newly came online for the average American. Though Congress was in the hands of Republicans, it was crafted in true bi-partisan fashion, overwhelmingly passed by both chambers (with only 21 "No" votes), and then signed by President Bill Clinton on February 8th, 1996.

The internet never looked back. While the local loop was being forced apart by the law's open access requirements, almost from the get-go policymakers worked to cabin-off the internet from traditional telephone regulation. As former FCC Chairman Bill Kennard noted, "[It] is not good for America" to "just pick up this whole morass of [telephone] regulation and dump it wholesale on the [Internet] pipe."

"The deregulatory focus of the '96 Act promoted this innovation, which is bridging digital divides throughout our nation. "

From this idea, "light touch" regulation was born. FCC rulemaking and Supreme Court precedent would subsequently ensure that internet access would avoid (for the most part) being regulated as a Title II telephone service.

What is light touch regulation for the internet? Well, it's:

- Section 230 of the '96 Act, which calls on policymakers to "preserve the vibrant and competitive free market that presently exists for the Internet and other interactive computer services, unfettered by Federal or State regulation."
- A preference for facilities-based competition.
- A bias that markets, aided by the advance of technology, are oftentimes better at meeting the needs of consumers than restrictive rules and regulations.
- And, the avoidance of picking winners and losers by promoting technological and competitive neutrality.

The FCC applied that framework in many areas. Perhaps the most successful application has been allocating increasing amounts of spectrum for unlicensed use. When the Commission first made the 2.4 and 5 GHz bands available for unlicensed use under the FCC's "Part 15" rules in 1985, few could have anticipated the explosion in innovation that followed. As a consequence of the FCC's light touch approach, these bands have become the focal points for wireless standards—such as WiFi and Bluetooth—that enable seamless communication between countless devices, driving hundreds-of-billions of dollars of consumer welfare and economic activity yearly.

Wireless internet service providers (WISPs) have taken tremendous advantage of this framework over the past two decades, too. They are entrepreneurs who run thousands of fixed wireless companies, quickly and flexibly deploying unlicensed use spectrum in our country's hardest to reach markets, serving millions of Americans with ever-evolving, high-speed internet access. The deregulatory focus of the '96 Act promoted

"FCC rulemaking and Supreme Court precedent would subsequently ensure that internet access would avoid (for the most part) being regulated as a Title II telephone service."

this innovation, which is bridging digital divides throughout our nation.

The benefits of light touch regulation cannot be overstated. Eschewing utility-style regulations keeps compliance costs low, which is especially important for small innovators. WISPs convert these savings to connectivity for hard-to-reach areas through investment in upgraded facilities and deployment of new infrastructure, including fiber. It incentivizes broadband providers to take risk and innovate with different models and approaches to reflect the evolving needs and desires of their customer base.

The 5.9GHz band is a great, current example of how that flexibility can work. WISPs played a leading role in keeping Americans online during the pandemic. As stay-at-home orders increased the demands on all networks, WISPs worked with the FCC via the Special Temporary Authority (STA) process to use 45-megahertz of the 5.9 GHz band to deliver added capacity and new broadband connectivity to rural Americans. With the FCC's STA grants, virtually overnight WISPs established new connectivity while also protecting federal operations and incumbent licensees. If the FCC had employed heavy-handed utility regulation to WISPs, this new broadband connectivity might have never happened.

Even without the FCC's 5.9 GHz grants, the light regulatory approach continues to help WISPs grow: By 2025, industry stats show that WISPs will serve approximately 13 million Americans with high-speed internet, up from 7 million today. Put simply – their existence in the marketplace could not have occurred if they were considered a typical telephone company. Without them, millions more of Americans would be in the digital divide.

Unfortunately, this good news and growth is not foreordained.

Last decade saw a flirtation by the FCC with a return to utility regulation, as it briefly imposed Title II rules on ISPs, including WISPs. With the recent shift in Administration, many industry observers believe lawmakers and policymakers might revert to a Title II mindset, cutting against the spirit and letter of the '96 Act. This would result in regulating WISPs as classic utilities, potentially mandating rates, services, where they must serve and other aspects of their businesses to make sure all Americans can get and stay online.

Its effect would be devastating, however. In short, it would move WISPs and other ISPs away from the 50-year arc of deregulation which has pumped trillions of dollars into our networks. In doing so, it would thwart private investment, innovation, competition and ubiquitous deployment of broadband facilities. Consumers would be harmed as a result, especially those without access to broadband or the ability to afford it.

This should be strenuously avoided.

More Americans have more types of connectivity than at any time in our nation's history. The '96 Act brought that about. Further, where the digital divide exists (a number which becomes smaller with each passing month), the '96 Act has the tools to narrowly, cost effectively and robustly meet that challenge through such Section 254 Universal Service programs as CAFII, RDOF and the ECF, among others.

We remain optimistic that, even in light of some legislative and policy activity which appears to veer away from the guidance of the '96 Act, policymakers will hold true to the Act's central tech-neutral, pro-competitive tenets. The '96 Act was built to evolve and move with the needs of the marketplace. WISPs are doing their part to further its success.

If there was a wish list to improve the implementation of the '96 Act, we might ask for modest policy outcomes, not wholesale changes to the law, to occur. These could include:

- Providing more spectrum for small fixed wireless innovators to quickly and cost effectively expand coverage.
- Developing accurately mapped, targeted subsidy programs that are tech-neutral and which leverage providers already in the marketplace.
- And, ensuring nondiscriminatory access to physical infrastructure for small broadband providers.

The '96 Act was a success. It still is. The WISP industry's growing and evolving service in the digital divide proves this point 24/7/365.

ABOUT WISPA

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

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A Service Provider's Guide to the Three Changes in Wi-Fi

By Charles Cheevers
Chief Technology Officer, Home Network Solutions
CommScope

Service providers will be able to take advantage of three changes in Wi-Fi technology over the next three years. These important technology milestones in Wi-Fi will be introduced in quick succession:

- The availability of Wi-Fi 6 access points and clients
- The imminent availability of 6 GHz spectrum around the world and the emerging Wi-Fi 6E devices supporting it
- The finalization of Wi-Fi 7's operating features

This is a lot for any service provider to absorb into its road map, particularly as many providers have yet to deploy Wi-Fi 6 solutions. An important step for providers is deciding how to reconcile access point and client availability in the context of new Wi-Fi technology applications over the next three years. There will also be new dynamics at play – much as there were when 802.11n introduced new 5 GHz spectrum support and the killer application was supporting IP video streaming, which still makes up more than 80 percent of all home traffic.

Wi-Fi 6

Let's start with what's available today: Wi-Fi 6 gateways, access points and extenders. Wi-Fi 6 has been in retail for more than a year. When these access points replace previous generation Wi-Fi 5 technology, the overall performance of Wi-Fi in a home with numerous client devices (Wi-Fi 4/5/6) increases in both throughput and range. This can be attributed to many factors, including better Wi-Fi access-point designs, improvements in front-end module power amplifiers and low-noise amplifiers (i.e., better receiver sensitivity) and more efficient use of a Wi-Fi physical layer in mixed Wi-Fi environments. This performance improvement for mature applications, such as access points, meshing solutions and clients – such as IP set-tops using Wi-Fi 6 – make it the obvious choice for service providers launching new devices in 2021 to give consumers overall better home connectivity.

Wi-Fi 6E

Wi-Fi 6E is one of the most significant improvements to Wi-Fi in years, with its addition of 6 GHz spectrum. The big question is how to get it to consumers. Besides offering much needed breathing room for traffic on the 2.4 GHz and 5 GHz bands, Wi-Fi 6E provides better quality of service for users and supports new low-latency, high-speed and "bookended" services. In bookended services, the access point and the client can be deployed together on 6 GHz channels to provide congestion-free 4K and 8K video over Wi-Fi 6 GHz – even in congested 5 GHz environments. The magic of Wi-Fi 6E and 6 GHz is that only Wi-Fi 6E–capable devices can use this new spectrum, so its use accelerates the adoption of the new Wi-Fi 6E efficiency features and provides an immediate benefit to new high-speed, congestion-affected and low-latency services.

But Wi-Fi 6E comes with a unique set of hurdles:

- Regulators in each country must approve making either 1.2 GHz or 500 MHz of spectrum available to unlicensed use for Wi-Fi.
- Regulators must decide on the power levels for mobile, indoor and outdoor use of 6 GHz Wi-Fi.
- There is new complexity surrounding the introduction of tri-band 2.4 GHz, 5 GHz and new 6 GHz radios.

Wi-Fi 6E is a service provider solution that will deploy in 2022 in most countries. But even the countries that already have created the necessary regulatory agreements for 6 GHz – such as the United States, South Korea, Chile, India and the United Kingdom – will require some time to see service providers deploy 6 GHz solutions. The primary considerations for service providers include:

- What is the consumer value in this new Wi-Fi 6E solution?
- How will this value manifest itself in a service offering?
- What services can be offered in advance of general consumer electronic client churn to new 6E solutions?

Whoever can first take advantage of the almost 66 Gbps capacity in 1.2 GHz of spectrum with some key use cases and features will be well positioned to win consumers. In the case of the service provider, the key elements will be formed from the following:

- Introduction of additional tri-band Wi-Fi 6E–capable devices (beyond dual-band Wi-Fi 6 devices): There will be overlap between the deployment of Wi-Fi 6 dual-band and Wi-Fi 6 tri-band devices for several years as consumers move steadily to higher-capacity and lower-latency Wi-Fi connection needs.
- Introduction of new service provider–driven wireless home connectivity networks: These will drive the onboarding of new Wi-Fi 6E–capable clients and higher performance levels, extending the access network into the home through 6 GHz Wi-Fi and creating the determinism to the end client that only scheduled OFDMA-based Wi-Fi 6E can deliver. In other words, 6 GHz channels and Wi-Fi 6E allow the ability to schedule transmissions from 6 GHz–capable clients so they don't collide and can be received at a "deterministic" agreed time value. Today's Wi-Fi access point equipment has somewhat best effort – versus guaranteed – bandwidth. The advent of 6 GHz and scheduled Wi-Fi capabilities in Wi-Fi 6 can offer a guarantee – or determinism – of packet delivery. This, for example, enables gamers to be offered guaranteed performance levels on a 6 GHz Wi-Fi channel. It also enables more-effective support for new latency-sensitive applications, such as cloud gaming over Wi-Fi.
- Introduction of key service provider bookended device solutions:
  - » Wi-Fi 6E–based mesh solution: Use Wi-Fi 6E to guarantee backhaul capacity and maximize the potential of 5 GHz for LAN connect only. At the same time, use the 6 GHz backhaul capacity to also directly attach to sparse 6E clients as they emerge gradually in the home. Though 6E clients will start replacing Wi-Fi 6 rapidly,

Cont'd on page 43

Cullman Electric Powers Gigabit Broadband Speeds to Rural Alabama Using 100G Middle Mile Aggregation

A Case Study
By Ciena

RURAL BROADBAND IN THE UNITED STATES

Historically, high-quality broadband has been limited in rural areas because it is difficult for incumbent providers to build a business case for deployment where populations are sparse.

Cullman Electric was one of the first cooperatives to be formed in the state—second out of a total of 22 co-ops—and was the first to provide electricity to its members.

Now, 85 years later, Cullman is paving another path—launching the Sprout Fiber Internet broadband service to its customers.

CHALLENGES AT A GLANCE

- Aging OT network in need of modernization
- Insufficient capacity to add broadband traffic
- Aggregation of OT and broadband traffic
- Prioritization for OT traffic
- Integration with last-mile FTTH

In fact, about 10 percent of U.S. households—mostly in rural communities—do not have broadband service, defined as 25 Mb/s or greater. Yet people living in rural communities work from home; they shop, consume entertainment, and access advanced education services and critical healthcare data online. The COVID-19 pandemic has only accelerated these trends—elevating high-speed, reliable broadband from an optional service to an essential one—just like water or electricity.

When rural communities lacked access to electricity in the 1930s, co-ops like Cullman Electric filled the gap. Now, they have a similar gap to fill in delivering essential broadband connectivity to their communities. Access to fiber internet opens up opportunities for rural communities in education, healthcare, economic development, entertainment, and much more. It also helps electric co-ops utilize the latest smart grid technology to improve the quality and reliability of their electric service.

CULLMAN ELECTRIC'S APPROACH

Cullman Electric recognized that the lack of broadband connectivity was having a negative impact on the residents in its service area, preventing them from enjoying the many benefits of modern technology—including telecommuting, streaming video services, and smart home appliances. It was also having a broader economic impact, deterring new businesses and industries from expanding or relocating into the region. Given its founding principles to support and empower members' rural communities, the co-op wanted to help.

Cullman Electric knew it would need much more capacity to deliver high-speed fiber internet to its residents. The rapid surge in demand due to COVID-19 resulted in significant overall broadband traffic growth—38 percent* in less than three months. When employed adults shifted to work from home and students in schools, colleges, and universities moved to online learning, traffic dramatically increased. The use of video calling and conferencing applications, such as Zoom and Microsoft Teams, and the demand for cloud services contributed to the mounting pressure placed on the network.

Additionally, the phenomenon of consumers cutting broadcast cable packages in favor of streaming services such as Netflix and Hulu compounded the situation. As people began to access entertainment through these platforms, demand increased accordingly.
With these challenges in mind, Cullman Electric launched Sprout Fiber Internet, a Gigabit broadband service that brings Fiber to the Home (FTTH) of its rural members. To accomplish this, the co-op built a 100G fiber middle mile backbone between their electric substations to aggregate their electrical Operational Technology (OT) and their new broadband traffic using Ciena's 5171 Platform.

*Source: Sandvine Global Internet Phenomena – May 2020

KEY NETWORK CHALLENGES

As an electricity utility, Cullman Electric had legacy OT connectivity in place. Evolving to smart grid required a modernization plan, and the addition of broadband traffic required a modernization of its middle mile infrastructure.

With a plan to offer broadband customers 300 Mb/s or 1 Gb/s packages, and use its connections to their full potential, Cullman Electric needed to build a middle mile solution between its substations with the scalability to meet its customers' demands—regardless of the amount of Netflix streamed or Zoom calls attended. A 100G middle mile aggregation solution was the clear choice.

However, the challenge was bigger than just delivering higher data speeds. It was essential that the modernized network could continue to deliver secure, prioritized, and ultra-low delay connectivity for their mission-critical OT services. Cullman Electric needed a solution that enabled the aggregation of broadband and OT traffic onto a converged, modernized middle mile aggregation network with appropriate class of service differentiation between traffic types.

CIENA'S SOLUTION

With its 5171 Platform, which delivers best-in-class middle mile universal aggregation, Ciena enabled Cullman Electric to build a scalable 100G-200G middle mile backbone for its mission-critical OT traf-

Cullman Electric: Serving The Community Since 1936

Cullman Electric Cooperative serves 45,000 member accounts distributed over approximately 1,000 square miles of Northern Alabama, primarily in Cullman and Winston counties between Birmingham and Huntsville. The co-op was founded by local farmers to ensure rural residents were afforded the same services and opportunities as those living in urban areas. Its mission today has stayed true to its founding principles to support and empower member's communities—ensuring these rural communities have access to reliable and affordable energy products and services.

"It was essential that the modernized network could continue to deliver secure, prioritized, and ultra-low delay connectivity for their mission-critical OT services."

fic while aggregating its Gigabit Sprout Fiber Internet broadband traffic in a converged solution.

The 5171 can scale to enable Cullman electric to add broadband customers and increase bandwidth utilization per household. It can also segregate the co-op's mission critical OT traffic, ensuring OT traffic gets the highest priority to keep the lights on in Cullman and Winston counties.

Cullman Electric's 100G middle mile network means that Cullman's customers can have faith in the performance of their subscribed services and know that they have the bandwidth to satisfy all their streaming, work-from-home, remote education, smart home, and remote healthcare needs—well into the future.

Cullman also partnered with Walker & Associates which played a key role in integrating the end-to-end solution, including Ciena for the middle mile and a target 10G PON solution for the last mile

CIENA'S 5171 FOR 100G MIDDLE MILE AGGREGATION

The 5171 is a next-generation 100G packet-optical universal aggregation platform with enhanced Operations, Administration, and Maintenance (OAM) capabilities. Complete visibility and centralized software control of the network is provided by Ciena's Manage, Control and Plan (MCP) domain controller so that provisioning, monitoring and service assurance operations can be performed most efficiently. Utilizing WaveLogic™ 5, it allows DWDM to be used to build an advanced middle mile network with 100GbE packet aggregation. It is compact in size and temperature-hardened for the varied, remote, and often hostile environment in which substations must operate—making it ideal for serving rural substations.

The 5171 addresses the multi-service needs of utilities which wish to offer residential optical broadband (Passive Optical Network), high-bandwidth services to enterprises, and wholesale applications such as mobile backhaul, by delivering high-density 10GbE aggregation. It delivers the standards-based, predictable low-latency performance that is essential for OT applications, and provides reliable, instant failure detection for quick recovery and maximum availability.

CULLMAN ELECTRIC'S RESULTS

Cullman Electric now has the performance and scalability needed cross its entire 1,000 square mile service footprint and is poised to successfully roll out its Sprout Fiber Internet broadband service.

- Increased bandwidth speed to deliver a middle mile aggregation layer at 100G that has sufficient headroom for Cullman's residential customer applications
- Improved smartgrid performance delivered through field-proven, ultra-low latency packet WAN enabling optimal teleprotection performance
- Converged mission-critical smart grid and substation traffic along with broadband customer traffic via middle mile aggregation, while ensuring OT traffic gets the highest priority

SUMMARY

Ciena's middle mile aggregation solution addressed Cullman Electric's challenges to deliver scalable rural broadband internet services for its community.

The solution enabled Cullman to deliver its mission-critical smart grid and OT traffic while providing the scalability to support the broadband applications its members demand today and will require into the future. It enhanced bandwidth capacity, lowered latency, and prioritized teleprotection—and gave Cullman an efficient, streamlined, secure foundation for future services.

Learn more by downloading the full case study at https://walkerfirst.com/uploads/files/literature/CIE_Case-Study_Cullman_Electric_v1%20FINAL.pdf

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25 Years of Change

By Prayson Pate
SVP Solutions Marketing and CTO Edge Cloud
ADVA

The Telecommunications Act of 1996 was intended to break down barriers and spur competition. And we have seen just that, with open markets creating new services and industries. The cloud providers are now major players in communications. And the traditional telcos, having tried to expand into the cloud and content, are now pulling back. Here's a condensed view of what has happened over the last 25 years.

1995-2005: THE RISE OF THE INTERNET, VOIP AND MOBILE

It's hard to remember how different the world was back in this era. The internet was just getting started. And we had cell phones, but they weren't smart. What's more interesting is that we were laying the groundwork for later innovations. Specifically: the buildout of the internet, the growth of the radio access network, and the introduction of voice over IP (VoIP) in 1995. All of these were essential to the explosion that followed. As was Google, which went IPO in 2004. Anyone remember WebCrawler, Lycos, AltaVista, Excite, or Ask Jeeves? Or that Yahoo started as a search engine?

2006-2009: STREAMING VIDEO, SMART PHONES, AND SOCIAL MEDIA

The communications world started to look a lot more familiar in this era. First, we saw the beginning of streaming services with Amazon Prime Video and Netflix streaming. These would be followed by many others, altering the nature of entertainment and building the foundation for convergence of video and data. Social media is a great example of this, with Facebook and Twitter leading the way. And, of course, smartphones. The BlackBerry hit the market back in 1999. After years of search for the killer application, it was the iPhone that started the smartphone trend. Its success was quickly followed by Android.

2010-2013: HERE COMES THE CLOUD

This is when the cloud really got going, thanks to higher bandwidths at lower costs as well as the availability of compute on demand. AWS and Azure led the way, and the traditional telcos flirted with the idea of joining in. CenturyLink acquired Saavis with an eye to being a cloud player, but that was short-lived. Verizon acquired Terremark and Telematics to enhance its IT muscle. Coming from the other direction we had IBM's acquisition of SoftLayer, the Microsoft acquisition of Skype, and advent of Google Fiber. All of which drove the bond between cloud and connect.

2015-2017: THE TELCO/CLOUD WAR ESCALATES

This is the period where the traditional telcos saw their voice revenues decline. They reacted by extending their residential services offering with video on demand, led by AT&T acquiring DirecTV and Time Warner, and Verizon acquiring AOL and Yahoo. The cloud guys weren't idle, with Google acquiring YouTube, and Facebook acquiring WhatsApp. And we saw the emergence SD-WAN, which was a major threat to lucrative MPLS revenue at telcos. On the regulatory front, we saw the FCC issue its Open Internet Order, marking the advent of Net Neutrality.

2018-2021: A SPLIT BETWEEN CONNECTIVITY AND CONTENT

In 2021, we've seen a major shift in the industry. AT&T, Verizon, and BT are all in the process of divesting their content units. And on the cloud side, the grab for content goes on with Google looking to pick up MGM.

DID THE TELECOMMUNICATIONS ACT OF 1996 ACCOMPLISH ITS GOALS?

Yes, at least partly. We now have cloud providers as significant competitors to the dwindling number of major telcos. But those cloud providers are themselves being accused of being anti-competitive, and there are calls to repeal the immunities in section 230. What's clear is that the landscape changed radically over the last 25 years. So much so that it's hard to believe – until you step back and look. As we consider the next steps in our regulatory environment, we should remember that things rarely turn out as predicted. Light and responsive regulation is the order of the day.

LET'S REVIEW

1996: Communications Act of 1996
1996: Launch of EchoStar (DISH)
1996: AOL moves to $19.95/month
1997: Netflix started
1998: Downloadable ringtones
1999: Emojis
1999: BlackBerry
2001: AOL/Time Warner merger
2002: 600 million mobile subscribers
2003: 3G rollout and Skype launched
2004: Google IPO and Facebook launch
2006: AWS & Amazon Prime Video
2006: Twitter
2007: Netflix streaming
2007: iPhone
2007: AT&T U-verse
2008: Android phone
2009: WhatsApp
2009: 4G rollout
2009: 4.6 billion mobile subscribers
2009: Time Warner divests AOL and Time Warner Cable
2010: Google Cloud
2010: Microsoft Azure
2011: Microsoft acquires Skype
2011: CenturyLink acquires Saavis
2011: Verizon acquires Terremark
2012: Google Fiber
2012: Facebook acquires Instagram
2012: Verizon acquires Telematics
2013: IBM acquires SoftLayer
2013: Google acquires Waze
2014: Facebook acquires WhatsApp
2015: FCC Open Internet Order
2015: Verizon acquires AOL
2015: AT&T acquires DirecTV
2016: Advent of SD-WAN
2016: AT&T acquires Time Warner
2016: Google acquires YouTube
2017: Verizon acquires Yahoo
2021: AT&T divesting Time Warner, DirecTV, TV Now
2021: Verizon divesting Yahoo & AOL
2021: BT divesting BT Sport
2021: Amazon acquiring MGM

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1

Combo PON Simplifies XGS-PON

- "Zero" operational impact – same splitters, same optical budget, no jumper changes, no truck rolls, no swivel chair operations.
- "Zero" additional space – swap out existing GPON cards with the Combo OLT cards.
- "Zero" customer disruption – PON inheritance automatically reconfigures GPON; no customer visits to swap out ONUs/ONTs.

Combo PON Delivers More

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

2

3

Combo PON Offers Better ROI

- Lower capex – up to 50% less*
- Lower space requirement – up to 75% lower*
- Lower power requirement – up to 66% lower*
- Increased revenue – up to 20% higher** gigabit service area coverage

**Compared to GPON/XGS-PON Coexistence approach*

*** No link budget loss with integrated CEx, resulting in increased PON service area reach, increased addressable market, increased take rate, and increased subs.*

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25 Years Later, Let's Look to the Next 25 – And Beyond

By Shirley Bloomfield
CEO
NTCA

This year, we mark the 25th anniversary of the Telecommunications Act of 1996, signed into law by President Clinton to expand the goal of universal service to include increased access to both telecommunications and evolving services like the Internet for consumers living in rural and insular areas at reasonable and affordable rates. It was the cornerstone for policies that were key to making telephone service available and affordable, and it has been gratifying watching that evolution to broadband services over the last 25 years.

Technology looks a lot different today than it did 25 years ago. I will never forget borrowing an NTCA member's "bag phone"—the precursor to the cell phone—to make sure I was available to talk to lawmakers during the last few weeks of debate on the Telecommunications Act. If you were lucky enough to have home Internet service in 1996, it was slow dial-up, and it might take you minutes to get online to check your favorite website—perhaps Amazon, which back then was just an online bookstore. You might listen to a CD while you waited and hope that nobody was trying to call you on your landline.

Now, you can shop online, check your email, stream music and make a call on your cell phone within a matter of seconds. What took minutes to load in 1996 takes nanoseconds now with technology like fiber. I am proud to say that, according to our most recent broadband survey, 70% of customers served by NTCA members have access to fiber-to-the-home technology. As we reflect on the 25th anniversary of the Telecommunications Act, we must think ahead to what the next 25 years will bring us, and how we can invest in our future. The only technology that is proven to last for decades is fiber, and we should invest in fiber-based networks that will serve us for years to come.

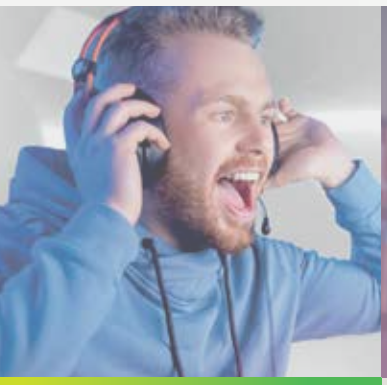
Just as I was honored to work on behalf of NTCA members in 1996 to ensure that rural Americans were included in this landmark legislation, I am proud to do the same today as policymakers consider different infrastructure proposals that could allocate billions of dollars towards broadband deployment. President Biden's American Jobs Plan would allocate $100 billion towards broadband deployment, prioritizing "future-proof" networks. And various counterproposals from Republicans in Congress come in around $65 billion.

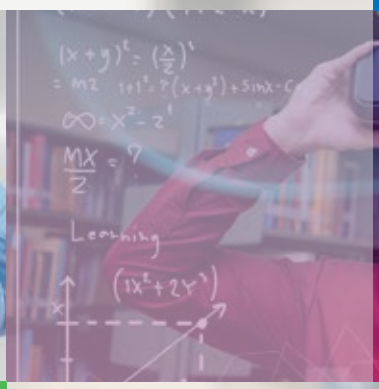
Wherever the final number lands, we must invest in technology like fiber that will be built to last. In rural areas, despite the low population density, fiber is still the most cost-effective, efficient form of connectivity. Other technologies certainly play a role, but they often provide sub-par service, or they weaken over time. A recent report by the Foundation for Rural Service found that, after 30 years, a mid-band wireless network might cost 30% less than a fiber-to-the-premises (FTTP) network but would also be 10 times slower at the start and likely 3,000 times slower by the end of that period. When we build roads and bridges, we don't build dirt roads and hope for the best. We build highways meant to last, and we should do the same with broadband infrastructure. In other words, we should aim higher and do better rather than merely patching potholes.

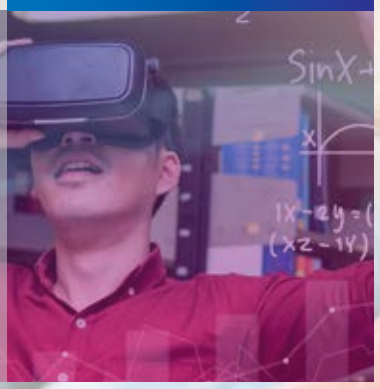
In addition to investing in fiber technology, NTCA has several other policy recommendations for any large infrastructure investment. Any broadband proposal should coordinate among the existing and new federal broadband programs. The Universal Service Fund, established by the Telecommunications Act of 1996, plays a curial role in helping providers deploy and sustain high-speed broadband in rural areas, and newer programs like the U.S. Department of Agriculture ReConnect Program provide capital to build out new projects. We must build upon this work and help agencies coordinate, rather than continue to create new programs from scratch. In addition, we should prioritize funding to and leverage the experience of the community-based providers like NTCA members, who are already doing yeoman's work to connect rural Americans. We must also address barriers like permitting and supply chain delays.

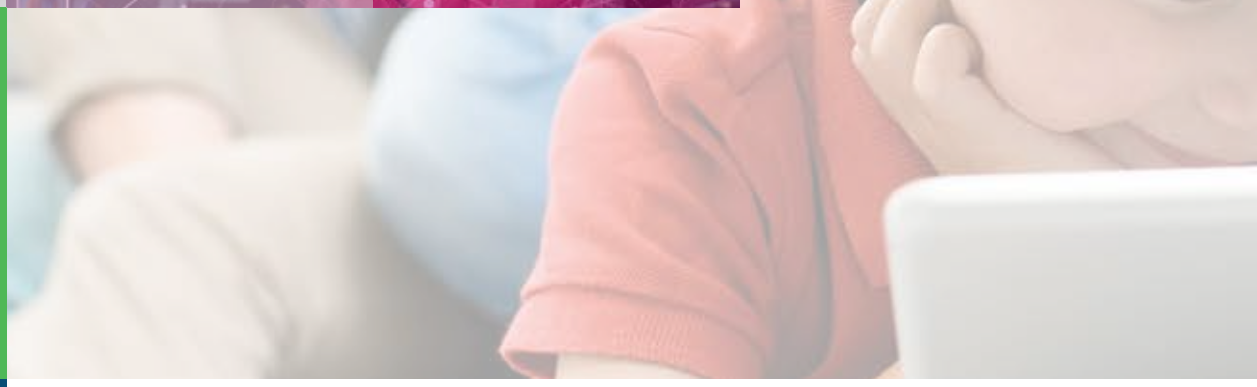
We have come a long way since the Telecommunications Act was signed into law 25 years ago. We once again have the opportunity to invest in our nation's telecommunications infrastructure for the next generation. Let's look to the next 25 years—and beyond—and invest in future-proof technology so that all Americans can have access to high-quality broadband at affordable rates.

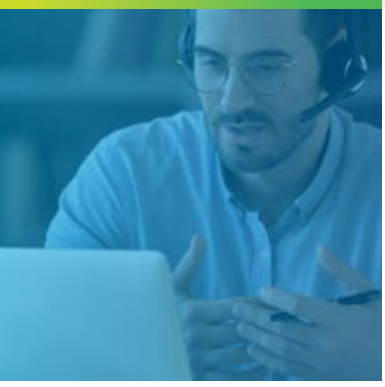
Shirley Bloomfield is chief executive officer of NTCA–The Rural Broadband Association, the premier association representing nearly 850 independent telecommunications companies that are leading innovation in rural and small-town America. With more than 30 years of experience representing the country's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











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Utility Broadband is the New Telco

By Brett Kilbourne
Senior Vice President of Policy and General Counsel
UTC

It is said that history has a way of repeating itself, and 25 years after the Telecommunications Act of 1996 ("96 Act"), utility telecommunications is once again at the center of the policy debate. The goal of the 96 Act was to promote competition in the telecommunications market and rely on market forces rather than regulation to improve service and reduce costs. Back then, utilities were seen as one of the main potential competitors in the telecommunications marketplace, as evidenced by Section 103 of the 96 Act, which provided a process that allowed utilities to provide telecommunications through wholly-owned subsidiaries (i.e., "exempt telecommunications companies" under the Public Utility Holding Company Act (PUHCA) of 1935). Many utilities did indeed offer telecommunications services, including large investor-owned utilities which tended to deploy long-haul and metro area networks to offer wholesale services and some smaller municipal utilities and electric cooperatives tended to deploy last-mile networks to offer retail services. Some of these utilities continue to provide these services today. Still, many dropped out and/or became restricted from offering telecommunications services by state laws written at the behest of the big carriers and cable television incumbents.

Fast forward to today, and there is a renaissance in utility telecommunications of sorts – but now broadband is the focus. Several electric cooperatives and municipal utilities are deploying fiber to the home networks and providing gigabit speeds in rural areas and isolated communities, many of which would have otherwise lacked access to any broadband services. Meanwhile, a growing number of investor-owned utilities are deploying middle-mile fiber backbone networks and leasing capacity, often in partnership with third-party ISPs. The ISPs provide retail services in areas that otherwise lack broadband access. In every sense, these utilities are bridging the digital divide. And policymakers are taking notice by removing regulatory barriers and encouraging market-entry by utilities, just like they did in the days of the 96 Act. Not only are utilities making broadband available, but they are promoting access to services that are affordable, reliable and robust, which has led to high take rates and low customer churn. While the 96 Act succeeded in promoting competition initially, it was blamed for fueling a bandwidth glut that helped create a telecom bubble that burst in the late 90s. Conventional wisdom was that competitive local exchange carriers (CLECs) were undercapitalized and adopted a "build-it-and-they-will-come" business strategy that ultimately resulted in their downfall. Moreover, the 96 Act was blamed for removing implicit subsidies that helped maintain universal service and affordable rates in rural areas, which led to de facto and de jure discontinuance of telephone service during the IP transition by the regional Bell operating companies (RBOCs). There was a growing belief in the wake of the 96 Act that rural areas could not be served economically, and as a result, investment was going to urban areas where profitability was highest. Access charges and explicit subsidies increased, resulting in high rates for consumers in rural areas and higher surcharges for contributions to the Universal Service Fund (USF), despite FCC efforts to reform access charges and USF. This period also witnessed market consolidation, as the RBOCs merged to form the new AT&T and cable television and wireless carriers grew into multi-media conglomerates through acquisitions, further reducing competition and customer choice. The vision of the 96 Act of promoting competition and providing affordable universal service was increasingly becoming at odds with reality.

Meanwhile, electric utilities have quietly gone about deploying broadband to their customers and have shattered some of these myths built up by the big carriers, and the CATV/wireless conglomerates in the aftermath of the 96 Act. Utilities have been able to deploy state-of-the-art fiber-to-the-home networks in areas

that ILECs and CATV operators refused to serve, or only offered meager DSL or cable modem services. Moreover, utility broadband businesses have proven not only economically sustainable, but they provide services that are affordable, robust and reliable—disproving misconceptions that rural broadband networks were not economically sustainable and that consumers in rural America wouldn't subscribe to broadband. On the contrary, consumer adoption of broadband has been high, especially in rural areas that previously lacked broadband service. Electric cooperatives and municipal utilities were the first to discover it, and more recently investor-owned utilities are seeing the same thing where they are helping to provide broadband through ISP partners. These utilities deployed broadband networks to promote economic growth, improve educational opportunities and provide better health care for the communities that they serve, while enhancing the quality and reliability of electric services – and COVID-19 has only underscored the need for utilities to deploy broadband so that people can work from home, doctors can treat their patients remotely, and students can attend classes and do schoolwork outside of the classroom.

Because of the utility broadband success stories, policymakers recognize that utilities empower broadband access. The

" . . . utility broadband businesses have proven not only economically sustainable, but they provide services that are affordable, robust and reliable . . . "

FCC's Connect America Fund Phase II auction and its Rural Digital Opportunity Fund Phase I auction awarded a combined nearly $2 billion over 10 years to utilities to provide broadband into areas that currently lack access to 25/3 Mbps speeds. Moreover, the Biden administration's American Jobs Plan proposes providing $100 billion for broadband, and it prioritizes funding projects by non-profits such as electric cooperatives and municipal utilities, mainly because the administration recognizes that doing so will promote affordability. Similarly, a National Association of Regulatory Utility Commissioners (NARUC) task force has published draft recommendations that support non-traditional broadband service providers, such as electric utilities, to expand broadband access. In response, the big incumbent telephone and cable television industries have publicly opposed utility broadband, accusing the American Jobs Plan of "economic socialism" by prioritizing funding for government-owned broadband networks, and urging states to impose additional regulations on utilities, including expanding pole attachment requirements. Despite objections from ILECs and CATV operators, policymakers continue to support utility broadband, and have thus far rejected attempts to impose additional regulations designed to prevent utilities from deploying broadband in unserved areas and underserved areas. This support is important, particularly for utilities subject to state and federal regulations, including cost recovery for investments in broadband infrastructure.

Telecommunications was the main focus of the 96 Act, and broadband was only a vague concept addressed solely by Section 706's goal of removing barriers to "advanced telecommunications capability". Now, it's the reverse. Broadband is the main focus, and telecommunications is largely secondary. In that way, history has changed; but once again, utilities are finding themselves at the center of the policy debate, so in that sense, history is repeating itself.

The policy debate has shifted, though. Traditional regulatory silos that influenced policies in the past are not as present today, and there is a technological convergence between communications and energy in the marketplace. Utilities are increasingly implementing communications technologies to support grid modernization to support new distributed energy resources (DERs) including renewable and clean energy from solar, wind and hydro, as well as new electric vehicles (EVs), cybersecurity, and other energy infrastructure requirements that were only on the horizon back in 1996. Moreover, utilities need increased capacity and coverage, so they have real-time, two-way, high-speed communications all-across their transmission and distribution networks and all the way to the electric meter, if not beyond. Not only will this enable applications like advanced metering infrastructure (AMI), but it will allow utilities to manage and balance the flow of energy back and forth from renewable sources of energy and EVs, as well as better monitor and control power quality using new synchrophasor and conservation voltage reduction technologies.

As utilities deploy fiber and other communications technologies to enhance the capabilities and ensure the security of their energy infrastructure, utilities and policymakers recognize the public interest benefits of using these communications technologies to promote broadband access – especially in the wake of COVID-19, which has underscored the importance of broadband access. Not only does this create opportunities to connect unserved areas, but it also has the potential to promote affordability so that people in both rural and urban areas affected by COVID-19 economically can be able to pay for broadband services.

Unfortunately, the more things change, the more they remain the same. Incumbent telephone and cable television industries continue to raise their same old tired policy arguments and perpetuate misconceptions of the past in opposition to utility broadband. They claim that utilities don't know how to provide broadband and/or they should be prevented from competing because utilities have unfair advantages. The reality is that utilities have owned, managed, and operated private internal communications networks for decades. They

Cont'd on page 39

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The Telecommunication Act in 1996 was crucial for making IP technology and the internet a foundation for today's public and private communication infrastructure. It did so by creating an open and highly competitive services market. A converged network for voice, video and data services has proven to be highly beneficial both for our society and our economy.

Enterprises have transformed themselves digitally. A large share of the value creation process today relies on secure and resilient IT and OT networks. The downside of this is an increasing vulnerability to cyberattacks. That's why the US government have been taking action to protect the benefits of the Telecommunication Act. That includes executive orders such as "Improving the Nation's Cybersecurity" dated May 12, 2021. This order aims to safeguard the economic and social value of communication and cloud services from ever-increasing cyber threats.

We as communication engineers have focused in the past on developing faster and more agile communication networks. Now we're now moving our attention to security and resilience. Using encryption and access control, we're working to make networks safe. And by making networks redundant, we're ensuring highest availability even in very unfavorable conditions such as cyberattacks or national catastrophes.

There is an area which is frequently overlooked. Many networks and enterprise applications require precise timing. Yet they rely on highly vulnerable GNSS-delivered synchronization. In response to this, as early as February 2020, a presidential executive order was signed: "Strengthening National Resilience Through Responsible Use of Positioning, Navigation, and Timing Services."

" . . . we must protect businesses and society from unavailability or compromised quality of PNT services. And doing so is a matter of national interest."

Critical infrastructure such as transportation, communication, energy, finance, or data centers over-rely on GNSS-delivered positioning, navigation and timing (PNT) services. We say over-rely because weak satellite signals are subject to a variety of vulnerabilities and distortions. These distortions may be natural or man-made attacks. In either case we must protect businesses and society from unavailability or compromised quality of PNT services. And doing so is a matter of national interest. Our Oscilloquartz assured PNT (aPNT) solution combines excellence in network- and space-delivered synchronization. They include industry-leading cesium clocks and assurance technologies featuring our AI-powered management system.

Most critical infrastructure mandates time traceable to UTC. We can achieve this by combining our cesium atomic clocks with multi-band, multi-constellation GNSS receivers. With spoofing and jamming detection, any malicious activity is immediately identified, and timing is derived from uncompromised sources. Our OSA 3350 optical cesium atomic clocks exceed even the most stringent timing requirements. They give our customers more margin for reliable synchronization of their applications. Our edge and access grandmasters, OSA 5422/30/40, provide integrated combiner functionality. With them we can create fully redundant ePRTC implementations with just two network elements. And the precision of our multi-band GNSS receivers meets strict PRTC-B specifications. This is true even without the need for an atomic cesium clock, significantly reducing cost.

ADVA's aPNT portfolio and Walker make a great team. Jointly we can make communication services and enterprise applications robust, reliable, and able to withstand the most adverse conditions. Critical infrastructure such as communication networks, energy companies, finance, data centers and others can always access accurate, resilient and trustworthy timing.

Building Customer Loyalty with SaaS Applications for Operations and Customer Success

By KT Mishra
Market Manager EMEA & APAC
ADTRAN

There has never been a better time to have high-speed broadband connectivity coming to homes and businesses. According to a recent report by RVA LLC and the Fiber Broadband Association, more than 54 million U.S. homes have been passed with fiber. A report from financial analysts at Cowen estimates that there could be over 68 million homes passed with fiber by 2025, accounting for a penetration rate of more than 50 percent in the U.S. This will be a huge psychological milestone, as it turns the conversation from how many homes, we have passed to how many homes we have left to pass; the finish line is in sight for the first time!

FOCUS ON BETTER CUSTOMER EXPERIENCE

A major boost for large-scale fiber build-outs has come from government policies, regulatory changes, and the availability of public funds, such as the Rural Development Opportunity Fund (RDOF) and private equity and infrastructure investment funds. Regional telecom markets are no longer primarily defined by monopoly incumbent operators. New types of providers, such as utilities, electric co-ops, and municipalities, have been emerging for a while, leveraging opportunities provided by market liberalization, competitive regulatory framework, and the relaxation of licensing regimes. With these types of programs already underway, it's almost a certainty that in the future, consumers will have multiple broadband offerings from which to choose, all with competitive bandwidth availability.

Fiber broadband networks offer low latency and symmetric gigabit connectivity that promise a better work-from-home experience, faster- and higher-quality video streaming and video gaming experiences, and better support for the ever-increasing number of devices in homes and businesses. But the fiber network alone does not guarantee subscribers a high-quality broadband experience. Wi-Fi has become front and center in a lot of people's minds. Many service providers are becoming aware of the harsh reality that their Net Promoter Scores (NPS) are still stalled because of poor in-home Wi-Fi setup and support.

The cost to set up and maintain broadband connectivity has also increased with the number of devices deployed. Today, service providers report that up to 50 percent of support calls are related to Wi-Fi issues that often take up to 30 minutes to resolve. On top of this, up to one in five of these calls results in sending a technician to the site to resolve the issue.

DELIVERING AMAZING CUSTOMER EXPERIENCES FROM A DISTANCE

The expectation of network reliability is much higher than before. Subscribers expect little to no maintenance, therefore making it essential for service providers to proactively resolve subscriber issues. Service providers must be able to remotely determine who is likely to call with an issue or who is at risk of churning.

Given all that has happened with the pandemic, people don't want technicians coming into their homes. The best outcome for a service provider is to inform the customer that there was a problem and it has already been resolved. This can be accomplished via AI-driven algorithms that recognize patterns and network performance analysis. For instance, a service provider must be able to discern that the ONU looks like a rogue ONU, or there is error data coming from a subscriber that indicates a dirty fiber connection or a micro-bend, or that the historical trending on the power level from this subscriber has dropped, indicating that the ONU needs to be replaced. It is critical to recognize the issue before it becomes a problem. This will ensure that the highest level of customer satisfaction is provided.

Simple networks may require changes to ensure that the optimal experience is sustained as the environment changes. However, these changes only make sense if they can be automated. Service providers need to leverage telemetry from the in-home hardware, turning it into actionable insight that is useful to their support team. They must add whole-home quality of experience-driven workflows that can constantly adapt to and optimize the network around not just the devices in people's homes but adapt to the changing behaviors of those devices over time as their bandwidth usage changes. This includes simple things such as regular speed tests from each access point to the network, constantly tracking backhaul links and individual device connectivity stats, or highlighting troubleshooting configuration pushed down to the support team to help solve issues in the subscriber home faster.

The capability for a customer success representative to see that a problem occurred on a network on a specific day and time is powerful. Having visibility to data such as Wi-Fi bandwidth rates or actual traffic throughput on all devices on the network, all at a specific point in time in the past, with the ability to see major events on the network that may have led to that event can turn customer success teams into Wi-Fi wizards with a far greater ability to solve the problems that come to their queue. This describes self-healing proactive maintenance for

issues that could have turned into real problems over time, in essence making Wi-Fi reliable without human intervention.

Having a centralized view of deployed network and residential devices improves the overall subscriber experience and reduces operational expense. Aggregated dashboards provide customer success representatives the recommendations they need to resolve Wi-Fi issues quickly and proactively eliminating the need for on-site visits. The dashboard captures subscriber device trends, usage behavior, and application patterns that drive more effective cross-sell and up-sell campaigns. Comprehensive and sophisticated support tools provide the highest level of proactive service. Service providers can manage all network operations and subscriber experiences in the same place to save time and reduce the likelihood of errors going undetected.

A BETTER VALUE PROPOSITION FOR SERVICE PROVIDERS

Another noticeable trend is the desire of many service providers to manage and support their networks via the cloud. The operational burden of building and managing the infrastructure is unnecessary. Operators want to be hyper-efficient and scale quickly while keeping costs contained. Every business metric that they are interested in points to the cloud.

A set of superior SaaS applications for subscriber and network care should be able to deliver customer data to technicians within seconds. Advanced analytics and AI-driven algorithms built into the cloud will enable service providers to identify and address network issues proactively. Analytics systematically convert internal and external data into predictions, insights, and choices, which guides and automates operational workflows, reduces truck rolls, and improves customer experience. These SaaS applications for operations and customer success help manage Wi-Fi networks and can react quickly to things that impact the network, such as building materials, wireless signal congestion, or lack of proximity. They can schedule daily optimizations to ensure that all networks receive the appropriate level of service based on the device type, prioritization in the network, and bandwidth used. Service providers can provide continuous upgrades and push new features and services throughout the life of the product, all from the cloud, keeping the subscriber engaged and delighted.

In summary, superior SaaS applications for subscriber and network care are extremely important to ensure that service providers provide the highest-quality customer experience possible. A great product is easier to support, so when issues occur, they need to be resolved quickly, eliminating the need for on-site visits. Advanced cloud-hosted AI and algorithms-driven applications will enable customer service representatives to solve problems faster and enable service providers to accelerate their marketing efforts by offering value-added services through insights gained from AI analytics.

ADTRAN's Mosaic One Cloud is a set of powerful SaaS applications for operations and customer success teams designed to give service providers a single platform to deliver exceptional subscriber experiences. Learn more at www.adtran.com/mosaicone.

Reaching Remote Subscribers With Advanced Technologies

Harmeet Singh
Product Management
IPG Photonics

The Telecom Act of 1996 aimed to open the telecommunication market to competition by removing regulatory barriers to entry. Today there is a wide choice of providers for internet, phone, or cable driving higher quality and more advanced services such as cloud DVRs, OTT services, home security, and even cellular services. With 1 Gb/s Ethernet access prices now rivaling those of a T1 in 1996, it can be easily argued that objectives of the Act were largely met.

However, the promise of ubiquitous high speed access has greatly fallen short in most rural segments of the country. While an urban and sub-urban user can routinely subscribe to up to 1 Gb/s for around $80/month, most rural consumers struggle for even a fraction of that capacity.

The primary reason for this disparity is that the large services providers have driven the development of high capacity DWDM transport equipment aimed at connecting large urban centers and data centers requiring 10s of Tb/s of capacity over fiber-rich cross country networks. Unfortunately, DWDM equipment designed to serve such customers does not well serve remote areas where the capacity needs are much smaller and network fiber is limited.

IPG addressed these problems faced by Independent Operators by providing solutions enabling point to point connections in a compact 1U footprint that transport and deliver 100G or 200G of bandwidth up to 100 miles without the need for any mid-point regeneration. To address the issue of fiber scarcity and minimize the cost of dark fiber lease, IPG developed the first dual laser CFP so that 100G transmission can also be accomplished over a single fiber in a bi-directional operation mode, a first in the industry.

These innovations have enabled rural service providers to expand their high speed networks out to more remote locations in the most cost effective way possible thus delivering on the promise to provide ubiquitous high speed access and the delivery of the most advanced telecom services to everyone.

With IPG's ClientReach solutions, service providers have:

- Expanded service areas over 100 miles beyond the existing DWDM network footprint
- Connected physically separated regions of service
- Connected mid to small data centers
- Provided connectivity to FFTH OLTs
- Offered wholesale bandwidth services

We invite you to speak with your Walker sales representative to learn more about these solutions and how they can help you lock in your customers with the best services and the highest RPU.

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Premium Services Are Key to Loyalty and Increasing Profit Declining Video Revenue

By ZYXEL Staff Writers

A recent study conducted by eMarketer found that by 2024, more than one-third of US households will have terminated their pay TV subscriptions, with most subscriber losses being felt by cable, satellite and telecom TV providers. A survey published by Transunion reported a 71 percent increase in the use of paid streaming services since the beginning of the pandemic in March 2020, with 55 percent of respondents opting to watch Over the Top (OTT) services versus cable-TV subscriptions.

The Hybrid Workforce Changes the Game for Service Providers

The COVID-19 pandemic has also driven an increase in the requirements placed on home broadband connections. According to Upwork's "Future of Workforce Pulse Report," more than 36 million Americans will be working remotely by 2025, reflecting an 87 percent increase from pre-pandemic levels. Establishing the home office as a semi-permanent work location drives the requirement for increased bandwidth, Quality of Service (QoS) and network reliability to support business-class video conferencing and other cloud-based applications.

The shift in consumer behavior means that the focus on "speeds and feeds" is no longer enough to maintain customer loyalty. Service providers need to focus on the customer experience and provide services that match their subscribers' current lifestyles. Delivering premium services that enable and enhance the use of these applications is critical to establishing differentiation in this increasingly competitive environment.

OTT Services and WFH Initiatives Increase Demand for Broadband Internet Services

According to OpenVault, broadband usage increased 40 percent over the previous year and analysts believe that this trend will continue. Service providers that offer broadband internet services must recognize their subscribers have transitioned from consumers to prosumers. Subscribers expect a highly-reliable network connection that optimizes the use of OTT services, business-class applications, and IoT devices. Offering parental controls, cyber-security protection and smart home solutions as premium services can help service providers recapture revenue lost to cord-cutting.

CPE is Key to Customer Satisfaction and Reduced Operational Costs

The choice of CPE is critical as it provides the portal for premium service delivery for service providers. WiFi 6 enables the delivery of the high-performance, whole-home WiFi that subscribers expect to optimize the use of advanced network-based applications. A cloud-based management and service delivery platform is essential for remotely provisioning services, and quickly and cost-effectively monitoring and managing devices and services.

As the interface of choice for consumers, mobile apps can enhance service usage, reduce support costs and improve overall customer experience. Intuitive, easy-to-use apps reduce tech support calls by giving subscribers the ability to manage their networks and can enable online service activation to provide fast network deployment, minimize time onsite and get subscribers online quickly.

Walker and Associates Joins Alcatel-Lucent Enterprise as National Reseller Partner

AT A GLANCE:

- Together the two companies create opportunities to connect more businesses throughout the United States
- The combined product portfolios deliver reliable wired and wireless networking and cloud solutions for utilities, transportation, and federal customers

Alcatel-Lucent Enterprise, a leading provider of communications, networking, and cloud solutions tailored to customers' industries, announced it is working with Walker and Associates, Inc., a national value-add distributor of network products for broadband providers, including wireline, wireless, CATV, government, and enterprise network operators. Together, they will deliver reliable, secure, easy-to-manage networking and cloud solutions for mission-critical networks.

The Alcatel-Lucent Enterprise portfolio of wired, wireless, and network management solutions enables Walker's channel to meet customer needs and expand rural broadband services. ALE also provides cloud-based solutions, enhancing the channels' ability to address businesses that are increasingly moving to the cloud.

QUOTES

According to Trey Hall, Walker's Chief Technology Officer, "ALE's line of hardened switches enables our utility provider and telco provider customers to extend their networks into harsh environments to deliver critical solutions and connectivity to homes and businesses across the country."

Gene Hawks, Head of Alcatel-Lucent Enterprise Channel in North America, said, "The combined high-level expertise and world class solutions from both companies give Federal agencies, utility, and service providers more to offer their customers. We are proud to partner with Walker and Associates to expand broadband connectivity and provide networking solutions to businesses across North America."

Fiber Broadband Association

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Tony Thomas, President and CEO, Windstream

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have been able to use their expertise and knowledge in communications to successfully deploy broadband networks in unserved and underserved areas.

Ironically, many utilities would not have provided broadband if the carriers or the CATV operators had done so themselves. These utilities deployed broadband networks because people in the communities they serve – and in some neighboring areas outside their electric service territory – begged them to do so. Some utilities tried to encourage CATV operators to provide broadband into these areas by offering them free pole attachments in exchange, yet none came. Other utilities tried to partner with carriers, and while some utility-telco partnerships were successful, many times, the carriers weren't interested in serving these communities or were unwilling to partner with the utility. In any event, utilities realized that deploying broadband would promote economic growth into these communities and potentially reverse problems with persistent poverty and population declines they saw in some of these unserved areas. Once utilities announced they were starting to offer broadband to unserved and underserved areas, incumbents began to reduce rates and upgrade the quality of their networks to stave off customer churn and protect their service territories against utilities competitively – thus achieving the goal of the utility in the first place.

Incumbent telephone and CATV operators continue to cling to pole attachment subsidies and make unfounded allegations against utilities as the excuse for their failure to provide broadband services into unserved areas. They continue to make unfulfilled promises that they will deploy broadband into unserved areas if they receive lower rates for pole attachments.

"Utilities remain at the forefront of these changes and are the catalysts for change for the good going forward for broadband deployment. "

" . . . utilities deployed broadband networks because people in the communities they serve – and in some neighboring areas outside their electric service territory – begged them to do so."

It is worth noting in the context of the 96 Act that Congress expanded pole attachment regulations to provide nondiscriminatory access to utility poles, ducts, conduit and rights-of-way by telecommunications carriers and provided two sets of pole attachment rates that applied for attachments used to provide telecommunications services and cable television services. CLECs were intended to be the primary beneficiaries. Moreover, Congress intended to exclude the ILECs from demanding regulated access and rates, as lawmakers also intended to require CATV operators to pay the higher rate for attachments they used to provide telecommunications services. Nonetheless, the FCC has allowed ILECs to receive regulated rates, and it has revised the telecom rates so that it is exactly the same as the rate for pole attachments that are used to provide cable television services, which has primarily benefitted incumbents rather than CLECs. All of this ostensibly was designed to promote broadband access, but there has been little of any evidence to show that it has actually resulted in substantial broadband deployment by the ILECs or the CATV operators. The FCC continued to report that broadband was not being deployed on a reasonable and timely basis for another two years after the FCC lowered pole attachment rates for attachments used to provide telecommunications services.

Recently the cable-industry lobby NCTA petitioned the FCC to require utilities to pay for attachers' pole replacement costs to deploy broadband in unserved areas. While the FCC has sua sponte clarified that utilities may not require a pole attacher to pay for the entire cost of a pole replacement if the attacher is not the sole cause of the pole replacement, the petition by the cable industry remains pending, and the FCC has stated that it would prefer to address the issues raised by the petition in a rulemaking proceeding rather than a declaratory ruling (as the petition requested).

Meanwhile, at the state level, there have been efforts to regulate pole attachments on poles owned or controlled by municipal utilities and electric cooperatives, again on the premise that doing so will promote broadband access into unserved areas. Late last year, Georgia established a so-called "One-Buck Deal" to encourage broadband deployment in unserved areas by allowing entities providing broadband in those areas to attach to electric cooperative poles for $1 per pole for six years, and the new rate becomes effective on July 1, 2021. Earlier this year, Florida passed legislation to regulate municipal utility pole attachments, ostensibly again to promote broadband access to unserved areas, which is counterintuitive as many of the areas that lack broadband in Florida are not served by municipal utilities.

If past is prologue, don't expect many telecommunications carriers or cable television providers to deploy broadband into those unserved areas, and in fact the Georgia Cable Association has already dismissed the one-buck deal as a gimmick. History has proven that pole attachments are not the barrier that is preventing broadband deployment by the telecommunications carriers and the cable television operators. Instead, it remains the high cost of deploying into those areas combined with low customer density that reduces their profit margins. Moreover, UTC continues to believe that pole replacement costs should not be unfairly shifted onto electric utilities and their ratepayers, and doing so won't promote broadband into unserved areas.

So, much has changed since the Telecommunications Act of 1996, while much is coming full circle and many other things remain the same. Utilities remain at the forefront of these changes and are the catalysts for change for the good going forward for broadband deployment. Policymakers are realizing that and are rejecting the tired arguments, misconceptions, and false promises of the traditional carriers and the cable television industries, who have failed to deploy robust, affordable and reliable broadband into unserved areas the way the utilities have done.

Smart Communities: Building a Connected Future

Kara Mullaley
Market Development Manager
Corning Optical Communications

In 2019, the IMD World Competitiveness Center in Singapore created the first index of Smart Cities across the globe.1 The organization documented and ranked 102 cities worldwide, including almost all the bustling metropolises, such as New York, London, Rome, and Tokyo. From a very high level, Smart Cities are designed to leverage technology resources to improve the quality of life, enhance efficiencies, and drive economic development within urban or metropolitan areas, from health and safety to transportation and environmental management.

The key underpinnings of Smart City technology are driven by the ongoing accurate collection of data from sources such as electronic sensors, mobile phones, and IoT devices that are woven throughout our everyday lives. Data is collected, processed, and analyzed to monitor and manage public transportation systems, utilities, and safety, among other community services. According to reports from the International Data Corporation (IDC), worldwide Smart City spending is expected to grow from $80 billion in 2016 to $158 billion in 2022,2 as cities transform to improve environmental, financial, and social aspects of urban life.

SMART TOWNS IN RURAL AMERICA

Rural areas make up more than 95% percent of land area in the United States and as dense populations spread out and become less centralized, unique challenges arise; localized use cases can dramatically shift the balance of specific requirements relative to urban and rural settings that require special consideration.

To address these differences and to focus attention on infrastructure development that's needed to bring smart technology to rural America, NTCA - the Rural Broadband Association, has recognized and defined a company that serves a Smart Rural Community as one that can:

- Provide broadband to at least 50% of its service area - meeting or exceeding the FCC broadband speed definition of 25 Mbps down/3 Mbps up.
- Demonstrate that 50% of its customers subscribe to and use the broadband service.
- Exhibit a stated commitment to collaborate actively with other local leaders, including school districts, health care providers, public safety officials, and businesses who work together to incorporate broadband-enabled applications into those facets of rural life.

More than 80 rural broadband providers within the NTCA membership currently qualify under these standards. However, there is still room for significant growth that will be essential in the future to ensure rural areas aren't left behind as connections and technology demands continue to accelerate.

THE FOUR PILLARS OF TECHNOLOGY IN A SMART RURAL COMMUNITY

Four use cases where Smart Rural Communities may experience unique benefits or require special attention compared to the big cities are:

1. **Smart Agriculture.** Smart technology enriches the agriculture industry with its ability to provide insight and actionable data. Consider soil moisture monitoring that can help maximize crop yields and reduce loss with sprinkler system optimization, which also helps to conserve water or air quality monitoring to comply with emissions regulations of harmful ammonia or nitrogen oxide gases. In contrast, large asset and task management monitoring can help keep track of equipment and control inventory levels reducing risk and waste.
2. **Telehealth.** Using smart technology's data collection capabilities to support long-distance clinical health care reduces the need to travel to doctors' offices from rural locations. Critical information can be gathered efficiently and safely, lower risk of exposure to contagious diseases, and provide significant cost savings for both patients and medical professionals.
3. **Remote Learning.** As recent experiences have shown, broadband to the home is a critical necessity when it comes to in-home learning. Smart technology relies on that same broadband infrastructure to help manage many aspects of the remote learning experience, whether it's the use of remote attendance systems or database access and test monitoring. Smart technology is instrumental to ensuring the education system is not only efficient but an effective learning tool.
4. **Citizen Services.** City management and maintenance is improved and made more efficient by the proper use of smart technology and it is every bit as true for small rural towns as it is for large cities. Smart surveillance systems may deter unwanted behavior but also alert personnel at the first sign of suspicious activity, from illegal dumping to fights on the playground. Utility services also offer numerous opportunities; waste management can employ smart trash cans to reduce service costs; thermal monitoring on electrical power plants can alert overheated transformers, and remote vegetation management can help electric service providers clear lines in response to fallen tree limbs before costly failures occur.

THE PROMISES AND BENEFITS OF SMART TECHNOLOGY

Whether it's a more timely and efficient transit system or the promise of improved public safety, the quality of life improves greatly for the average person

" . . . the quality of life improves greatly for the average person in a smart community."

in a smart community. In 2018, after studying dozens of Smart City applications and measuring their effectiveness across 50 cities, the McKinsey Global Institute determined the quality of life can be improved by as much as 10-30% by introducing such initiatives.3

Smart initiatives also drive economic development by positioning smart communities as desirable places to live and conduct business. For example, the Logan County Economic Development Corporation (LCEDC) in Colorado developed a high-speed internet infrastructure to create opportunities for workers in rural and disadvantaged areas with the view that remote jobs could provide local work opportunities. It was a strategy that paid off, with an influx of new teleworking opportunities for residents and the attraction of more than 25 new businesses into the area, including restaurants, boutiques, an arts co-op, and a microbrewery.

THE TECHNICAL FOUNDATIONS OF SMART RURAL COMMUNITIES

Underneath it all, solid foundations are required to make the collection and transmission of information possible: 1) sensors and mobile devices for collecting and measuring the data, 2) a robust mobile wireless network, which is increasingly migrating to 5G; and 3) an underlying fiber network which enables both of the above while also providing broadband connectivity to every area in the community.

Broadband fiber network: Broadband fiber must be woven into the rural landscape's fabric to ensure the continued viability of these populations to thrive in an ever-increasing technological environment. This challenge will require enormous investments. A 2017 Deloitte study suggested that a $130-150 billion overall investment would be required. Another study from CostQuest in 2018 claimed $61 billion would be needed to build out exclusively unserved rural areas of the U.S. Fortunately, several grants and resource funding opportunities have recently become available to make an aggressive push in the right direction.

Robust wireless connectivity, including 5G: 5G and Wi-Fi 6 are completely different technologies, but they both promise support for more connected devices and better wireless connection speeds-factors that are critical to the rise of smart communities.

IoT devices and sensors: The Internet of things currently consists of more than 30 billion connected devices, with more being added daily-in cities, farms, and homes. Data collection is constant and ongoing in every facet of everyday life.

Marching Forward

The development of Smart Rural Communities and smart technology will have an enormous impact on the future of rural life - from significant efficiencies related to the management of local towns and farms, to critically improved health services, remote learning, and remote job opportunities. New York, London, and Rome may get international attention as they step up their game, but on the local, rural, and individual levels, the advances will be felt just as deeply, and the outcomes will be just as profound.

1SMART CITY INDEX, https://www.imd.org/globalassets/wcc/docs/smart_city/smart_city_index_digital.pdf
2Brooks, Alison, et al, IDC FUTURESCAPE: WORLDWIDE SMART CITIES AND COMMUNITIES 2019 PREDICTIONS, https://www.idc.com/research/viewtoc. jsp?containerId=US44970019
3Research: Smart Cities: Digital Solutions for a More Livable Future, https://www.mckinsey.com/business-functions/operations/our-insights/smart-cities- digital-solutions-for-a-more-livable-future

Kara Mullaley is the Community Broadband Market Development Manager supporting the North American Tier 2/3 needs at Corning Optical Communication. With over 20 years in telecommunications supporting network operators in the deployment of broadband worldwide, she is a subject matter expert on best practices for fiber deployment, architecture, and solutions to address tough deployment challenges. Her focus is to ensure operators invest wisely to meet today's rising bandwidth and tomorrow's emerging application demands. She has delivered technical sessions at various FTTx conferences and has also been published in several trade publications.

Based in Hickory, North Carolina, Kara graduated with a Bachelor of Science degree in Industrial Engineering from Virginia Tech.

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because of the higher cost, there will be a mix of three sets of Wi-Fi devices: low-cost Wi-Fi 5–only devices, dual-band Wi-Fi 6, and tri-band 6E clients shipping together for the next three years. After this three-year period, Wi-Fi 7 comes into the mix.

» Wi-Fi 6E–based set-top box (STB) and smart media device (SMD) solutions: Particularly in congested 5 GHz multiple-dwelling-unit (MDU) deployments, using new 6 GHz spectrum can afford apartment residents their own Wi-Fi channels, offering unparalleled performance for service provider–led SMD solutions. What OTT streaming service wouldn't want to run on a device with no congestion in its delivery?

» First deterministic, low-latency, no-jitter Wi-Fi services: Wi-Fi 6E can deliver connection quality equivalent to an Ethernet cable. The 6 GHz spectrum offers a new platform for low-latency, no-jitter applications, such as gaming and financial trading. In addition, high-capacity services such as virtual reality and augmented reality will need Wi-Fi 6E to create in-room, untethered, immersive experiences that can work only with determinism of rendering and decode times.

Wi-Fi 6E–based service-provider offerings align more with new use cases and new services, solving issues such as MDU 5 GHz congestion. These deployments run concurrently with Wi-Fi 6 gateway and access-point deployments for consumers not quite ready to take advantage of the new features aligned with Wi-Fi 6E. We expect to see service providers drive 6E adoption faster than the random addition of Wi-Fi 6E–capable clients to the home and take advantage of extending their deterministic DOCSIS 3.1 and XGS-PON access networks through the home to the end client applications.

Wi-Fi 7

There's more … enter IEEE 802.11be or extremely high-throughput (EHT) Wi-Fi. Currently working through specification within IEEE and expected to become the Wi-Fi 7 standard, it is a rapid evolution of Wi-Fi 6E and naturally extends the work of new spectrum-aligned features. To complete Wi-Fi's journey to try and match the capability of any wired solution, Wi-Fi 7 adds several features, but two in particular define what it is and where it will be used.

320 MHz Channels

A significant upgrade from 160 MHz support in Wi-Fi 5/6, 320 MHz stretches modulations to 4K QAM. Together with 6 GHz spectrum availability, this gives Wi-Fi the potential to support 10–20 Gbps in the home, creating the potential for both 10 Gbps-plus backbones to interconnect rooms and the ability to do in-room Wi-Fi from 4.7 Gbps to 10 Gbps, depending on investment in radios. This creates a future wireless platform to grow services such as complete, untethered, low-latency immersive solutions on headsets or even on holographic monitors, such as those from Looking Glass Factory. With this wireless platform, it's easy to imagine the applications that will build up in the home.

Multilink/Multiband Operation

With tri-band access points and clients becoming the norm from 2023 onward, the Wi-Fi specification introduces the ability for the access point and client to send traffic on all three bands (2.4/5/6 Ghz) and for the Wi-Fi MAC itself to manage the decisions about how to send and receive these IP streams over the multiple bands. This will effectively replace the specific band steering seen today, coaxing clients to the right single band to get the best throughput.

So, although there will be potential to introduce Wi-Fi 7–based solutions in 2023, it will be driven by a need to support high-capacity applications in particular. Because most people will not need this immediately, there will be plenty of room for Wi-Fi 6E and Wi-Fi 6 solutions to find adoption and overlap with Wi-Fi 7 availability. However, Wi-Fi 7 also will resync the changes in Wi-Fi 6 and 6E insofar as the shift to tri-band access points and clients goes – creating compelling new Wi-Fi solutions for all deployments in the 2025 timeframe. In particular, home backbone and mesh solutions as well as VR/AR solutions will rapidly adopt Wi-Fi 7 as core technology. Also, new access technologies, such as DOCSIS 4.0, will naturally align with the availability of Wi-Fi 7 – pushing 10 Gbps low-latency delivery from the core network to client applications in homes.

The Simple Path For Service Providers

There is a simple path for service providers to take advantage of the three new changes in Wi-Fi technology over the coming three years. At its core is the key philosophy of investing in extending deterministic high-capacity and low-latency networks to client applications themselves, not just the access network. All three Wi-Fi solutions – dual-band Wi-Fi 6 and tri-band Wi-Fi 6E and 7 – will have a fundamental part in creating the new platform of reliable high-capacity, low-latency wireless networks that new home services, such as VR and AR, will run on in the future.

By investing in creating a deterministic wireless platform in homes, service providers will naturally attract all services to that platform, ensuring their relevance to consumers and potentially offering new commercial agreements with other OTT providers wanting to leverage low-latency, congestion-free wireless delivery for their services to use. It seems to be one of those times in which if the service provider builds it, they will come. And they will indeed come, as reliability, performance and latency required for the service become fundamental in the increasingly digitized world.

Charles Cheevers is Chief Technology Officer, Home Network Solutions, at CommScope, a global leader in infrastructure solutions for communications networks. He is responsible for the two- to five-year technology vision of CommScope's consumer-premise equipment (CPE) business.

In this role, he defines new home architectures for CPE devices and cloud-to-ground solutions as well as the evolution of CommScope's home gateways, set-tops, and connected home solutions.

In his more than 20 years in the telecommunications industry, Mr. Cheevers has been responsible for bringing to market a range of technologies — including DVB, DOCSIS, DSL, PON Network and CPE Video Voice and Broadband solutions. For the last six years, Mr. Cheevers has focused on delivering the next generation of connectivity and technology-driven user experiences to the home. As a result, he's played a key role in pioneering major trends in Wi-Fi, IoT, IP video, TV experience and set-top technology, and most recently AI-driven smart solutions, with the debut of CommScope's Smart Media Device.

Mr. Cheevers and his team have also been creating new home platforms for many of the world's leading service providers. With the emergence of new wireless convergence solutions in both unlicensed and licensed bands — from 1 to 100GHz — Mr. Cheevers and the CommScope CTO office have been innovating new architectures for consumer and home wireless convergence across Wi-Fi, LTE and 5G.

Mr. Cheevers joined CommScope through its acquisition of ARRIS in April 2019 where he served as CTO of CPE Solutions from 2012 to 2019. He joined ARRIS in 2003 via acquisition of Com21 Inc and was VP Engineering of ARRIS Cadant® C3™ CMTS and D5™ EdgeQAM products. In 2006, he was appointed as Chief Technology Officer of Europe, a position he held concurrently to being GM for the ARRIS Edge QAM business from 2008 to 2010.

Prior to his tenure at ARRIS, Mr. Cheevers was Vice President of Engineering and an Officer of Com21 Inc and held senior management positions for Apple Inc.

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High Altitude Platform, and Satellite services make switched access inconsequential and the argument over unbundled network elements laughable. What is lacking today are the government's attention to some of the operating circumstances that continue to make access of advanced telecommunications services in many rural areas unsustainable and the land use issues that make the construction of high capacity infrastructures difficult. The FCC auctions, for example – today's diluted version of the FCC's former endorsement of RLECs' acquisition of unserved study areas – do not adequately consider the long term sustainability of a broadband network in very high cost rural areas. And, even with FCC auction or USDA grantmaking support for telecommunications infrastructures in unserved and underserved rural areas, many broadband projects are hindered and made more expensive due to the government's own rights of way and easement restrictions. There has been no discernible improvement in either state or federal government rights of way regulations since the outbreak of the Covid-19 virus, and a telecom company's access to an electric easement remains as troublesome and expensive as it had been prior to the pandemic. In the words of one government official last year, "the normal rights of way processes will continue to be followed". For rural areas, normal means deprivation.

In sum, the Telecommunications Act of 1996 can be considered a major success for the stimulation of open markets and innovation in much of the United States, though missing the target in achieving comparable benefits in rural areas. If there is to be an Act of 2022, let it be focused on reforming a broadband carrier's use of governmentally managed lands and the reconstruction of a financial model that ensures the sustainability of competitive broadband services in the more remote and low income areas of our country.

Cont'd from page 13

BBC: Do you see broadband and the presence of fiber as important to making communities more attractive?

MC: It is. It fuels and allows for more opportunities. We must recognize the importance of fiber infrastructure to the rest of the ecosystem. This is not a binary discussion. This is not a fiber-versus-wireless discussion. Increasingly, people are seeing that there's no tension here. This is a positive acknowledgement. We're using the conjunction "and." We're not saying "or." When you do that the opportunities are boundless.

We're launching the BroadLand movement because we recognize there are examples of those scrappy innovative companies that are doing things in certain footprints that we know should be wired and should be more enabling. They are proving all the naysayers wrong. I believe that is what the Telecom Act envisioned. It was a down payment via opportunities, competition and connectivity. We have got a lot to celebrate, but we have got a lot to do.

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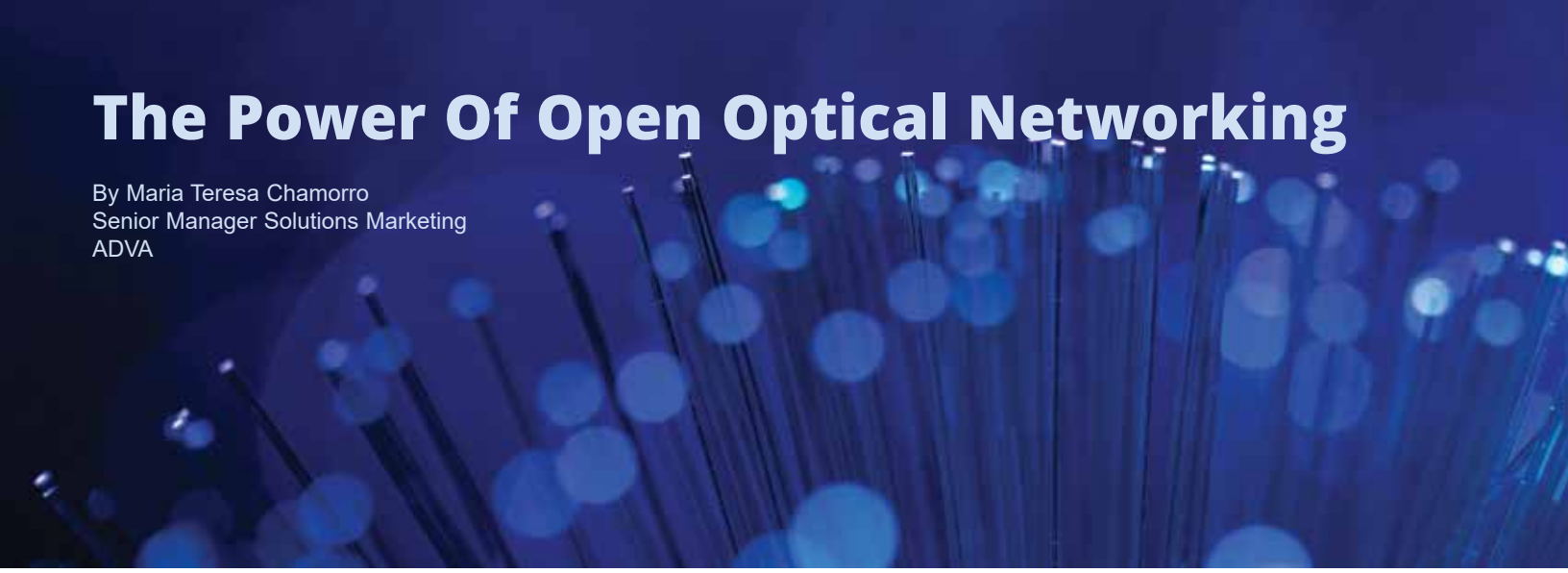
The Power Of Open Optical Networking

By Maria Teresa Chamorro
Senior Manager Solutions Marketing
ADVA



High-capacity and ultra-flexible DWDM networks are a fundamental pillar for mission-critical applications. So much so that I find it hard to believe that there was a time without them. The first commercial DWDM deployments started to ramp up in the late 1990s, around the time when the Telecommunications Act became law. Since then, the rapid evolution of DWDM transport systems has been driven by the ever-increasing demand for bandwidth. But change doesn't stop there. Now, the trend towards open networking has also reached fiber-optic transmission systems. Open and disaggregated DWDM systems have become key themes. But what do openness and disaggregation of optical networks mean? And why's that important for network operators? Let's take a closer look.

FUTURE-PROOF AND COST-EFFICIENT

Suppliers have traditionally sold DWDM systems as closed solutions, where a single supplier provides all the components in the system. That includes transponders, amplifiers, filters, ROADMs, and network management software. In this scenario, the evolution of the network relies on the evolution of the whole system, and the innovation capabilities of that one system vendor.

In contrast, open and disaggregated systems – where the optical line system is decoupled from transponders – give operators choice and flexibility. By disaggregating transponders from the line system, operators can easily take advantage of faster transponders innovation cycles, and adopt the latest advances in coherent technology. And they can do so without changing other components.

What's more, since the line system is not coupled to the vendor's transponders, it can also transport wavelengths from a third-party vendor's transponders or from any other type of optical transceiver, such as latest 400ZR coherent pluggable modules, which can be plugged into switches and routers. By using an open line system, operators can select best-of-breed technology for each part of the network, they can decide where and when it's needed, and they can harness solutions from one or multiple vendors. This unlocks the full benefits of competition and innovation.

OPENNESS GOES BEYOND HARDWARE DISAGGREGATION

All the above is true only if the system is both disaggregated and truly open. An open line system will support those wavelengths without the need of additional (and expensive) hardware or exorbitant licensing fees. It will also not block or limit the transparent transport of those wavelengths, or the capabilities to monitor or protect them.

" . . . the rapid evolution of DWDM transport systems has been driven by the ever-increasing demand for bandwidth."

Open optical networking also requires open programmable control. Terminals and line system must be accessible and controllable through open and standards-based application programming interfaces (APIs). Doing so enables integration into software-defined environments with vendor-independent end-to-end control.

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"2021 is a really pivotal year for disaggregation and open packet-optical networks. After many years, the industry is coming together around some open and disaggregated models that are built for the telecom market."

- Sterling Perrin, Principal Analyst, Heavy Reading

Last Mile Open Access Networks: The Logical Next Step to Telecom's Digital and Historical Transformation

By: Heather Burnett Gold
CEO
HBG Strategies

Two recent blogs provided clear "lay person" definitions of open access networks (OAN). The first, published by UTOPIA Fiber in early March[1] compares open access networks to a municipally owned airport, where the community builds and runs the airport (fiber transmission lines), but the individual airlines (analogous to internet service providers (ISPs) rent capacity and directly serve the customers. The second, from late April on the MERIT[2] blog page, compares open access to a highway system, in which the taxpayers build and maintain the highway (fiber network) but a customer can use any model of car (ISP) he/she desires to drive the highway. Both definitions highlight the capability of the OAN to bring great competition in services and applications to communities without expensive overbuilding by multiple physical plant providers. The physical assets (the fiber rings, interbuilding and usually last mile) are constructed by a community as a utility and then offered on a nondiscriminatory basis to multiple providers (ISPs) who compete for consumer business by offering competitive services/applications and pricing. This transition to Open Access networks is fully aligned with the Digital Transformation currently taking place in Telecom and follows as the next step in telecom's regulatory history.

Regulatory History of OAN in the United States

Open access is not a new concept in the United States though it has undergone various iterations over the last 3 decades[3].

1. Structural separations concept – was present prior to the Telcom Act of 96 as an option for local/long distance entry. One of the earliest discussions of an open access network surrounded a proposal by Rochester Telephone Company in 1994 to the New York Public Service Commission[4] to separate itself into a wholesale transmission company and a retail services company. It was not ultimately permitted because it provided insufficient safeguards between the retail and wholesale units.
2. "Bit stream" unbundling was proposed by competitors as incumbents pushed "new wires, new rules" concept in early 2000s. As the large incumbents (particularly Verizon) began to deploy more and more fiber optics into their networks, their opposition to offering these facilities on an unbundled basis grew. Using the argument that "New Wires demanded New Rules" and with the remand of the Federal Communications Commission's (FCC) Unbundling Order and the commencement of the FCC's Triennial Review of the Telecom Act '96 Act, the incumbents saw their opportunity and started their push back. Unbundling provisions in broadband markets were vacated by the courts as a result of the United States Telecom Association (USTA) I (Appeal of FCC's initial Unbundling Order) decision in 2002 and were phased out by the Triennial Review Order of 2003. The competitive local exchange carriers (CLECs) attempted to counter these physical unbundling requirements by asking for service unbundling wherein the incumbent local exchange carriers (ILECs) would permit access to the "a bit stream" of data so that CLECs could provide advanced services over these lines. This proposal was not accepted as both the FCC and the ILECs argued that permitting such access would undermine investment in alternative, competitive facilities. Such duplicative investment was considered a public goal at the time.
3. It was determined during the implementation of the American Rescue and Recovery Act (ARRA) that "open access" requirements should be placed on middle mile Broadband Technology Opportunities Program (BTOP) grants. With the economic collapse and the need for massive infrastructure investment in 2008-2009, the ARRA funded $7.2B in broadband investment, $3.6 for BTOP administered by National Telecommunications Infrastructure Agency (NTIA) within the Commerce Department and the remainder administered by the Rural Utilities Services (RUS) under the Department of Agriculture. NTIA found that duplicative investment in critical middle mile infrastructure was unlikely, particularly in rural areas. However in order to encourage such investment with competitive offering of services, the BTOP, required such middle mile investment on an open access basis[5].

Now let's look at some examples of Open Access Networks.

1. Public Utility Districts formed – Like many of the electric cooperatives formed in the 1930s to assist rural areas getting electricity, Washington State turned to what they called the Public Utility District (PUD) model. In 1930, The Washington legislature gave each county the right to form a PUD, primarily to provide power. Later the PUDs expanded to provide water. In 2000 PUDs were also authorized to provide telecom on

a wholesale basis. A group of PUDs came together to form NoaNet which operates as an open access middle mile network, to bring broadband to unserved and underserved areas. This year, the Washington legislature has overturned all restrictions on community and municipally own networks enabling PUDs to offer retail services if this is what they want to do.

2. UTOPIA Fiber – the Utah Telecom Open Infrastructure Agency was formed in 2004 and operates as a wholesale provider. They currently have 16 communities and 14 internet service providers on their network.
3. Huntsville, Alabama Utilities – The City of Huntsville, home to more engineers than anywhere in the US, was frustrated by the lack of high-speed internet and big data portals. At the same time Huntsville Utilities was looking to expand it network fiber deployment to better manage its electric grid. Following a feasibility study, the utility concluded that it would be too expensive (and risky) to build a complete fiber to the home network. Consequently, the utility decided to expand only along its routes, providing an open access dark fiber network and seek third parties to build the last mile drops into homes. In 2017 Google Fiber announced it would partner with the utility with a 20 year lease and provide "triple play" (voice, video, and data) to all customers. This partnership enabled the city to get the broadband it needed and greatly reduced the construction costs for Google. While Google has been the only internet service provider to ride the utility's dark fiber to date, the utility would welcome any other ISPs willing to take the same terms and conditions including building their own connection to the premises.
4. Ammons, Idaho began building its open access network in 2011 focusing on broadband as an essential utility. Dividing the city into community districts, Ammons has the property owners in each district share in the cost of the infrastructure deployment. Once the community is built out the costs are divided among the property owners and paid for over a 20 year period, thus taking the financing of the build away from the city. The annual cost is less than $200 per residence and the operating costs (part of the utility bill) is about $16.50 per month. All ISPs as well as their various services are managed via software. Ammons currently has just over 17,000 residents eligible for its fiber with 4 ISPs operating on its network. And it will be expanding its reach in partnership with its sister city, Idaho Falls, to have a total potential universe of 85,000 citizens.

Digital Transformation in Telecom

As the push for ubiquitous broadband with multiple advanced applications accelerates, OANs are being more widely recognized as a viable model for telecom buildout. The key is giving citizens the reliable, affordable services where and when they need(want). This will happen as more providers undertake the transformation to all digital/virtual network management.

As Chris Mitchell from ISLR has pointed out "*We believe this [The ability to successfully offer OAN] will change as the technology matures and more communities embrace software-defined networks (SDN)..... The ability to offer simultaneous services depends greatly on the underlying technology. Not all FTTH networks can give ISPs the tools they need to have confidence in delivering a high quality product reliably to their subscribers..... The Holy Grail among those who prioritize this flavor of open access is to make it very easy for network subscribers to manage their own*

ABOUT THE AUTHOR

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

subscriptions - changing providers on the fly (and again, see Ammon above for a model). This approach would allow ISPs to specialize and greatly encourage innovation, particularly for niche services. You might subscribe to an ISP that specializes in great connections for video games while also having a part of your connection dedicated to a home alarm system and still be able to initiate a high-quality teleconference for health care that wasn't transported on the public Internet.[6]"

The case for digital transformation has been expressed as follows:

1. Barriers to new revenue growth were inhibited by legacy closed "proprietary" systems. For all telecommunications providers, regardless of degree of monopoly and size, the demand of new revenue opportunities driven by advanced service applications grew. In order to encourage such innovation, providers needed to move beyond their legacy "closed" proprietary IT systems and implement more open architecture. A true picture of the impact of moving to a more application systems can be witnessed by the growth of Apple's and Google's mobile phone OS market share where they encouraged the use of third-party applications and innovations via open sourcing versus the decline of Nokia's where it maintained its legacy proprietary systems.
2. Growth of virtual network management. With the roll out over ever more fiber optics and 5G, the networks can now provide the platform on which digital services can be delivered and the entire network managed virtually. This is known as the digital transformation The TM Forum lays out the requirements for the Digital Transformation as follows:

a. A shift from discrete network elements to an independently managed, virtualized communications and cloud infrastructure. The benefit here is a shift from expensive and hard-to-manage discrete network elements to a virtualized environment that's easily more run at a far lower cost. The first manifestations of this transition were driven by Network Function Virtualization and Software Defined Networking.
b. The move to uniformly orchestrated security. Digital services have higher security requirements, so security needs to support the full technology stack, the data, the service creation process, the partners, and the physical environment. The increasing importance of IoT adds to this challenge.
c. Changes in data usage, from limited to a uniformly orchestrated, data-driven enterprise. Central to the digitally transformed telco is a consistent approach to the collection, analysis, distribution, security, and monetization of data collected rom multiple sources. Digital success is largely dependent on how well data is leveraged, both for internal business optimization and external monetization.
d. The emergence of an Open API platform architecture. Digital transformation means an end to traditional telco closed IT architectures. Open platforms and easily accessible APIs are required to support the development of both internally developed own-brand services, and externally developed third-party services.
e. The service revolution, meaning a diverse portfolio of digital services. Digital transformation means telcos expanding their service portfolios to offer new suites of digital services, addressing new vertical markets, with strong revenue growth potential.
f. Building and supporting a vibrant ecosystem of partners. Transformation means CSPs ceding control of traditional relationships with vendors and partners and replacing it with a more diverse ecosystem in which partner relationships are managed in new ways.
g. Replacing a limited set of business models with multiple, innovating business models across the market. It's critical for telcos to develop new flexibility in how they create value for both themselves and their partners. This means new operational models and new business processes are table stakes.
h. Culture change. Taking all of the above into account, culture change – the shift from being a traditional, network-centric organization to partner-driven, diverse service portfolio company requires a totally new mindset, particularly to compete effectively with OTT players.
i. Abandoning tradition and leveraging new ways to market. Digital transformation revolutionizes how telcos sell. Fining new communications and partner channels to drive the communications service provider's brand, maximize digital services and products revenues, is critical to success.
j. 360-degree omnichannel customer experience must replace traditional, more limited, relationships. User expectations increase in the digital world and to meet them, seamless, integrated experiences must be supported if the telco is to accrue benefits in increased customer satisfaction and reduced customer churn.[7]

" . . . a search of the data indicates only about thirty communities are providing open access networks."

The number #1 benefit of the Digital Transformation is the transformation of the Customer Experience. Heretofore customers were forced to call into a service center to make any changes and each part of their issues had to be manually and separately researched. Now with digital transformation, even residential customers can implement service order changes through their desktop or mobile apps. Thus, the customer who is expecting house guests can "up" their bandwidth requirements for a couple of days without changing their regular service plans or getting through to a service rep. This transformation not only benefits monopoly providers but can most directly impacts smaller and open access networks.

There is a growing recognition that, particularly in less densely populated areas, constructing duplicative infrastructure would not only be cost prohibitive, but a single provider/operator system could fail to deliver service competition, inhibiting the offering of new and innovative applications to all consumers. But an OAN that implements a virtual network management and cloud-controlled applications (as dictated by the digital transformation), dramatically changes how networks and services are provisioned, enabling multiple service providers to ride the physical infrastructure and implement new and advanced services seamlessly making competitive service provision a much more practical and affordable option.

So Why Aren't There More Open Access Networks?

Currently a search of the data indicates only about thirty communities are providing open access networks. Given the benefits and digital transformation changes cited above, why don't we see this type of network more widely deployed?

1. Federal and some state funding require grant recipients to be "eli-

gible telecommunications companies" (ETC), which means in most instances that they are certificated local telephone providers. As open access networks only provide the infrastructure and not the service, they have no need to become ETCs which is accompanied by a varying degree of regulatory oversight. This is starting to change as the conversation about bringing new solutions to the rural and underserved communities grows. Currently there are 2 programs for Economic Development grants through the Department of Commerce that are open to OAN.

2. Restrictions on municipal ownership of telecom facilities. There are currently 18 states which have restrictions of some kind, from outright prohibition to extensive legal and regulatory hoops, on municipal investment in communications investment. This creates the need to find private partners to "front" investment which often does not permit the "open access" framework the communities want and need. The good news is this number is decreasing, as we saw this year when the Washington state legislation removed all restrictions.
3. A lack of knowledge by smaller providers and communities that software vendors are starting to offer the necessary SDN and virtual network management requirements for supporting multiple ISPs on a subscription basis. These offerings eliminate the need for smaller providers and communities to invest in these kinds of software upgrades on their own.[8]
4. Limitations on the ability to attract multiple ISPs due to a smaller subscriber base. In order to successfully support multiple ISPs on an open access network, it is estimated that you need several 1000s subscribers per ISP. Some communities are working around this subscriber limitation by having a single provider for the last mile local network but with contractual obligations upon that carrier for open access to all advanced service offerings – like a strict "net neutrality" regime. We have seen this in Danville, Va. and in Medina County, Ohio. In additional, where permitted, neighboring communities can work jointly to ensure a sufficient subscriber base such as UTOPIA does.

Regardless of where the next iteration of OANs go, it is clear that they are definitely a viable path to bringing competitive service advantages and control over an essential utility service to any community and should be further supported by federal and state authorities.

1 https://www.utopiafiber.com/2021/03/17/open-access-networks/

2 https://www.merit.edu/news/the-benefits-of-open-access-networks-for-communities/

3 Open Access has been successfully utilized in European communities for decades.

4 New York Public Service Commission, Petition of Rochester Telephone for Approval of Proposed Restructuring

Plan – Joint Stipulation and Agreement, Case No. 93-C-0/03, Amy 13, 1994.

5 A full description of the interconnection, pricing and terms that must be available under BTOP can be found at:

https://www2.ntia.doc.gov/files/Interconnection_Nondiscrimination_11_10_10_FINAL.pdf

6 htt//muninetworks.org/content/ok-just-what-does-open-access-mean-anymore

7 https://www.evolving.com/resources/blog/what-is-digital-transformation-in-telecoms

8 For example, ETI Software has just recently announced a partnership with Microsoft that will enable it to offer smaller providers the same advanced network virtual management and SDN that large incumbents provide to customers. This will even be more beneficial in the OAN market where multiple service providers are trying to virtually differentiate themselves over common facilities.

NEWS

A TDS fiber network expansion will bring 1 Gbps service to a total of 68,000 addresses in Spokane County and Spokane Valley in Washington State. The new addresses include 22,000 in Spokane County – including the city of Millwood – and 46,000 in Spokane Valley.

The Spokane network, which offers all-digital TV service, TDS TV+ and phone options, launched in six neighborhoods in April. The 1,100 mile FTTH network eventually will connect more than 88,000 homes and businesses. Construction began last year, with services to be added in phases, the company says.

"TDS is delighted to bring a new choice with fiber optic speeds for residents in Spokane Valley and Spokane County," TDS vice president of Marketing and Product Development Julie Maiers said in a press release about the TDS 1 Gbps expansion. "Along with our gigabit internet speeds, TDS also offers a state-of-the-art TV viewing experience and voice service."

Telecompetitor covered the lighting of the first six neighborhoods in May.

The Spokane area project was announced in late February 2020. At that time, the company said that service would be provided through TDS Metrocom, the company's competitive local exchange carrier (CLEC).

TDS is overbuilding two high profile service providers, Comcast and CenturyLink. A story that appeared in The Spokesman-Review when the overbuild was announced said that TDS research suggested that there is high demand in the Spokane market for competitive broadband options. TDS also is constructing a 700-mile network in nearby Coeur d'Alene, ID.

TDS is aggressive on the fiber front. When it announced its 2020 results in February, it said that it had passed 300,000 locations with fiber, about 36% of its 845,000 wireline locations. The company promised to add 150,000 locations this year and to more than double its fiber locations – to 620,000 – by 2024.

Posted on June 22, 2021 by Carl Weinschenk, Telecompetitor
https://www.telecompetitor.com/tds-expands-1-gbps-broadband-in-washington-state/

IN THE SPOTLIGHT

SARAH WALKER
Sarah has accepted a promotion as Director of Services Development for the company. She joined Walker in 2020 with nearly 20 years of experience in telecom and cloud communications. She started her career at Speakeasy, where she worked in Sales and Business Development roles for four years. She then transitioned to Support to focus on serving the partner community and solving customer issues. Sarah has spent the last 10 years working for MegaPath (now Fusion Communications) leading Service Delivery, Implementations Engineering, and Technical Support organizations. Sarah is passionate about leveraging technology to drive exceptional customer experiences and outcomes. She is very excited about the opportunity to bring the knowledge and insights she has gained working on the front lines back to Walker.

Sarah is a third generation Walker, proud of the heritage passed along by her grandparents, company co-founders Chris and Virginia Walker. Sarah grew up in Virginia and attended college at Warren Wilson in Asheville, North Carolina, before relocating to Seattle, Washington.

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JOE TRAMMELL
Joe Trammell recently joined Walker in the capacity of Utility Market Manager, Central Region. He is responsible for key customer relationships in the Utility Market in the Central U.S. Prior to Walker, Joe spent several years with technology companies in Business Development and Channel Sales roles, including ADTRAN and 3Com. His career began working on voice and data solutions for clients in SME and GovEd and for the last several years has specialized in broadband access solutions in the rural carrier market. Joe's career in technology started in the previous century and for over 30 years he has watched the world morph from analog and copper, then digital, to IP and fiber-based solutions. Joe holds a BBA degree from Baylor University.

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MATTHEW COONEY
Matt has recently transitioned into the role of Inside Sales Executive and will be covering the states of Wisconsin, Tennessee, and Illinois. Matt Joined Walker and Associates in August of 2019 in the Marketing department working within the Business Development Group. Coming into the 2021 fiscal year he transitioned to a hybrid role of Inside Sales Executive Floater as well as still working within the Business Development team on various sales/marketing BD campaigns. Matt has undergraduate degrees from Guilford College in Greensboro, as well as an MBA from Florida Tech University.

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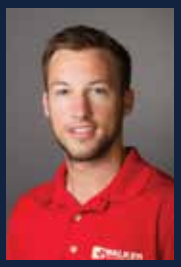

ADAM BLACKLEY
Adam Blackley, who first joined Walker as an intern in 2013, is moving to a named account team as an Inside Sales Executive. Most recently he has been an ISE for several east coast state, managing 100 different accounts over the years. His work has given him extensive exposure to a variety of Regional Account managers and OEM representatives. Adam's experience with Walker also includes time with the Federal Sales organization. His well rounded experience has earned the trust and confidence from customers and business colleagues, earning him awards and recognition along the way. Congratulations, Adam, on this new assignment!

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MICHAEL SMITH
Michael Smith has more than 26 years working in the telecommunications industry. Starting in 1994 as an OSP Engineer and working his way up the to the Engineering and Planning Manager for Lexcom Telephone Company, Michael managed the design and deployment of copper, coaxial, and fiber networks. His experience includes designing and deploying aerial, buried, and underground cable facilities, cross connects, pedestals, manhole systems, cabinets, and shelters. After Windstream acquired Lexcom Telephone Company, Michael was promoted from Supervisor to Manager of the OSP engineering where his responsibilities included managing engineers, project managers, and contractor teams. As Manager of OSP Engineering for Windstream, Michael's responsibilities increased from managing three small exchanges to managing OSP for all ILEC territories in North and South Carolina. After joining Walker in 2017, Michael used his project management skills to enhance customer experiences and improve processes to increase value for Walker Services.

Michael's new role is Product Line Manager for Cabinets and Shelters, and is responsible for expanding Walker's cabinet and shelter product lines.

Michael plans to engage with teams to understand opportunities, collect feedback, and evaluate strategies that will be used to increase revenue opportunities for the cabinet and shelter solutions.

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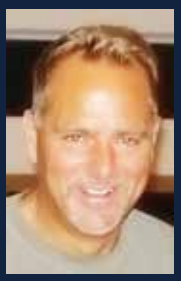

GREG GOLD
Greg Gold recently joined Walker as Professional Services Network Consultant. Greg comes to the company with more than 15 years of professional experience. He has a diverse background that includes business administration, team management, security, network design, consulting, operations, systems integration, and architecture. His diverse strengths include high-profile customer relationship building, vendor management, project management, and cross-functional collaboration. He possesses knowledge of an ever-growing list of technologies with excellent communication skills and a proven track record of superior performance. Greg has a reputation for aggressively building upon attained industry certifications and pursuing advanced levels of technical expertise. Personal interests include Aviation, finances and tennis.

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BRIAN MULLAR
Brian Mullar launched his telecommunications career with Ingram Micro's technical support group, specializing in customer premise equipment such as T1 Channel Banks, PBXs and Key Systems, Remote Access Servers, and Routers from various manufacturers.

In 2000 he joined ADTRAN as the Sales Engineer on the West coast supporting all Carrier Networks and Enterprise product solutions. The next 15 years he transitioned through the various technologies of TDM, ATM, SONET, and on to Ethernet, assisting with designing pre-sales solutions, troubleshooting issues, training customers, and mentoring team members.

In 2015, Brian was promoted to Sales Engineering Manager of the West coast and Latin America. Responsibilities included ensuring team members had the equipment, training, and departmental resources to be successful supporting customers.

Brian comments: "I believe in teamwork, relying on each other's expertise, creating resources to make everyone more efficient, and passing knowledge along to help each other succeed. I believe integrity and work ethic helps an individual succeed and maintains customer loyalty when challenges arise."

Brian joins the Walker and Associates team as Professional Services Network Consult, assisting the Regional Account Managers and the Professional Services team, initially focusing on ADTRAN solutions expanding into Juniper, ADVA, Ciena, and others.

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TOM LANCASTER
Tom is a 16-year veteran of the telecom and broadband industry, beginning his career in 2004 as a technician for Time Warner Cable, learning the need and importance of reliable broadband service. He later moved into Telecommunications Engineering and Design with ONUG Communications. Tom was responsible for the field data collection of various fiber, copper, and remote terminal placement projects.

In 2011 Tom joined Byers Engineering Company as a Project Engineer Regional Manager, developing and managing teams of engineers to complete OSP projects, on time and within budget, including Fiber to the Home, Fiber to the Tower, Enterprise builds and Utility Relocations. Tom coordinated with existing and potential customers on current and upcoming projects while also reviewing and submitting RFP bid packages.

Tom joins Walker as an OEM Development manager for a suite of OSP manufacturers. He broadens the company's ability to evaluate new outside plant technologies and method for strategic selection of technologies and advise customers how to deploy and maintain utility grade infrastructures. Tom is excited to Join Walker and Associates as an OEM Development Manager. As he onboards with the team, his goal is to efficiently develop and maintain relationships with existing and new manufactures in the FTTx space.

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BRITTANY BECK
Brittany Beck joins Walker as an Inside Sales Manager. Her team covers the west region of the country, coordinating work with Regional Account Managers, managing customer service responsibilities, and driving sales campaigns in the region.

Before joining Walker and Associates, Brittany most recently worked for a local distribution company specializing in precision plastics and rubber products and spent the majority of her early professional career in various sales, marketing, sales support and customer service responsibilities. Brittany has a broad base of distribution experience supporting hundreds of customers, many manufacturing partners, and the intricate processes required to support daily transactions.

In her free time she likes to spend time with her family of Labrador Retrievers (Boozer, Mickie, Luke & Nyx), her fiancé, as well as weight training and helping others reach their fitness goals. She is a nationally ranked competitive bodybuilder and former state champion.

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LISA SMILEY
Lisa Smiley was recently recognized by AFCEA as a Meritorious Service Award winner. This award honors recipients for their outstanding contributions to AFCEA and their professional accomplishments in early to mid career. "The AFCEA community wouldn't be the same without these fantastic individuals—thanks for all you do!", stated the press release from AFCEA. Congratulations to Lisa Smiley on this achievement. Ms. Smiley has worked at Walker and Associates over 32 years, serving in a variety of leadership roles. She is currently the Director of Enterprise OEM Development for the company.

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Technology Evolved: Helping Businesses Grow

By Alcatel Lucent Enterprise Staff

Technology has come a long way in a short time and continues to be instrumental in growth of business and our lives. The recent health crisis changed how companies function as organizations were forced to adapt in challenging conditions while ensuring business continuity. Enter the power of digital transformation and the need to have a digital strategy as part of a greater business strategy.

When it comes to digital transformation, businesses that embrace advances in technology further drive the evolution. As many experienced in the last year, a business aligning a digital strategy with its business strategy, positions itself for success under any circumstances.

Our long history in the technology space has firmly established Alcatel-Lucent Enterprise as a reliable resource for businesses. We have 100+ years of experience in communications innovation with a global presence includes 2,900 direct/indirect business partners, serving over 830,000 customers. Most recently we were recognized with the 2020 Global Communications Platform as a Service Enabling Technology Leadership Award from Frost & Sullivan; and included in the Gartner UCaaS Magic Quadrant 2020 as a Niche Player. Our portfolio includes innovative real-time communication solutions and digital-age networking – delivered flexibly through the cloud, on-premises, or hybrid.

Throughout the numerous years of development, ALE has remained focused on technology that is fully compliant with security regulations (ISO 27001, TAA compliant) while operating on open standards. These have enabled us to deliver secure connectivity in support of newer technologies like the Internet of Things (IoT). What's more, with mission critical networks and bringing value added services (AI, analytics, workflows) we help customers integrate networks and communications services in their own business processes, furthering technology as a business advantage. For many, using AI is the next step of the digital transformation of a business.

Cloud technology is another development supporting enterprises today, while also building a mindset that pushes innovation, agility and problem solving. Cloud technology has helped businesses push beyond digital transformation plans and overcome the challenges of working through a pandemic. We've witnessed how flexible technology enables businesses to adapt the work environment, ensure efficient operations and manage costs.

Aside from cloud migration, another evolution is hyper automation. Automation improves both efficiency and user experience, meaning IT leaders can now shift focus to business innovation rather than building and running their infrastructure. We see a boost in demand for autonomous networks in companies with smaller IT teams, or teams working remotely. An autonomous network simplifies deployment by automatically and securely connecting people, processes, applications, and objects; the need for this level of simple yet secure connectivity is only going to grow in the near future.

Continuing this course, Alcatel-Lucent Enterprise will remain invested in delivering unique technology capabilities to education, healthcare, hospitality, government, and transport customers.

Let's deliver broadband level connectivity to all communities across the US. Whether it's the need for remote learning, a telemedicine appointment, working from home, or streaming entertainment, more than ever, your customers deserve the best experience no matter where they live. Juniper solutions are here to power those connections while making it simple for you to deliver.

Power Connections. Empower Change.

JUNIPER NETWORKS | Engineering Simplicity

Destination 5G

Only one path matters. Yours.

Converged 4G/5G xHaul transport and intelligent automation.

ciena

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