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A Breathtaking Year and Future

LETTER FROM THE PRESIDENT & CEO

Gary Bolton, FBA President & CEO

The Fiber Broadband Association and its many members – nearly 600 companies and continuing to steadily add more – did a lot of work last year that is documented in this edition of *Fiber Forward*. I continue to be amazed at the wealth of white papers and research FBA and its partners generated over the past twelve months, discussing the growth of the fiber broadband world and how it grows the economy, creates jobs, and strengthens American competitiveness.

More than half the homes in America are passed with fiber broadband, as you can read about it in the "U.S. Home Fiber Deployments Top 88M homes passed" piece. It bears repeating that FBA has a goal to reach 90% fiber penetration to all U.S. households in the next five years and we expect that to happen through a combination of both private equity and federal support.

Why do I and rest of the industry feel so confident in reaching 90% of U.S. households by the end of the decade? The many reasons can be found in "Documenting the Economic Benefits of Fiber in 2024," a summary of the numerous white papers created last year discussing the operational and economic benefits of fiber. Fiber is the most cost-effective and highest-performing technology to securely move large amounts of data and facilitate business operations and there's plenty of work by our committees and partners to document its many attributes.

Facilitating fiber coverage in the months and years to come will require more efficient approaches to construction. "Speeding Deployments by Speeding Locates" discusses the FBA Deployment Specialists Committee's white paper that examines the locate process and provides best practices for accelerating it.

Tribal Nations are an important community within the Association, and we continue to support them by working with the FBA's Tribal Committee and continuing to provide focused programming for Indigenous Nations through Fiber Connect and Regional Fiber Connects. Our Tribal-focused event in Albuquerque provided unique insights into the reasons why fiber broadband networks are a vital asset in creating jobs, supporting indigenous businesses, and preserving Native American culture, as revealed in "Shared Wisdom for Successful Tribal Broadband Initiatives" and "The Chickasaw Nation's Carrier-Grade Network."

As the FBA continues to grow, so has its executive leadership. Learn more about the latest election and our path forward in "Fiber Broadband Association Elects and Grows its 2025 Board of Directors." The new and growing board will help implement FBA's short-term goals over the next twelve months and move us towards our long-term goals over the next five years, the details of which you can find in "FBA Accomplishments for 2024 and Plans for 2025."

One constant found throughout the history of the internet is the ever-increasing need for more speed to support new applications. "An Evolution of Broadband Growth – CES 2025" looks at the many fields showcasing innovations that require lower latencies and bigger broadband, including agriculture, AI, construction, holographic assistants, power utilities, and home robotics, just to name a few.

Finally, "Lighting Up Nashville with Fiber Connect 2025" previews the world's largest fiber broadband event happening June 1-4, 2025. I'm looking forward to seeing everyone at the Gaylord and seeing how far we've progressed towards all of our goals.

Sincerely,

Gary Bolton

About the Cover

By Rich Williams, *Publisher*

New year, new focus for our *Fiber Forward* covers. While paying homage to Norman Rockwell's famous magazine covers was fun, we're bringing this year's covers a bit more into the modern era and creating covers that mimic iconic movie posters.

For this edition, we chose *Back to the Future*, the classic 1985 American science fiction film directed by Robert Zemeckis and starring Michael J. Fox, Christopher Lloyd, Lea Thompson, Crispin Glover, and Thomas F. Wilson.

Our cover time traveler is no Marty McFly though, he's fully connected to his world through fiber broadband. As you can see in the background, he's checking in on a deployment in his community, jumping through time in his electric, autonomous vehicle. If you look closely, you'll note that Finneas McFiber is wearing the latest FBA socks Virtual Reality googles that rely on fiber's low-latency symmetrical bandwidth capabilities, and checking his Apple Watch to ensure that the deployment behind him stays on track and on time. Finneas knows that only fiber broadband delivers the capacity to help his community reach its full potential in today's digital economy.

Without fiber, his rural community and many others will be left behind like it actually was in 1985 without broadband, with slow connection speeds, horrible delays in loading today's cloud services and AI-based assistants, and a digital divide extending economic hardship for families and communities around the country.

Back to the Future is considered by critics and audiences to be one of the greatest science fiction films and one of the best films ever made. The United States Library of Congress selected it for preservation in the National Film Registry in 2007. If you want to catch up on this cinematic masterpiece, it's available on-demand on multiple popular streaming platforms today. Watch the 4k version over your fiber broadband link for the best customer experience.

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2025 EDITION 1

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Fiber Broadband ASSOCIATION

EDITOR'S MOMENT

What are you going to do with it?

By Doug Mohney, Editor-in-Chief

Dear Readers:

Back around the year 2000 or so, a telco executive skeptical of fiber-to-the-home said, "Sure, we can provide 100 Mbps, but what are people going to do with it?" Twenty-five years later, we have telcos and cable companies of all shapes and sizes that are falling over themselves to provide households with symmetrical multi-gig services.

In my local market, TV ads for the incumbent cable company tout the virtues of gigabit and fiber, but don't blink because you'll miss the disclaimer/disclosure about how fiber delivers to the neighborhood while the last segment of delivery is through coax cable. And don't ask about symmetrical speeds, because you'll probably hear "What are you going to do with it?"

Certainly, the broadband ecosystem of service providers and equipment manufacturers believe there's much more to life than 100 Mbps, much less the FCC's minimal asymmetrical 100/20 Mbps standard these days. The future of PON is being waged between those that believe that the best path forward is to move from XGS-PON to 25G/50G services today with a demonstrated growth path to 100G tomorrow vs. those who want to go straight to 50G now with 100G available later.

For some forward-thinking communities, fiber has been paying and continues to pay economic dividends for decades. The city of Chattanooga bet hard on fiber, offering all its residents and business 1 Gbps service in 2010. Today the area continues to attract tech firms, startups, and venture capital. In addition, the same fiber network has enabled a smart grid that has cut power outages by 55%, an issue not only of convenience but of business productivity.

Other fiber economic success stories can be found around the country, with the availability of fiber creating new businesses, translating into higher average income per household, and increasing the value of homeowners and rental properties, just to cite a few of the many tangible benefits.

Searchlight Capital partner and former FCC Chairman Ajit Pai is very much in on fiber. Searchlight's 2021 deep-dive analysis on what to invest once he joined the firm saw the "one consistent theme in the consumer broadband experience… is that they're always consuming more bandwidth and that applications and services are going to scale according to consumer more bandwidth," said Pai on the February 12, 2025, *Fiber for Breakfast* webcast.

The Searchlight analysis also saw the need for more symmetrical bandwidth to support emerging and growing applications such as telehealth, gaming, high-quality video conferencing, and precision agriculture. Fiber emerged as the best available technology, with Searchlight portfolio companies seeing a tremendous consumer response when they offered it to their customers.

At CES 2025, the need for fiber was clear in not so much any one individual application or field, but in the cumulative growth of many. AI is the buzzword monster of the year, but companies are serious about leveraging machine learning and conversational interactions across all sectors, requiring low latency and the ability to support symmetrical voice and video. AgingTech and HealthTech come up with new ideas every year to make our lives better, regardless of what our birthdates are, while autonomous vehicles are expanding their reach in precision agriculture and arriving at airports, construction, and waste management.

All these applications are going to add up and continue to add up, moving us past the "What will you do with a gigabyte?" discussions of today and into "What can I do with 100 Gbps?" sooner than we think.

Until next issue,

Doug Mohney

AI-Powered Fiber Planning: Smarter Growth, Higher ROI

A new approach improves network design, decision making and returns

What was once a straightforward fiber rollout in cities and suburbs has become a complex, high-stakes challenge. As operators push into lower-density areas, their costs increase, demand is less certain and investment decisions become even more challenging. Yet there is hope.

Operators are learning how to pinpoint high-return project areas and cut costs by streamlining their network planning and deployments with AI-powered fiber planning and economic-modeling tools from Sand Technologies. Using the company's advanced AI solutions, operators can achieve three key outcomes:

Boost Returns: Expanding fiber in sparsely populated areas comes with significant ROI risk. Sand Technologies' AI models use comprehensive market data to pinpoint locations with the highest adoption potential, reducing uncertainty and optimizing financial outcomes.

Lower Costs through Smarter Network Design: Whether commercial, PE-backed or subsidized by BEAD and RDOF, fiber projects must be cost efficient. AI-driven design tools reduce manual efforts and increase cost efficiency by improving unit economics and cutting costs per passing by knowing when to utilize alternative access technologies such as FWA or repurpose legacy cable or other infrastructure.

Stronger Competitive Advantage: The biggest market share goes to those with the best strategic plan. Using AI/ML models, operators can assess competitor infrastructure and pricing to inform faster, smarter overbuild projects that establish a distinct market advantage.

With AI-driven solutions like those from Sand Technologies, fiber providers can build more efficiently, grow faster and achieve stronger returns.

Fiber Broadband Association Elects and Grows its 2025 Board of Directors

By Doug Mohney

At its 2024 Premier Members Meeting held in December, the Fiber Broadband Association (FBA) elected its 2025 Board of Directors with a significant change from the past. As FBA looks to support organizational expansion and lead its members through the largest fiber broadband investment cycle in history, this year's Board of Directors has an additional member. An additional member will be added each following year for the next two years for a total of 12 FBA board members by 2027.

"The excitement within the fiber broadband industry is palpable. We're seeing record CapEx investment in fiber broadband as we build our nation's critical broadband infrastructure in an effort to connect every American by the end of the decade," said Gary Bolton, President and CEO of the Fiber Broadband Association. "Our 2025 Board of Directors is filled with leadership from across the fiber broadband ecosystem. Together, they will offer strategic guidance and support as our members look to navigate this crucial moment and enable universal access to reliable, high-speed internet."

Ariane Schaffer, Head of U.S. Federal & State Policy at GFiber, was elected as the new Board Chair for a one-year term beginning on January 1, 2025. Schaffer has a wealth of experience in broadband public policy, state and federal government relations, digital equity efforts, and business expansion. She has served on the FBA Board of Directors for two years and as the Board Liaison to the Public Policy Committee and the Sustainability Working Group.

The full 2025 Board of Directors includes the following fiber broadband industry leaders:

- Chair: Ariane Schaffer, Head of U.S. Federal & State Policy at GFiber
- Vice Chair: Ashley Brown, Senior Director Field and Partner Marketing, Adtran
- Secretary: Evann Freeman, Vice President, Government & Community Relations, EPB of Chattanooga
- Treasurer: Jimmy Todd, CEO and General Manager, Nex-Tech
- Scott Jackson, National Market Manager – Broadband, Graybar
- Sachin Gupta, Vice President, Business and Technology Strategies, Centranet
- Mark Boxer, Technical Manager – Solutions and Applications Engineering, OFS
- Roger Timmerman, Executive Director, UTOPIA Fiber
- Bob Whitman, Vice President, Market Development, Corning
- Rob Shema, Director of Corporate Development and Government Affairs, altafiber

2023 FBA Board Chair Joseph Jones "JJ" and FBA President & CEO Gary Bolton welcome Ariane Schaffer from GFiber as the 2025 FBA Board Chair. **Source:** FBA.

Bob Whitman and Rob Shema are newly elected board members, and each will serve three-year terms beginning in 2025. Whitman has over 27 years of experience in optical fiber network architecture, product development, and carrier engagement and has been actively involved in FBA programs for 23 years. He previously served two terms on the FBA Board of Directors, including the organization's first year when it was known as the FTTH Council, and helped launch regional FTTH Council chapters around the globe. Whitman has also participated in several FBA Committees and Working Groups, including Public Policy, Education, Membership, and Trusted Fiber.

Shema works with government and private entities to develop new opportunities and relationships to expand fiber. He is extremely active in the grant process at the national, state, and local levels. Beyond his role at altafiber, Shema is co-founder of Hoosier Net, a middle-mile fiber network consortium comprised of 18 rural electric cooperatives and 17 telephone companies. He has been actively involved in the Fiber Broadband Association since 2011, participating in the Membership Working Group and Public Policy Committee.

Jimmy Todd and Scott Jackson were both re-elected to the Board. Todd, CEO and General Manager at Nex-Tech, was re-elected for a second consecutive three-year term. Most recently, he served as Chair to the 2024 Board of Directors, Vice Chair to the 2023 Board, and Secretary to the 2022 Board. He also launched and co-chaired FBA's Precision Agriculture Working Group and participated in Committees for Public Policy, Education, Technology, Deployment Specialists, and Marketing.

Jackson, National Market Manager – Broadband at Graybar, was re-elected for a second consecutive three-year term and previously served from 2012 – 2018, including positions of Treasurer in 2016 and Chair in 2017 and 2018. Jackson launched the Supply Chain Committee in 2022 and serves as Chair. His other past duties were as a board liaison to the Utilities Roundtable and Sustainability Committees.

As of December 31, 2024, Gregg Logan, Vice President of Engineering at C Spire, has reached the end of his three-year Board term. He served the 2024 Board of Directors as Treasurer and will now serve as the 2025 Chair of the FBA Senior Council.

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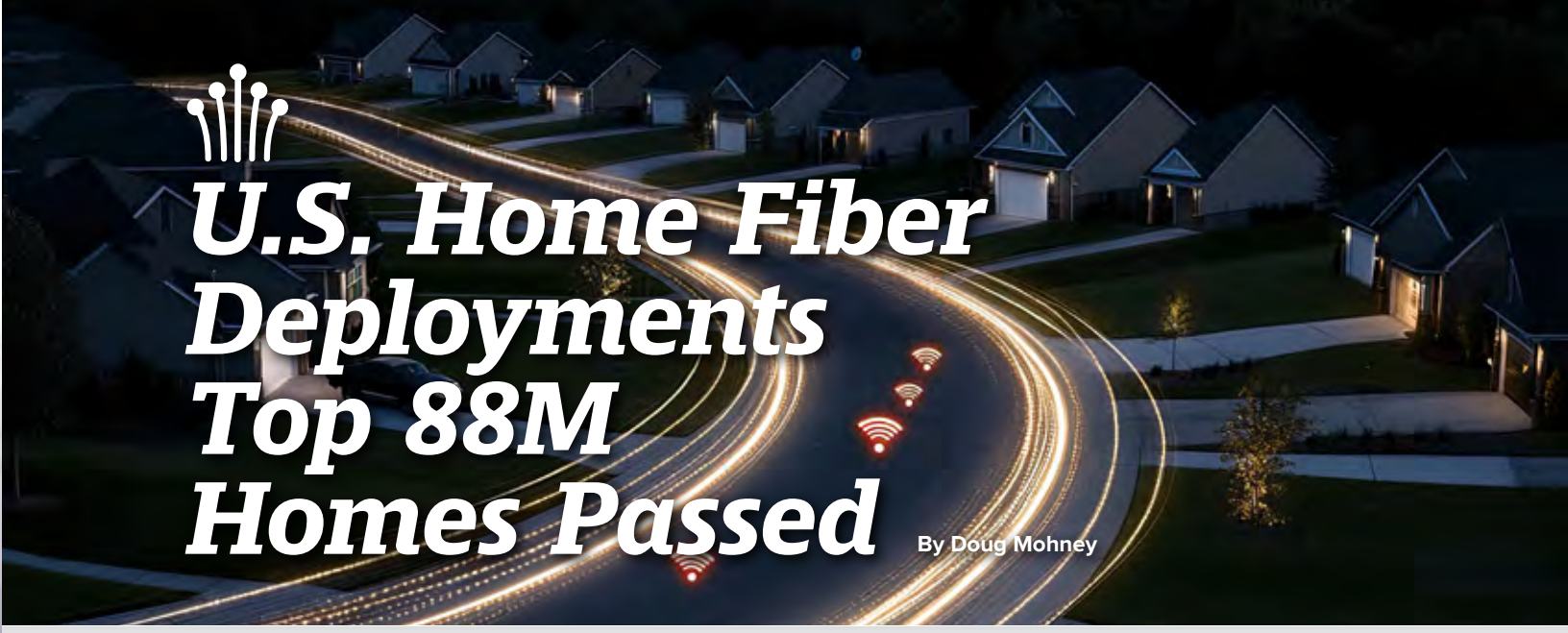


U.S. Home Fiber Deployments Top 88M Homes Passed

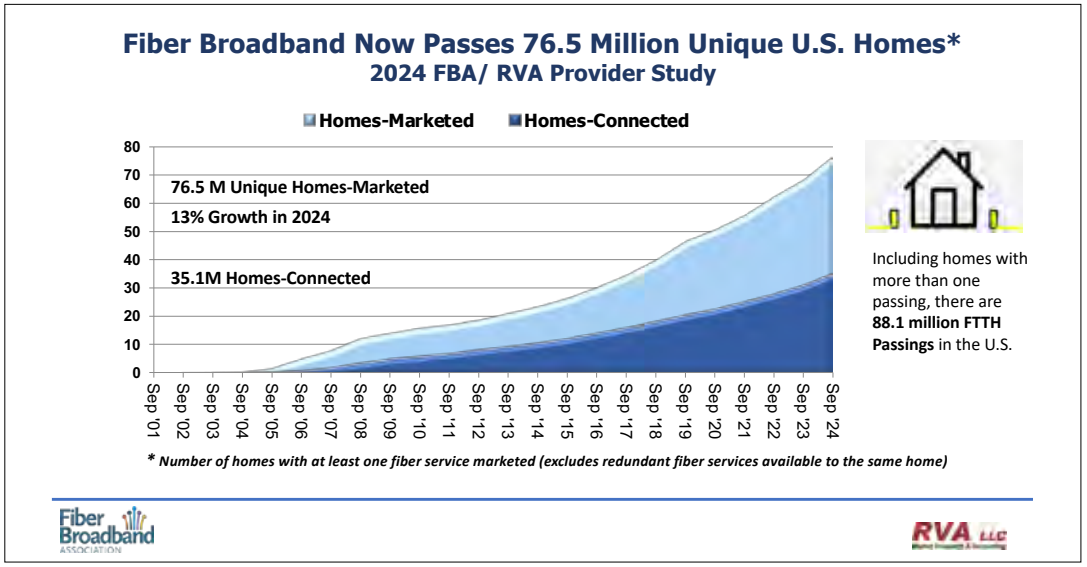
By Doug Mohney

The most recent North American Fiber Deployment survey by RVA LLC Market Research & Consulting (RVA) released in January 2025 presented more records for the progress of fiber across America. A new annual record of 10.3 million U.S. homes were passed in 2024. Including homes with more than one passing, there are now a total of 88.1 million homes passed with fiber in the U.S., with continued growth expected over the next five years.

"The fiber broadband industry is experiencing record-breaking success, and there is a lot more runway left to go," said Mike Render, Founder and CEO, RVA, in a January 23, 2025, FBA press release announcing the latest statistics. "The addressable FTTH (Fiber-to-the-Home) market remaining is still very large, assuming about 70 million first passings left (including household growth) and an estimated 80 million more second or third FTTH passings to go. That's a total available market of 150 million FTTH passing left to go."

Fiber now passes 56.5% of U.S. households, according to the 2024 survey data, with fiber take-rates increasing slightly in 2024, growing to an average of over 45% based on unique passings. Service providers are now achieving their first 20% take rate in a much faster period now and are reaching higher take rates over time. In addition, RVA estimates around 35.1 million U.S. homes were connected with fiber in 2024.

RVA's deployment study methodology used multiple data sources to arrive at its numbers, including an analysis of public company data, 2024 FBA/RVA surveys of smaller to mid-sized providers, data from the 2024 FBA/RVA Consumer Study conducted in the first half of 2024, a review of 2024 FCC mapping data and other government sources, data from other industry associations, and interviews and data from vendors and engineers. Render declared the fiber industry's inventory issues generated by COVID-era stockpiling now resolved in a December 18, 2024, Fiber For Breakfast podcast discussing the report's preliminary findings, with the average month of inventory estimates steadily going down across a six month period and those trends expected to continue into 2025, especially given the anticipated construction boom over the next five years.



A Bright Future

RVA estimates there are at least 150 million or more U.S. home fiber passings that can be done over the next decade, with 48% of first household passings remaining and an estimate of 87% of homes that could be passed two or three times in competitive markets. The RVA long-term estimate also assumes 10 million new homes will be added in the years to come.

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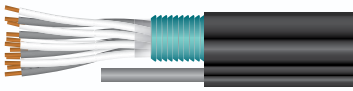

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"Looking at the addressable market, there's still a lot of market left," said Render on the December podcast. "First, households increase every year. The next decade we're looking at a conservative one million households increase per year. There's still a lot of initial passings out there [to be made], both in dense low-income areas and denser high-income areas, small towns, rural, and of course, second homes… it may be as much as 150 million or more still."
RVA does not believe that the arrival of DOCSIS 4.0 will stop cable's continued market share decline in the marketplace. Instead, cable companies are embracing fiber to simplify their operational costs rather than trying to further upgrade their legacy coax plant and to stem churn losses from customers moving to fiber or fixed wireless. Cable has lost 33% net user share over the past two years, according to the FBA/RVA Consumer Study published in April 2024, compared to a 41% net gain for fiber providers during the same time in areas that cable and fiber are available.

There is a lot of money flowing into the telecommunications market from multiple sources, reports RVA, with S&P Global estimating private equity has committed about $80 billion cumulatively to telecom projects in the past five years, with disbursements of the money occurring over multiple years. Fiber mergers and acquisitions are on the rise, with deployment funding often increasing to accelerate the growth of market footprints. In the past year, T-Mobile has been investing in fiber as a supplement to their wireless holdings, while Canadian companies such as Cogeco and Bell Canada are investing in U.S. fiber operations.

Large U.S. telecom firms have reported an average of $96 billion capital investment annually in each of the past two years, with much of the funds going into fiber for competitive reasons and to replace legacy copper plant. Adjusted for inflation, this is almost double the capex investment for the previous 20 years. AT&T and Verizon have both indicated they are increasing capex, with AT&T planning to start copper retirement at 25 percent of its wire centers this year. AT&T would like to decommission most of its existing legacy copper plant by 2029, with 90 percent of the legacy copper footprint eventually getting fiber.

Finally, there are ongoing federal contributions to modernizing telecommunications infrastructure in unserved and underserved areas. The Federal Communications Commission (FCC) reported $64 billion cumulative in federal dollars over the past five years, from that agency, U.S. Department of Agriculture Rural Utility Service (RUS), NTIA and U.S. Treasury funding, with much of that going into fiber networks. Over the next five years, the $42.5 billion in NTIA BEAD funding is expected to be awarded, with disbursements occurring over multiple years, plus additional funding likely from FCC and USDA RUS programs.

Because of these factors, RVA's five-year U.S. FTTH forecast is quite strong. The firm expects a 50% or more increase in homes passed when two or more fiber passings are included, and over a 100% increase in route miles added to support homes passed, with the only constraint to growth being workforce availability.

The U.S. FTTH Addressable Market In The Next Decade Is Still Very Large

FTTH Providers are Reporting lower take rate break even because of:

- Lower Opex
- Lower ARPU
- Higher ramp rates
- Lower churn

RVA Estimates: 88 Million Down – 149 Million To Go

48% of first passings remain (through 2034)
87% of second and third passings remain (current estimate)

	Dense – Low Income	Dense – Mid-High income	Small town/ Rural	Second Homes	Total
First Passings Possible	28.5	70.4	38.2	10.7	147.8
First passings Now	11.3	43.5	17.8	3.9	76.5
First passing left	17.1	26.9	20.4	6.8	71.3
Redundent Passings Possible	5.3	72.4	10.7	0.5	88.9
Redundent Passings Now	1.0	8.7	1.9	0.0	11.6
Redundent Passing Left	4.4	63.7	8.8	0.5	77.3
Total Passings Left	21.5	90.6	29.2	7.3	148.6

Notes: Assumes 10M in household growth. Assumes 2M rural not buildable (off grid). The number of redundant passings is most speculative.

Fiber Broadband Association

RVA LLC

Once the FTTH market reaches maturity, RVA anticipates plenty of growth opportunities in numerous other markets, as other fiber use cases are relatively early in their evolution. Fiber to the data center (FTTD) is likely to be very strong as AI and data centers continue their growth, while fiber to the tower (FTTD) and middle mile will continue as cellular coverage expands within and outside of urban areas. Smart grid applications combining renewable energy generation, storage, and microgrids, especially when managing EV chargers and vehicles, require fiber for real-time resource management.

A bit further out, fiber's opportunities become more mundane and more exotic. Fiber to the room, extending high-speed coverage within the office and room is a logical step, especially as higher-speed wireless services depend on line-of-sight access. Fiber will also play a growing role in quantum computing applications, autonomous vehicles, and used as a sensor medium to monitor environmental and building conditions. The plethora of fiber applications in other markets is likely to keep the fiber ecosystem strong and thriving for years to come.

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An Evolution of BROADBAND Growth

CES 2025

By Doug Mohney

People seeking the killer app or killer product out of the Consumer Technology Association's annual mega-event in Las Vegas typically find themselves overwhelmed at the sheer amount of information flowing out of the show, amplified by massive amounts of marketing hype and PR spin. January 2025 was no different than most previous years, more than 4,500 exhibitors large and small demonstrating their latest-and-greatest to over 141,000 attendees, and 6,000 global media, content creators, and industry analysts.

For broadband providers and the fiber world in particular, the need for more bandwidth and low latency continues to be driven on multiple fronts as technologies such as AI, autonomy, AR/VR/XR, holography, robotics, and wearables are applied to use cases including precision agriculture, aging, health care, and home monitoring, just to name a few examples.

Two meta-trends are apparent. First, AI is real and continues to make rapid progress as companies continuously improve how machine learning is applied to real-world problems. While one attendee joked that many of this year's "AI" announcements are simply previous year's "Smart" announcements run through find and replace, such as an "AI toothbrush," there are clear examples of companies building upon initial AI deployments while simultaneously improving the quality of the service being delivered.

Fiber is a vital component of AI, from connecting servers within the data center for training models to providing access to finished models to corporations and consumers around the globe. NVIDIA's AI Cosmos platform announced at the company's CES 2025 keynote is one example of developer building-block technology to enable the creation of next-generation robots and autonomous vehicles.

Secondly, companies are not focusing on one technology, but a "stack," a group of building blocks put together that is greater than the individual parts, delivering an easy-to-use solution and providing a foundation for applications across a company's entire service base. AI is now a basic component of tech stacks being teamed with other components to build working solutions that deliver results.

AI's Rapid Advancement

Consulting firm PwC had a lot to say about AI through its Chief AI Engineering Officer Scott Likens and its

Rapid advancements in AI, in combination with holographic displays and broadband, are creating highly realistic avatars capable of conversational discussions. **Source:** Doug Mohney.

demonstration of his interactive AI-driven virtual twin. Dubbed Synthetic Scott, the virtual twin starts with a Proto holographic display, either in a portable one-meter-high rectangular box or a larger full-size projection box which *Fiber Forward* saw demonstrated by AARP last year, that generates a likeness of Liken's voice and body. The characteristics of Scott's hologram double are based upon a two-minute studio video recording – no green screen or motion-capture suit required. The holographic display includes a camera and microphone to see and hear its surroundings along with a touch screen with a virtual button to start a conversation with the model.

For CES 2025, Synthetic Scott was loaded with PwC's AI informational knowledgebase and has the ability to conduct general conversation outside of that realm. When asked about the day's weather, Scott's response was, "I'm sorry, but I cannot provide real-time weather updates. However, you can easily check the weather through local news websites or weather apps for the most accurate information."

Leveraging the onboard camera and image recognition routines built into the AI model, Synthetic Scott was able to see that the room had two white chairs and some plants, but "I'm unable to identify or describe people from images" in the current version.

The AI-generated voice is authentic enough to be identified as Likens' by a transcription service. About the only flaw in Synthetic Scott's implementation was a looping repetition of body gestures that was noticeable over a couple of minutes of dialogue, an item that will be fixed in the updated version of the model in the future.

"Once they fix that, while you're in listening mode, you'll have a different kind of gesturing pattern," said Likens. "When you're answering, it'll use more of your natural movements. We're doing a client project right now and that was one of the issues. It's the founder of this company, and they wanted to look very much like him, and so we had to record the actor a certain way, so that the gestures were very natural."

Most remarkably, PwC has gone from a very basic 1.0 to the current 2.0 version in approximately 18 months. The basic 1.0 version utilized a cartoon avatar while 2.0 leveraged advances in machine vision processing to bypass the need for motion capture suits and green screens, an advancement that is also changing the gaming industry. Synthetic Scott's 2.0 model was captured in a studio using HD cameras but one can just as easily be done using an Apple iPhone camera and back-end AI processing.

PwC and Likens were at CES 2025 discussing the company's 2025 AI Business Predictions. One of the more interesting discussion points is the role of AI in solving one of the problems it is creating. PwC predicts AI will be a driver for sustainability. In the short term, the demand for more data center power driven by AI and other applications has driven an embrace of nuclear power to provide more energy.

"Because of this mass demand, it's forcing innovation in how we generate electricity in a greener way," said Likens. "If we get that right to be able to do the AI stuff, which is about maybe 5% of data centers. Now maybe that doubles, which would be catastrophic, normally. But if we do this in a way that is greener and more innovative, the other 90% of industries benefit."

PwC is doing a study expected to be released in March where they are quantifying how AI's rapid development is forcing innovation in electric generation, grid, and green power, with the benefits accretive to sustainability and other industries.

Operating Dump Truck via App

Three years ago, John Deere introduced its first autonomous vehicle at CES, a simple tractor designed to plow fields. Executives at the show emphasized that the feat was built on over a decade of work and multiple technologies cultivated by the company. At CES 2025, John Deere expanded its autonomous technologies across more of its business lines, leveraging and building upon its initial technology stack to add more agricultural vehicle options and expanding into construction and commercial landscaping.

Expanding autonomy was positioned as a necessary step to support and increase productivity as the country copes with worker shortages across many sectors.

"Our customers all have work that must be done at certain times of the day or certain times of the year, and there simply isn't enough available skilled labor to do that work in a timely and efficient manner," said Jahmy Hindmen, Senior Vice President and Chief Technology Officer, John Deere, at the company's CES press briefing. "Let's look at some facts in the U.S. The average farmer is over the age of 58 and each day they're putting in 12 to 18 hours to grow the food for all of us. The American Farm Bureau Federation estimates that there are roughly 2.4 million farm jobs that need to be filled annually with that agricultural workforce continually shrinking."

operations on both the edge and at the data center, with cellular connectivity playing a key role for last mile/last foot networks. For example, John Deere's second-generation autonomy kit for tractors includes 16 individual cameras to enable a larger 360-degree view of fields while the new orchid tractor kit includes Lidar sensors for more precise navigation, generating significantly more data than the first. Even the company's autonomous battery-powered commercial landscaping mower has eight cameras.

For remote operators, the real-time data being generated flows to John Deere's Operation Center Mobile app, where the driver can monitor and access it all remotely via tablet or phone. Quarry operators and commercial landscapers are now joining farmers in the digital world, essentially

John Deere's dump truck can be outfitted with an autonomy kit, enabling it to operate on its own without a human in the cab and controlled via web portal or even a cell phone. **Source:** Doug Mohney.

Similar labor challenges are found in the construction industry, with 88% of contractors struggling to find skilled labor. For landscaping, 86% of business owners struggle to find the labor to fill their open positions.

Quarry operations are a far different environment than relatively flat and level farm fields, with "steep slips, deep ruts," and "slippery muck," as described by John Deere's website. It's literally tough dirty work that would make a Tesla Cybertruck break down and cry. As such, autonomous dump truck operations require a significantly higher level of machine intelligence and sensor technology to safely navigate and operate a 26 ton or larger dump truck moving tens of thousands of pounds of material on each circuit from pickup to destination on unpaved dirt and gravel roads that aren't painted or market.

Running more autonomous vehicles of all types across the nation will require more broadband and fiber to support operating purpose-built robots for increased productivity, notified via alert when a problem arises, a piece of equipment needs to be serviced or, in the case of electric-powered machinery, such as the commercial landscaping mower, needs to be charged.

Electrification Across Fields

Autonomy, AI, connectivity, and electrification announcements for big moving machinery weren't limited to John Deere. Kubota joined the farming wave with KATR, a compact four-wheeled robot designed to transport loads over uneven terrain such as hilly and mountainous areas without tilting the cargo deck. The first version of KATR is operable using an onboard joystick or a remote controller, with a conventional engine; a more eco-friendly battery-powered electric version is under development. KATR is designed to be an open platform, with different modules plugged in to tailor it for different uses, with pest control the first one being considered.

(cont. on page 57)

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Documenting the Economic Benefits of Fiber in 2024

By Doug Mohney

Taken for granted in many circles, fiber is the backbone of America's broadband technology ecosystem, enabling AI in data centers, cable and cellular networks, and yes, even satellite communications. Fiber's resilience and security makes it the go-to for mission critical applications such as public safety and smart grid.

Reliable high-speed, low-latency fiber broadband connectivity drives economic growth and job creation around the country. Fiber's ability to scale and deliver terabytes of data down a single strand boost the competitiveness of U.S. industries across the board, from agriculture to the factory floor. Building and maintaining fiber networks drives employment opportunities for construction workers and technicians, as well as create jobs in the fiber supply chain, including American-made fiber optic cable, conduit, and electronics.

In 2024, over 1,000 individuals from Fiber Broadband Association member companies participated in and contributed to one or more of the organization's 17 committees, working groups, and roundtables. During the course of last year, FBA, its committees, and research partners published numerous documents examining the fiber industry, its technology, and the economic and social benefits that fiber delivers to communities across the United States and around the world.

A number of those documents described and analyzed the benefits of fiber in different ways, including general discussions on the benefits of retiring legacy copper plant, fiber's scalability and longevity compared to other media, and gigabit fiber's contributions to productivity. There are also case studies assessing the economic power of fiber in small towns and rural areas as well as a macro study estimating the large-scale impact of fiber upon the nation as a whole.

Retiring Copper, Scaling Fiber, Long-Living Fiber

The FBA's Technology Committee published two documents in 2024 examining the general benefits of deploying fiber. "The Benefits of Retiring Copper Today" white paper discussed the economic challenges of legacy last mile networks operating on copper pairs or coaxial cable today. Incumbent providers of all sizes are already in the process of moving to all-fiber networks, looking to retire their legacy copper for increased reliability and lower operational costs.

As copper continues to increase in value, telecom providers see it as a potential source of funds to offset fiber deployment expenses when recycled. **Source: FBA** "The Benefits of Retiring Copper Today" white paper.

Most legacy systems were built in the last century and require considerable labor and power to be operated and properly maintained. Further complicating the picture, as equipment has aged, so have the people who understand how to maintain it, with the companies that once made the systems and parts now having moved on to other products or have simply gone out of business. The workforce understanding legacy systems that remains becomes more expansive to retain with each retiring worker taking their knowledge with them.

The white paper analysis found that a move to an all-fiber network can save $54 per year per home passed when compared to hybrid fiber coax (HFC) networks

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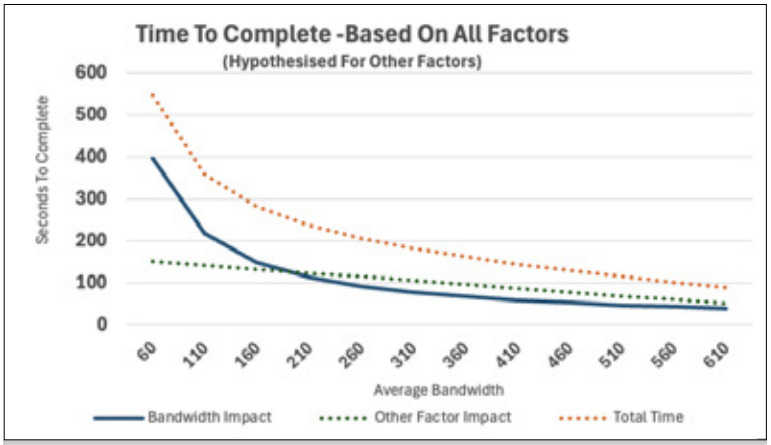
and a whopping $91 year per home passed compared to legacy DSL equipment. Savings come through a variety of mechanisms, including better reliability translating into fewer truck rolls for repairs, lower power usage, and lower real estate costs as legacy equipment is removed and replaced with more compact, power-efficient fiber gear.

Removing the legacy copper can provide cost recovery through recycling, as the demand for copper for EV chargers and other applications keeps that metal in significant demand and its price high. AT&T and BT are among the Tier 1 service providers that have stated they are recycling their decommissioned copper.

Fiber has significant longevity compared to any other existing telecom technology. Fiber put into place in the early 1990s is still in use after over 35 years of service and is expected to continue to deliver broadband for decades to come, based on the materials, technologies, and manufacturing processes used to produce modern, high-quality optical fiber and fiber optic cable, according to findings in the "Fiber Broadband Scalability and Longevity" whitepaper, also published by the FBA Technology Committee last year.



Slower broadband means wasted productivity, especially for remote workers. The time waiting for downloaded files and cloud services to load adds up in the course of a year. **Source:** FBA "Gigabit Fiber can Add $326B to US GDP" white paper.

More importantly, the medium of fiber has proven to be easily and rapidly scalable, with fiber deployed two decades ago to deliver hundreds of megabits of service now being used to deliver multi-gigabit symmetrical services over the same medium through electronics upgrades without replacing the fiber itself.

The ultimate speed for today's fiber has yet to be determined, with demonstrations of 50 Gbps and 100 Gbps speeds to the home taking place in 2024 while high-speed core network speeds of 800 Mbps are coming into service today with near-term growth to multi-terabit speeds already on the horizon. A single strand of single-mode fiber deployed in the 1980s could be capable of carrying up to over 600 terabits per second. No other existing wired or wireless communications medium comes close to this capacity.

Fiber also delivers the best latency and jitter performance based on user measurements, according to an FBA/RVA 2023 Consumer Broadband study and cited by the Scalability paper. Median latency for fiber to the home is 30 milliseconds, far superior to any other wired or wireless alternative, with the industry working to further reduce delays by improving network congestion management.

Time is Money – The Case for Gigabit Speeds

Everyone hates to wait, but waiting costs money. More than a decade ago, Amazon found that every 100ms in latency cost the company 1% in sales, according to a piece on the Gigaspaces website, while an extra half second in search page generation time dropped traffic by 20%. Users will abandon applications if applications and sites take too long to load, while waiting for data to download and cloud applications to respond means less productivity in the course of the working day.

RVA Market Research and Consulting examined the relationship between higher bandwidth and greater efficiency in its white paper produced with FBA entitled "Gigabit Fiber Can Add $326B to U.S. GDP." The paper conservatively estimated for a 100 Mbps/20 Mbps connection, about 11% of interactive time spent online was spent simply waiting, adding up to a productivity loss of almost 20 minutes per day, assuming 3 hours of interactive work moving around files and working with cloud services.

In comparison, a user with a high-speed connection delivering 600 Mbps average performance from a gigabit connection would only be waiting around 2 minutes per day, adding up to about 108 hours in productivity per year. Heavy interactive users, such as remote workers, would gain almost 32 more productive workdays annually.

The increased productivity through higher bandwidth would provide substantial value for remote workers who value their time as well as contributing to more GDP. Moving all home users from 100/20 Mbps service to gigabit fiber speeds would potentially add 1.2%, or around $326 billion to U.S. Gross Domestic Product because they'd get more work done than waiting for files to download and cloud services to load.

(cont. on page 58)

Lighting Up Nashville with Fiber Connect 2025

By Doug Mohney

Many events at Fiber Connect 2025 provide opportunities for networking as well as recognition of industry excellence, such as the Amplify Awards.
Source: Fiber Connect 2024/ Doug Mohney.

Preparations are well underway for Fiber Connect 2025, to be held in Nashville, Tenn., on June 1-4, 2025. This year's event is expected to draw over 5,000 people to the Gaylord Opryland to learn more about the state of today's fiber industry through its multiple pre-conference workshops, general session keynote presentations, operator Light Talks, afternoon breakout sessions, exhibitors, expo hall theater presentations, and much more, including Hot Wings on stage.

Fiber Connect Conference Program Director Rich Willams and FBA Board Member and EPB Vice President of Government & Community Relations Evann Freeman provided an initial preview of Fiber Connect 2025 on the December 25, 2024, Fiber for Breakfast podcast, discussing what attendees can expect and hinting at some to-be-announced surprises in the works.

"We're really excited about the lineup of events," said Freeman. "The theme of Fiber Connect 2025 this year is 'Light it Up.' We're highlighting lighting up networks throughout our country. This year is an important year with the states getting their BEAD funding and a lot of [network] construction projects already underway will be completed and [others] started."

Fiber Connect 2025 will kick off on Sunday, June 1, 2025, with pre-conference workshops including the FBA's long-running Broadband Starter Toolkit packed full of lessons learned, tips, and tricks for people and organizations just entering the broadband market. Confirmed and newly added pre-conference workshops are the "Brand Economics and How Brand Impacts Fiber" and "AI Impacts on Telecom."

The Fiber Broadband Toolkit, a long-running favorite of attendees planning to build a fiber network or just getting started, provides a comprehensive view of the fiber deployment process and provides the insights and strategies new network operators need to bring connectivity to their communities. The half-day workshop addresses how to navigate legal and regulatory policies, explore funding options, and launch end-user installations. Industry leaders will demystify the complexities of deployment and share actionable solutions to ensure attendees will be ready to succeed in building the connected future.

"The goal of [the Brand Economics workshop] is to help operators and vendors and the ecosystem understand the role brand equity and brand knowledge plays as you introduce new service and might be serving people for the first time who've never considered broadband," said Williams. "And understanding how that could affect how your brand is perceived, and how you launch and manage services in those areas."

Brand Economics delves into the intersection of branding and financial performance, as industry experts provide actionable insights on establishing your brand in new markets, creating value with high-impact service launches, strengthening partnerships to enhance brand recognition, and how to leverage customer experience to drive success.

Operator Wisdom and Flaming Palates

Fiber Connect starts in earnest on Monday, with the first operator Light Talks. A total of six operator Light Talks are scheduled during the June 2 to 4 main stage general sessions, with Charlene Gavel, President and CEO, SaskTel, leading off the discussions. Other service providers that will take the stage and share their knowledge and insights include CJ Ehrenreich, Vice President of Construction and Customer Operations, Ting Internet; Ron Beerman, Chief Network Officer, Alta Fiber; Suzy Hayes, President and CEO, C Spire; Clayton Dowell, President and CEO, Bristol Tennessee Essential Services; and Jonathan Restivo, Chief Development Officer, Cityside Fiber.

The discussions will be far from bland, with some executives being put on the spot on the main stage with some scorching food (and likely some milk) involved. "Sean Evans, of the 'Hot Ones' YouTube series, is going to be hosting a fiber broadband hot seat with two lucky guests," said Williams. "They're going to dive deep into issues and challenges associated with building extreme fiber broadband. As guests answer the questions, they'll be eating increasingly hot wings."

General session panel discussions include "Bringing Fiber to the Most Remote Locations on Earth," "Expanding Fiber's Reach," "Creating the Ultimate Smart Home," and "Architecting for Growth." Through this group of main stage presentations, network operators and industry experts will share their experience in overcoming significant deployment challenges and obstacles; discuss fiber's ability to provide new services, technologies, and applications; explore the Smart Home evolution from home appliances to security systems; and explore the workforce, governmental, and network infrastructures needed to scale when adding millions of rural, suburban, and urban households to fiber networks over the next five years.

Wednesday, June 4, will mark the second State Broadband Summit, a gathering of state broadband officers from around the country who have begun the process of delivering fiber. They are leveraging BEAD funding as well as other federal and state programs to best serve their communities and cities by delivering the best broadband possible.

The Summit will include panel discussions on how fiber delivers increased economic impact and opportunities by delivering higher household incomes, new job opportunities, and new business development along with higher home prices; the mayors of Charlottsville, Va., Danbury, Conn., and Adams County, Colo., sharing their perspectives on deploying fiber broadband and its impacts on their communities; and a discussion on the many challenges of fiber construction.

The main stage at Fiber Connect 2025 will host elected leaders and industry executives from across North America discussing the state of the industry. **Source:** Fiber Connect 2024/ Doug Mohney.

Breaking Out Beyond the Main Stage

Numerous information and education sessions will take place at afternoon breakout sessions and on the expo hall floor. Among the breakout highlights are Tuesday's Broadband Policy Symposium discussing the latest perspectives from Capitol Hill on legislative and policy efforts aimed at closing the digital divide and addressing challenges in unserved and underserved communities.

Tuesday will also showcase the Overbuilder Toolkit track. As fiber providers will find themselves in competition with established telco and coax incumbents, new operators will have to carefully evaluate their value proposition by offering more than just a fast pipe. Other sessions examine the growing open access network model where multiple service providers share the same physical infrastructure and discuss adoption challenges in crowded markets with multiple high-speed broadband options available.

On the expo hall floor, the Smart Home Open House track will highlight how firms are putting broadband and fiber into every part of the residence to ensure the best experience, applications, and services leveraging the full potential of fiber, and the economic advantages fiber brings to households and home values.

Among the social and networking highlights for this year's Fiber Connect include the "Backyard BBQ Welcome Reception" on Sunday evening, the second annual Amplify Award Luncheon on Monday, FBA's Live Karaoke Dive Bar on Monday evening, and the Women in Fiber luncheon on Tuesday.

"We try to have something for everyone at Fiber Connect," said Williams. "No matter what your role is, what your level is, whether you're a veteran or brand new to the industry, you'll find things tailor-made for you."

Booth 1088 - Fiber Connect 2025 - June 1 - June 4, 2025

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Fiber Broadband Association Photo Gallery

(All images source credited to FBA)

FBA President & CEO Gary Bolton addresses the crowd at the Premier Members Meeting.

Competition was fierce at the pickleball tournament sponsored by Calix at the Premier Members Meeting in Florida.

FBA Conference Program Director Rich Williams and FBA Senior Council member Kevin Morgan enjoy a fishing excursion during the December Premier Members Meeting.

FBA VP Public Policy Marissa Mitrovich provides an annual update at the Premier Members Meeting in Florida.

Many Premier Members Meeting attendees chose to attend a sushi making class while at the annual meeting this past December in Florida.

At the Premier Member Meeting, Mike Render from RVA Consulting provides an update on the state of fiber deployments in North America.

FBA President & CEO Gary Bolton welcomes Premier Members to their annual meeting last December in Florida.

Eric Chavez, from the office of U.S. Senator Ben Ray Lujan, delivered a keynote at the Regional Fiber Connect event in Albuquerque on the power of broadband.

Needham & Co's Ryan Koontz presents on Fiber's Future: Key Considerations for Investors & Operators at the Premier Member Meeting


Premier members enjoy a balmy welcome reception at the annual meeting this past December in Islamorada, Fla.

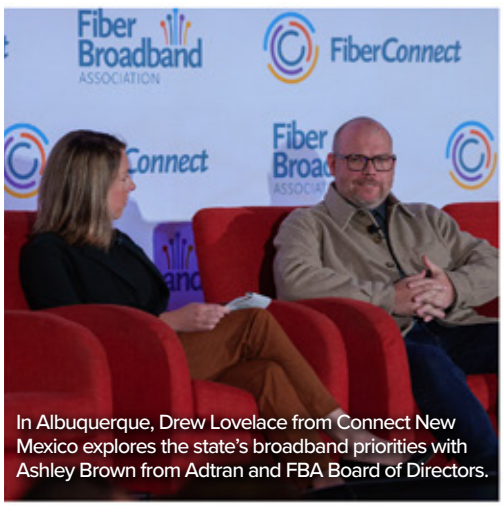
Danae Wilson, Division Chief, Office of Indigenous Connectivity and Technology, Bureau of Indian Affairs has a fireside chat in Albuquerque on coordinating broadband development with tribes, federal agencies, and states.


Patricia Dominguez, State Director, New Mexico State Office | Rural Development, United States Department of Agriculture provides the opening keynote in Albuquerque, exploring rural connectivity.


FBA Board Member Sachin Gupta catches up with Dycom Industries' Bill Valentino at the Premier Members Meeting.

Premier Membersß Meeting attendees show off a big catch during a fishing excursion sponsored by IMMCO.

Adtran sponsored a cruise around Islamorada, Fla., at the Premier Members Meeting in December.



In Albuquerque, Drew Lovelace from Connect New Mexico explores the state's broadband priorities with Ashley Brown from Adtran and FBA Board of Directors.

Premier Members Meeting attendees enjoy sun filled activities in Islamorada, Fla.

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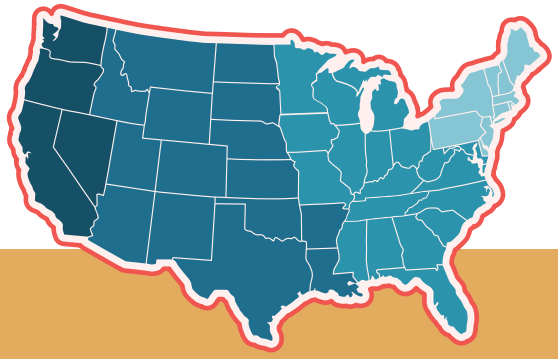

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FBA Accomplishments for 2024 and Plans for 2025

By Gary Bolton, President & CEO, Fiber Broadband Association

I am proud to say 2024 was the best year in the Fiber Broadband Association's history. Our industry set a record in fiber deployment, passing 10.3 million homes in 2024, surpassing 2023's record deployment of 9.1 million homes. We now have 76.5 million unique U.S. homes passed with fiber, with a total of 88.1 million fiber-to-the-home (FTTH) connections, including homes with more than one fiber passing. After 18 months of slow sales on the supply side of our membership, service provider fiber and fiber-related equipment inventories have now normalized.

These numbers are only expected to be considerably larger in 2025 and the following years, due to several factors.

The State Preference for Fiber

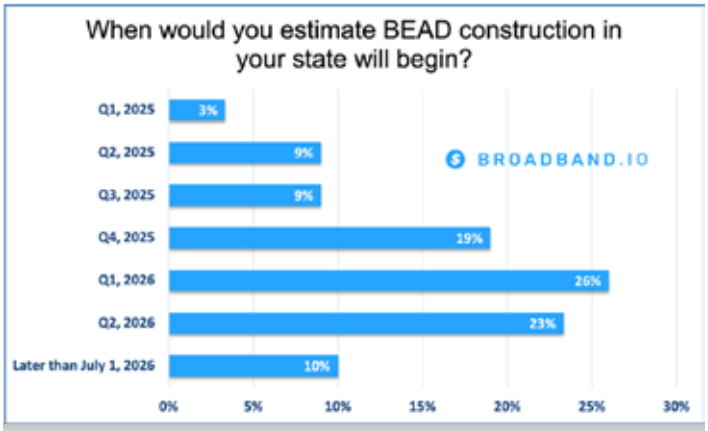
NTIA has approved the initial NTIA BEAD proposals for all 56 states and territories. Louisiana has already submitted its final proposal to NTIA, awarding 95.4% of its BEAD unserved and underserved locations to fiber projects. Similarly, Nevada is also making significant progress, allotting 80% of its NTIA BEAD funding locations to fiber deployment projects, which beat our target estimate of 74% based on their funding allotment.

The preference for fiber within the state broadband offices remains clear. Doug Adams of Broadband Marketers released a State Broadband Director survey which received responses from 31 states. State directors remain very bullish on fiber, with verbatim comments including:

- "Fiber deployment is the most reliable technology, future proof, and provides the most benefit and value."
- "States are running their own programs, LEO may be needed where fiber doesn't make economic sense, but there isn't enough LEO capacity to cover every location."
- "We will continue to prioritize fiber and will do everything in my power to keep that priority."

When asked if the new Administration will make the NTIA BEAD deployment process better or worse, 80% responded "Better or Much Better" or "The Same."

The survey also provides some estimates from states on when they believe NTIA BEAD Funding construction will begin:



Source: Broadband Marketers

Private Investment Continues to Fuel Fiber Deployment

While the $42.45 NTIA BEAD funding is important in connecting unserved and improving underserved households, it represents only an estimated 5.5 million locations. This is a small fraction of the overall capital investment in fiber broadband infrastructure taking place throughout the country.

Approximately 90% of the nation's fiber build out is funded through private investment, fueled by a combination of ongoing infrastructure upgrades and network expansion by publicly traded companies and private-equity partnerships that have recognized the value and long-term return on investment of fiber infrastructure.

In November, John Stankey, CEO of AT&T, presented the company's plan to pass 50 million homes with fiber. As of the end of 2024, AT&T has passed 29 million locations and is on track to pass an additional 15 million homes with fiber by the end of 2029. These 45 million fiber homes passed, coupled with more than 5 million homes passed through their Gigapower joint venture with Blackrock Ventures, will achieve AT&T's target.

Stankey delivered a compelling case to Wall Street, demonstrating how fiber investment perfectly aligns with the new administration's objectives. He masterfully highlighted how fiber's faster penetration, higher ARPU, lower churn, and greater convergence has accelerated the fiber return business case by two years.

I can cite similar stories and successes from many of our fiber network operator members, such as Hawaiian Telcom which along with government funds has committed to invest $1.7 billion to become the first 100% fully fiber-enabled state by 2026. Fiber is good for investors, good for communities, and good for generations to come. The market has spoken: *Where fiber leads, the future follows.*

Strengthening Our Advocacy Efforts

While we feel the fiber industry is on strong footing heading into 2025, we are taking nothing for granted. As the new Administration and leadership in Congress took office, the Fiber Broadband Association has strengthened its public policy and advocacy efforts as we continue to meet with the transition team, members of the new congress, NTIA, and the FCC. We held the FBA Policy Summit in Washington, D.C., February 26-27, and we will hold our annual Fiber Day on the Hill on April 9. We will continue to meet with individual offices both on and off Capitol Hill on a regular basis.

FBA's Growth Last Year

In 2024, the Fiber Broadband Association's expansion continued to accelerate. Membership grew to a record level, growing nearly 20% year-over-year. Revenue for the year is projected to finish at a record level as well, up 19.5% year-over-year. And our revenue diversity continues to be strong with 53% coming from our annual conference, 21% from membership dues, and the remainder from new initiatives. Tight expense control has enabled the organization to be within 6% of budget while growing revenue by 26% favorable to budget.

While financial metrics are important to the health of our organization, we are also pleased with membership engagement in 2024. During the year, 1,020 individuals from member companies participated and contributed to one or more of FBA's 17 committees, working groups, and roundtables. Already in early 2025, we now have 1,100 individuals participating in one or more of FBA's now 20 committees, working groups, and roundtables.

During the year, FBA's committees, working groups, and research partners published a substantial amount of research with over 15 studies, reports, and white papers, with discussions of everything from fiber's scalability and longevity to the impact of gigabit fiber on productivity. Several FBA publications throughout the year documented the impact that fiber broadband has on growing the economy and creating jobs across the country.

Bold Goals for 2025

Our successes in 2024 provide FBA with the foundation for a bright and thriving year ahead. As we move into 2025, we are working to strengthen our public policy efforts in Washington D.C. through events such as our Policy Summit, annual Fiber on the Hill event, and executive fly-ins to meet with Congress and Executive Branch leaders.

We will continue to drive fiber adoption through our workforce development efforts across the country, continuing towards our goal to have FBA's OpTIC Path™ program available in all 56 states and territories, as well as continued efforts to build Digital Opportunity offerings.

FBA will propel Fiber Connect 2025 to become the top Fiber Broadband conference in the world. Every year we continue to grow this event in terms of attendance, exhibitors, content, and impact and I expect this year's event in Nashville to take the attendee experience to the next level.

We are already executing on our plan for Regional Fiber Connect workshops with seven cities on the calendar this year, including Toronto and Anchorage. FBA's LATAM Fiber Connect event has been expanded to four cities this year. Our first regional event in San Antonio on February 11th set a new attendance record which provides strong momentum for our remaining workshops.

The Vision for the Future

While 2024 was the best year of the Fiber Broadband Association by any measure, 2025 will be the defining moment in our industry.

Over the next five years, FBA must ensure our nation's critical infrastructure is built with fiber that will unleash a paradigm shift in technology innovation. We will empower our members to deliver robust Digital Opportunity programs, shape the narrative for the critical role fiber infrastructure plays in supporting innovation, economic opportunity, and growth, and close the Digital Equity Gap, once and for all.

I must credit much of this past year's success to FBA's 2024 Chair, Jimmy Todd, CEO of Nex-Tech. Jimmy has been highly engaged, joining me in traveling around North America, Latin America, and abroad. He is deeply passionate about rural broadband, precision agriculture, and anything "techie." I have learned so much over the past year and applaud all that was accomplished during Jimmy's tenure as chair.

I'm excited to welcome Ariane Schaffer, Head of Federal & State Policy, GFiber, as FBA's 2025 Chair. As a public policy and advocacy pundit, Ariane is the perfect fit for FBA as we focus on policy and advocacy this coming year. Ariane joins a very strong board in supporting the organization. The FBA staff continues to hit on all metrics, we have amazing and passionate strategic partners, and our volunteer leadership continues to strengthen.

I could not be more excited for 2025 and the opportunities the Fiber Broadband Association and its members will create in the months and years to come as our contributions grow the nation's economy, create new jobs, and strengthen American's competitiveness. If I or anyone on my staff can help you and your company accelerate the deployment of fiber, please do not hesitate to reach out.

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Shared Wisdom for Successful Tribal Broadband Initiatives

By Doug Mohney

Godfrey Enjady, Dr. Jim Trumbly, Brian Thomason, and moderator Robert Griffin (left to right) discuss the unique requirements and challenges of building fiber networks on Tribal lands at the Regional Fiber Connect in Albuquerque. **Source:** Doug Mohney.

There are many challenges to building successful Tribal broadband programs, including deploying fiber across large remote areas, the importance of proper vendor selection, contract management, building a sustainable business mode, and being able to have sovereign possession of network infrastructure. Held on November 7, 2024, the Regional Fiber Connect in Albuquerque, New Mexico, examined the many issues indigenous nations have and continue to face in provisioning and operating broadband networks on their lands.

The last panel of the day brought together representatives from the Navajo Tribal Utility Authority (NTUA), Osage Nation, and Mescalero Apache Telecom to discuss the unique requirements of building networks on Tribal lands, key factors for stakeholder and vendor partnerships, and how each sees fiber broadband impacting their people in the years to come. Robert Griffin, Tribal Broadband Leader for the Choctaw Nation and Co-Chair of the Fiber Broadband Association's Tribal Committee, moderated the panel and was quick to underline the depth of experience that the panel participants brought to the discussion.

"Did I tell you these gentlemen know where the bodies are buried?" joked Griffin. "They dug them up and buried them again, right?"

With operational fiber networks on their respective lands, all the representative tribes were leveraging access to high-speed, low-latency broadband to substantially improve the social and economic lifeblood of their Nations. The fiber infrastructure supports a variety of projects to improve government services, reduce costs, and preserve and protect a way of life.

"Today, we are fully fiber to the home," said Godfrey Enjady, General Manager, Mescalero Apache Telecom and President of the National Tribal Telecommunications Association (NTTA). "We have 10 Gbps XGS-PON to every home on the reservation. I got a middle mile grant to build a 288 [strand] fiber all the way to El Paso. We are building a brand-new data center. We put in a brand-new SCADA system for the whole tribe. Part of what I've been working at is about smart Tribal nations and how could that help Tribes going forward, especially with digital inclusion, digital equity."

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In addition, Mescalero is building towers to support a FirstNet first responder cellular network for tribal law enforcement officers and the tribal Emergency Operations Center. The SCADA system has automated water and sewer operations on the reservation for the first time.

But broadband's ability to do more than simply improve government operations was also highlighted. "The other part of that too is the fact of language and cultural preservation," said Enjady. "That's something that really is a new tool for tribes to be able to try, because if we lose our language, we could lose our status as being a tribe. How do we preserve that? The other part is trying to get kids to understand what the culture is, because they're all stuck in TikTok, they're stuck in Facebook."

Another speaker views broadband as a necessity due to its far-reaching impact upon daily life, from education to telehealth and remote work.

"I think you struggled to find an area that's not impacted by it, because I think it touches everything in our lives," said Dr. Jim Trumbly, Tribal Business Development Manager, Tribal Ready and a member of the Osage Nation. "By having the connectivity within the Osage Nation or [Indigenous Nations] in general, you enable people to move back, embrace their culture, embrace their language and at the same time work and be productive in the modern society, in the modern world."

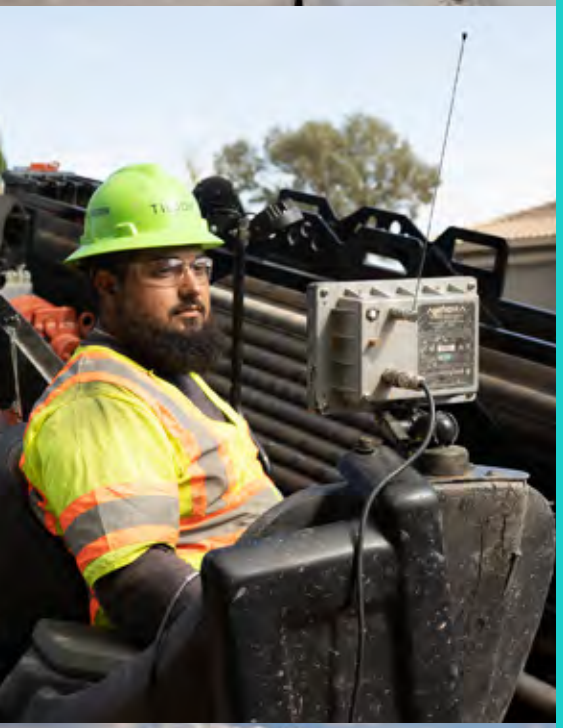
The Navajo Nation faces twin challenges as it expands its networks, the vastness of its territory and continued economic development so it can build and operate networks that serve all its citizens. "The area is huge," said Brian Thomason, Deputy General Manager, Communications Systems Division, NTUA. "We're having to find the most economical path to provide that service but also think about when we provide that service and invest the grant dollars that we're providing a service that can last more than a limited period of time. Those are all decisions and challenges that we deal with as we look at providing what we're intended to do and that service to everyone in the nation."

Operating new networks once they are built is an ongoing concern for many tribes, since grant money doesn't cover operational costs once construction is finished. "NTTA has been advocating for sustainability," said Enjady. "I always use that analogy of a brand-new Escalade with all the bells and whistles, everything else to build it, but we have no gas money and no driver's license to drive."

Enjady and others have been lobbying for federal funding reforms, such as expansion of the Eligible Telecommunications Carrier certification to qualify for High-Cost support from the Universal Service Fund, so new networks will have sufficient resources for continued operation in the high-cost areas they are expanding into.

Like other broadband providers, tribal organizations have had to juggle the overhead involved with multiple federal grant programs, each with different accountability requirements. "We had grants from RUS, from the Community Connect program, ReConnect 3, NTIA, CARES and ARPA,"

Robert Griffin, Tribal Broadband Director, The Choctaw Nation held a fireside chat in Albuquerque with Margaret Gutierrez, Acting Division Chief of Tribal Broadband Connectivity and Nation-to-Nation Coordination Division, NTIA, OICG, U.S. Department of Commerce. **Source:** FBA.



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said Trumbly. "The funding agencies get a little upset if you buy something with one grant and use it on another project. That was a big challenge, because we did all of our material purchases and management. We established a warehouse, did our procurement, segregated all of our inventory. It's like we actually had five different inventories, one for each grant and segments that way. That was a huge challenge." Mescalero takes a different approach, with Enjady indicating he prefers for contractors to manage materials procurement and warehouse inventory rather than having to carry the overhead involved.

Workforce Development and Tribal Wealth Investment

One unique requirement Indigenous Nation service providers have in hiring is a preference for employing members of their tribe in their businesses along with providing continuing workforce development to maintain and enhance the skills of those who work there. NTUA has around 1,000 employees with all but 18 Navajo, but it is a continuing challenge to retain them.

"Part of my mission, my role, is to help bring up those folks on the Navajo Nation that work at NTUA to take my job and make that 100% [Navajo employment]," said Thomason. "Attracting that talent initially is very hard, especially if you look at bringing people back who are members of the Navajo Nation, but maybe who don't live there today. About half of the Navajo Nation tribe doesn't live on the nation as full-time residents and the reason is because of jobs. It's a very complicated scenario. What we're working to do is to train people up to help them grow in their skill sets. It's a challenge. It's a challenge because time is of the essence here."

Unlike traditional businesses, NTUA is a self-sustaining, not-for-profit, tribally owned enterprise, so Thomason has to balance standard profit and loss with the need for ways to deliver workforce development for the benefit of the Navajo Nation as well as keeping phones and broadband networks running.

"It's not easy," said Thomason. "We're sending people to training and bringing in training as we can, but it has to be very focused, so we make the best use of those to take care of the work that needs to be done. Fiber engineering, fiber design, are some things that we are focused on right now, to strengthen those skill sets."

Facing the same challenge, the Osage Nation partnered with a local vocational school to provide a two-week fiber optic technician training course. The Nation identified qualified tribal members who had an interest in the program and needed financial assistance, paying for the course and then placing graduates with subcontractors building network infrastructure for further on the job training in the field.

All the panelists emphasized that tribes need to understand that they drive and own the network build process and must gain and retain the institutional knowledge necessary to manage it when dealing with contractors and operations.

"The biggest thing is to make sure that we have build standards for tribes to follow," said Enjady. "To make sure that if you have an underground contractor who lays cable, putting about 20 miles, are you sure that's very good? What depth that you specify underneath, what standards? Because [under] NTIA, we really didn't get too much of that.

"Tribes have to know and understand these processes and contracts to make sure that they're protected. As we keep moving forward, we want to make sure everybody's got a bulletproof network, getting your engineers to make sure that they're building redundant networks. We should have rings. Fiber Broadband Association has taught a lot of that [need for resilience]."

Considerations in contracting needs to go beyond the initial build into operational costs and considerations that come into play once network construction is finished, Thomason said. The network will have to be maintained once it is up and running. Vendors need to provide help and build trust with tribes, while not taking advantage, said Enjady.

"One of the things we do when we select vendors and vendor equipment, I look at what the warranty is," said Thomason. "I look at supply chain. Look at the warranties on the equipment. Look at where it's made. Because, when it comes down to it, after you get built, you want to make sure it can be sustained."

And no matter what, tribes need to hold on to the fiber network once it is built, regardless of any short-term temptations for financial returns. Sovereign ownership of fiber networks is just as important as owning and controlling other utilities.

"Don't ever give an asset that's as valuable as your fiber infrastructure," said Trumbly. "You be in control. It's your network, it's your fiber footprint, it's your infrastructure. Never, ever sell it. Don't give it away. Don't lease it out. There are a lot of people in [Indigenous Nations] that go 'Oh, we can take this money and build this $60 million [project], and we can sell it and give per cap[ita distribution] to our people for $10 million.' Well, yeah, but then you're going to wind up living off the scraps from the edge of the table. It needs to be tribally owned. You need to manage it. You need to run it. You can get help if you don't have the skill set. There are companies out there that will help you without taking an ownership stake or a controlling stake in it."

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The Chickasaw Nation's Carrier-Grade Network

By Doug Mohney

Trace Fiber Networks president Josh Snow (Center) discussing how the Chickasaw Nation decided to build its own carrier-class network to serve the needs of the community. **Source:** Doug Mohney.

Encompassing over 7,600 square miles of south-central Oklahoma and all or parts of 13 Oklahoma counties, the Chickasaw Nation is a vast enterprise that employs more than 14,500 people, according to the Office of the Governor, and generated $3.5 billion in its most recent fiscal year with net assets exceeding $7 billion. The Nation operates numerous businesses in Oklahoma and across the United States, with a portfolio that includes banking, entertainment, hospitality, manufacturing, and gaming.

One of the many components of the Nation's economic success is its creation of Trace Fiber Networks, a wholly owned subsidiary that built and operates a fiber network serving the businesses, tribal government offices, hospitals, libraries, and communities in south-central Oklahoma. Originally a middle mile network designed to link tribal data centers, Trace is now providing business services and expanding its network to deliver fiber to the home.

Trace's origin story starts in 2015-2016, when the tribe wanted to increase its high-speed connectivity within its enterprise operations. There were nine telco incumbents with legacy exchanges within the Nation's footprint and a multitude of cable providers providing some form of broadband.

"We, as the Nation, had built and were consolidating some data centers," said Josh Snow, President, Trace Networks. "The need for 10 Gig and above speeds became necessary. When we started getting the prices from the existing incumbents, we saw considerable special construction costs attached to those builds. We analyzed those costs and concluded we could build and own the network instead of paying a provider to build their network and then charge us on a monthly basis.'"

Building and owning the network would provide significant benefits, including the ability to manage costs and get faster speeds at lower prices. "What the business cases really proved is that once we had the fiber, we could, on day one, go from 500 Mbps connectivity to 100 Gbps connectivity," said Snow.

Compared to the substantial special construction costs and projected monthly service fees from the incumbent provider over five- and 10-year periods, it became clear that the tribe could build and operate its own sovereign middle-mile network on a cash positive basis within a decade just for its own internal uses without having to bring in third-party revenues. The business plan and feasibility study went to the tribal leadership and council for business review, with Trace being created in 2017 and starting construction shortly thereafter.

"I think the thing that sold the deal was the generational impact," said Snow. "The network would have a useful life

of at least 20 years, and we would be reaping the benefit long into the future. It wasn't just a one-time investment for a limited period of years. The Chickasaw Nation leadership really saw the vision- controlling our destiny from a digital sovereignty perspective, and ensuring backup, reliability and resiliency within our operations."

Digital sovereignty is especially important to indigenous nations, with tribes being able to own and control their data on their own lands, rather than having it handled by a third party in the cloud. It is a stance very common within the European Union, with some countries having data residency laws that require companies to store data on servers within the country, so it is subject to the country's laws.

It was also important for tribal enterprise operations as well as to support potential revenue customers to build a middle mile network that was truly carrier class, not simply point-to-point. "I was pretty adamant that we build a ring topology or not at all," said Snow. "With 28 years of industry experience, I knew resiliency was going to be paramount in our success. We really built the network with that in mind." To make sure that the network would have sufficient capacity both for near-term and future needs, Trace built three fiber ducts along the route, filling one with 216 strand cable and leaving the other two open for expansion.

Construction of Trace's initial middle mile network started in 2018 and was completed in 2020, with around 550 miles. The network, built to carrier-class standards, provided the starting point for Trace's continued service expansion beyond supporting the enterprise-class operations of the Nation and its billions of dollars of businesses, as well as community anchor institutions including K-12 and vocational tech schools, hospital and other health care facilities, and public safety organizations.

"Our first initiative, which was self-funded, built to seven communities central business districts to pass 1,000 small and medium-sized businesses (SMBs)," said Snow. "It was a main street buildout to capitalize on that small/medium business." Communities in the main street builds were at around 10,000 people or less and were either unserved or underserved by the incumbent broadband provider, typically a cable company with legacy coaxial infrastructure. Business customers outside of the local community include providing cellular backhaul for AT&T towers and to support the national FirstNet first responder wireless network.

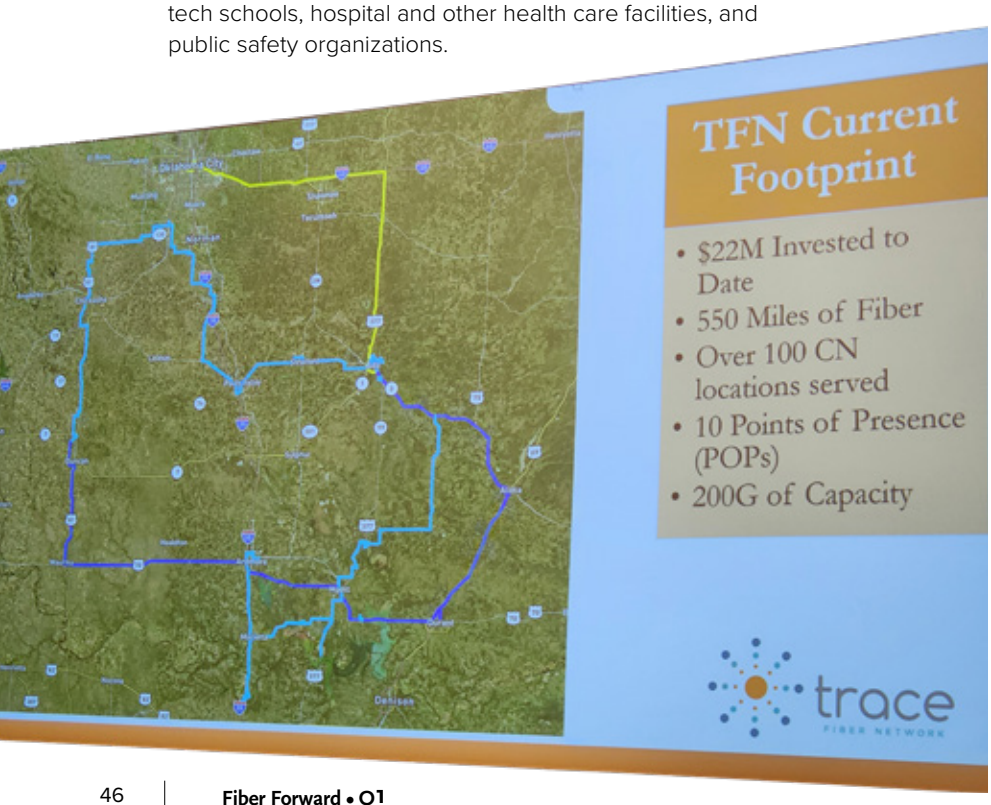
Trace's next expansion is built around $78 million in federal grant monies from NTIA and USDA RUS to deploy fiber to the home in areas of two counties with an expected passing of about 10,000 homes in total. "This is a rural build-out," said Snow. "Four point five, 4.6 homes per mile, on the density."

SMBs are able to get up to 2 Gbps connectivity while future fiber-to-home customers will be able to select from a basic package of 100 Mbps symmetrical service or opt for 1 Gbps symmetrical if they so desire. Trace also offers its business customers a full suite of telecommunications services including MPLS, VPLS, Ethernet, private line, and DWDM wave services all backed by SLAs and the ring topology Snow advocated from day one.

"That carrier-grade mentality was a big lift from a financial standpoint, but it's already providing financial dividends," said Snow. "We future-proofed our network so we wouldn't have to look at the typical five-to-seven-year upgrade cycle. We have so much capacity now that it should be 10 years before we're looking at any significant upgrades for network capacity."

For tribes looking at the economics of running their own networks, Snow recommends them to "wrap your arms around your entire telecommunications" as the Chickasaw Nation did when it started evaluating its options, and calculate the total current spend spread across different organizations.

"You really need to look at it holistically, to come up with a true value in what you're spending with various connectivity or telecommunication providers," Snow said. "I think even smaller tribes can create a model that supports their future growth and capacity while reducing reliance on external providers. It's certainly something that my leadership found to be very, very attractive."



Trace's middle-mile network (left) will be expanded and deliver FTTH broadband for several communities in the area. **Source:** Doug Mohney.

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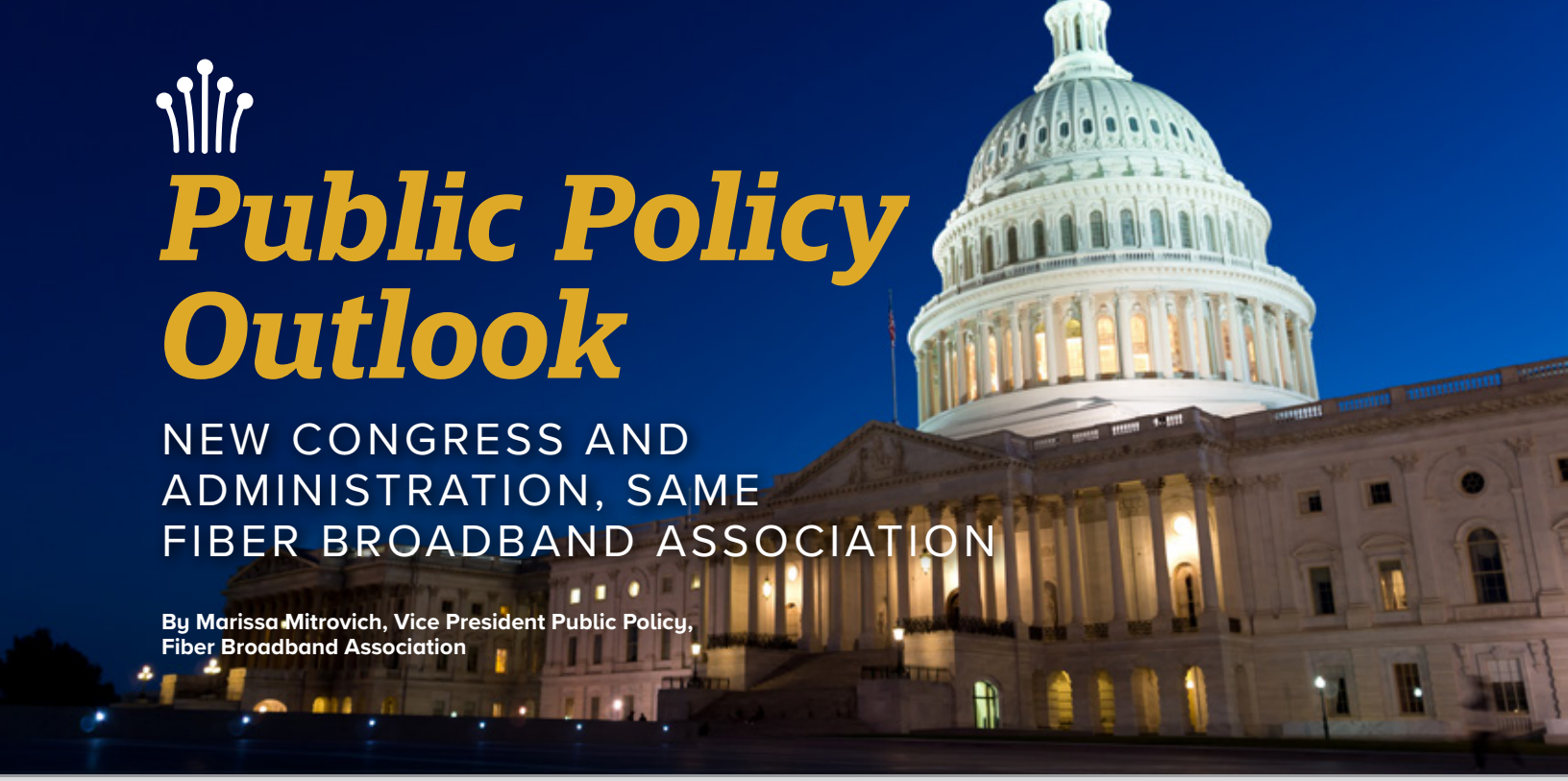

Public Policy Outlook

NEW CONGRESS AND ADMINISTRATION, SAME FIBER BROADBAND ASSOCIATION

By Marissa Mitrovich, Vice President Public Policy, Fiber Broadband Association

The 119th Congress commenced on January 3rd with the swearing-in of new House and Senate members. Leaders from the Fiber Broadband Association (FBA) were present on Capitol Hill, participating in ceremonies and welcome receptions. With many new faces in Congress and changes in leadership, FBA is spending time meeting with these legislators and their staff to share our public policy priorities. Notable changes include the House and Senate committees responsible for broadband oversight, with Senator Ted Cruz (Texas) serving as the Chair of the Senate Commerce, Science and Transportation Committee and Congressman Brett Guthrie (Ky.) serving as the Chair of the House Energy and Commerce Committee. Additionally, Congressman Richard Hudson (N.C.) will now lead the House Subcommittee on Communications and Technology.

Despite a significant snowfall and freezing temperatures, there was a smooth transition of power for President Donald Trump as he was sworn into office on January 20th. His inauguration was moved inside, the first time in 40 years it did not take place on the steps of the U.S. Capitol. In addition to many festivities to celebrate his Presidency during the weekend ahead of inauguration, President Trump and Vice President Vance wasted no time beginning their administration with a flurry of executive orders and actions. Key executive actions have involved temporary pauses on certain federal grant and loan programs. On his second day in office, President Trump made a major announcement that investments in infrastructure to support AI through data centers will be a key priority.

With the new Congress and administration in place, FBA sees many opportunities to advance fiber broadband policy and bipartisan public policy priorities including the continued acceleration of the Broadband Equity, Access, and Deployment (BEAD) program, permitting reform, network modernization, building a stronger, larger telecommunications workforce and creating manufacturing opportunities in America.

At the Fiber Broadband Association, we also have exciting new changes as our public policy committee structure has changed. Over the past two years, the public policy committee has tripled in size, requiring its leaders to consider a new format for the committee to support our members and our engagement in policy forums and issues. There are now four co-chairs leading the committee. Chris Champion, Vice President of Government Affairs, C-Spire; and Jordan Gross, Director of State Government Affairs, Lumen; will continue as co-chairs and joining them is Carsi Mitzner, Government Affairs Director, Brightspeed; and Glenn Reynolds, Vice President of Government Affairs for North America and Head of DC Office, Nokia. Ariane Schaffer, Head of Government & Public Policy, GFiber, is the FBA Board Liaison.

The committee will now have four working groups, established to allow members to spend more time dedicated to the direction of FBA public policy priorities. The working groups will meet once a month and focus on the areas of state policy, manufacturing, permitting, and network modernization.

In addition to these changes, the public policy committee will expand its programming in 2025. By the time this issue of *Fiber Forward* is published, we will have hosted our first inaugural public policy summit in Washington, D.C., on February 26-27, 2025. We also will be visiting state capitals throughout the year, growing Fiber Day on the Hill on April 9, and hosting our annual fly-in during the fall.

Quarterly Policy Overview

FCC Leadership Changes

Brendan Carr was officially designated as Chairman of the FCC by President Trump and Olivia Trusty was nominated to serve as an FCC Commissioner. A timeline for Trusty's confirmation is not known, however she has received overwhelming bipartisan and industry support on her nomination, including from FBA.

FCC's 2024 Communications Marketplace Report

The FCC released its latest report on broadband deployment, affordability, and access across the U.S., underscoring the importance of fiber broadband in expanding connectivity. Key findings include a notable 18% increase in fiber-optic deployment since 2023, persistent affordability gaps, and 25% of rural households still lacking high-speed internet access.

Net Neutrality Struck Down

On January 3, 2025, the U.S. Court of Appeals for the 6th Circuit struck down net neutrality rules, reshaping the regulatory framework for broadband providers. This decision reopens debates on how internet services should be regulated. FBA supports a light-touch regulatory approach to ensure rapid broadband expansion, particularly in underserved areas.

BEAD

BEAD has been front and center during hearings on Capitol Hill already this Congress, with the program discussed during the Senate Commerce, Science, and Transportation's nomination hearing on January 29 for Howard Lutnick to be the U.S. Secretary of Commerce. FBA anticipates that there will be efforts made to expedite broadband deployments, and we encourage Congress, the Administration, and states to continue to move ahead with this program. In the last days of the Biden Administration, NTIA issued guidance for alternative broadband technologies under the BEAD program on January 2nd. However, with a new Secretary of Commerce and the nomination of Arielle Roth as the anticipated NTIA Administrator this guidance could change. FBA supports NTIA's prioritization of fiber and continues to work with Congress and state governments to expand fiber broadband access through BEAD.

If your company is interested in joining the public policy committee, please email mmitrovich@fiberbroadband.org for more information.

Speeding Deployments by Speeding Locates

By Doug Mohney

Onsite locate equipment ensures proper deployment of conduit and reliable documentation once it is in place in the ground. **Source:** TAK Communications.

If every journey begins with a single step, then every fiber broadband network begins with a lot of paperwork. Before the first backhoe can break ground, most operators and construction contractors take necessary precautions to prevent damage to utilities, ensure utility services remain intact and uninterrupted, and prevent serious injury to people or property, including field installation teams and nearby residents.

Utility locates are arguably the most essential step that needs to take place before the physical act of construction begins, but the public and private organizations supporting the locate process are under increasing strain as fiber construction booms place unprecedented surge stress on municipalities, utility owners, and locate firms to provide timely location and marking of underground utilities.

According to the Common Ground Alliance's 2022 DIRT report, late locates are preventing excavation on the planned start date at least 56% of the time. Digging without locates runs the risk of local and state fines that can come to tens of thousands of dollars per violation, even before factors such as liabilities for damage to existing utilities come into play.

Skipping the locate process is not an option, as underground locates are a public safety requirement to prevent costly interruption of services and repair of damaged lines and pipes. Further, utilities may not have accurate mapping of buried facilities due to a variety of factors, including the age of the infrastructure and its documentation, deviation

Failure to properly locate buried utilities can result in build delays and the cost and time to repair damages. **Source:** UtiliQuest.

of paper documentation from actual construction, and the difficulties of utilities and municipalities to get sufficient funding for accurate mapping to modern standards.

"The reality of fiber broadband deployment today includes difficult decisions around installing fiber underground, whether all affected utilities have performed locates within the state-assigned timeframe or not. Each state has different laws that govern installers when they decide to move forward without underground utilities being located and marked," said Brendan O'Boyle, FBA Deployment Specialists Committee Chair, and PLP National Sales Manager-Communications Markets. "Underground line construction crews assume all responsibility when they proceed but are put into

impossible situations to decide to move forward to stay within the time constraint required to complete the project. Understanding how to work with local permitting departments, HOAs, and other groups to ensure the locate process is smooth, fast, and efficient will be a key factor as operators look to move forward."

Last year, the Deployment Specialists Committee reviewed the many issues involved in the locate process and discussed best practices to speed up the process in its "Accelerating Timeliness of Utility Locates" 14-page white paper, available for download by FBA members on the organization's website.

The Problems with Locates

Many potential issues can lead to locate delays that will result in ripples throughout deployment timelines, increasing costs and affecting an operator's ability to meet deadlines associated with funding grants.

One of the biggest factors affecting locates is available labor both at the administrative level and for field work. A local township or municipal government may only process a handful of locates per week or month, typically for new home construction or other building projects. Fiber broadband construction in an unserved or underserved area will require locates for a large number of addresses in the area, resulting in the need to process hundreds or more locates per month until construction is completed.

This bow-wave of locates means that administrative staffing may need to staff up and/or the locates process needs to become more efficient. It also puts pressure on the field workers who go out and find buried utilities and mark them, requiring them to either put in overtime or bring in outside labor to get locates done in a timely manner. Like fiber optic technicians, experienced locators are in short supply, and it can take anywhere from three to six months to train a locator. Without sufficient field workforce, installs can back up and ticket backlogs will continue to pile up.

The "Accelerating" white paper detail recommendations for improvements throughout the locate process, breaking them down into three categories of pre-ticket call-in preparation, ticket call-in process, and during the locate process and construction.

Pre-Ticket Call-In Preparation

Contacting the state's 811 organization and understanding state-specific 811 laws and regulations is the first step for a more efficient locate process. Construction firms and project managers need to recognize variations in ticket types, completion requirements, and tolerance zones as applicable.

Engaging with all the stakeholders involved in or affected by construction should be undertaken, with state 811 centers, local damage prevention councils, HOAs, and others impacted by construction is vital. Everyone should be made aware of the project scope, blueprints, and other related materials in advance of construction to facilitate preparation and discover potential issues before field crews are on site clocking time and money.

All necessary permits should be secured before initiating a locate request to avoid delays and potential second requests because the available paperwork wasn't available the first time. Proposed Installation paths should be white lined to minimize unnecessary locating time, providing a visual guide for locaters. Finally, limit the locate area to the required excavation zone, avoiding unnecessary extensions.

Ticket Call-In Process

Much of the advice in the ticket call-in process is common sense. Adhere to state 811 laws and regulations when initiating locate requests. Ensure the accuracy of contact information and appoint knowledgeable personnel as primary contacts on locates for effective communication; having an intermediary that doesn't understand the process, or the build only causes opportunities for miscommunication or delay.

Construction managers should also plan on delays due to less-than-optimal locate labor resources. Locates may not be performed as fast as represented, especially if there's a backlog of other requests.

During the Locate Process and Construction

Best practices during this phase of operation include potholing to visually identify utilities that are in the vicinity of the installation and maintaining regular communication with stakeholders. Periodic meetings should be held to ensure everyone affected by the process is on the same page as to what is happening and how it may affect them.

Notifying homeowners of the upcoming project by outlining the various steps of the process helps to make sure they are not surprised by construction crews and potential temporary inconveniences, such as traffic disruptions or noise. Implement proper damage prevention measures to mitigate utility damage to safeguard project timelines and company reputation.

Pay special attention to any "cleared" utility locations shortly after the ticket request was made, because the probability is high that it was cleared in error.

Smoother Locates, Faster Construction

The humble locate is a vital part of the construction process and it is important to not take it for granted. Many factors can delay locates, including the need for government and private sector stakeholders to scale processes to enable the larger number of locates necessary for a fiber project.

In addition, stakeholder participation is essential in making locates and the construction process go smoothly. Transparency and communications throughout the locate and excavation process can ensure that fiber project construction meets the expectations of all involved with minimal surprises along the way.

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2025 Industry/Partner Event Calendar

PCCA 80th Annual Convention
March 7-12, 2025 | Scottsdale, Ariz.

2025 NRECA Power Exchange & TechAdvantage
March 9-12, 2025 | Atlanta, Ga.

Connected America 2025
March 11-12, 2025 | Dallas

ITA Showcase
March 11-13, 2025 | Portland, Ore.

ICA Annual Meeting & Expo
March 24-26, 2025 | Des Moines

NTTA Tribal Broadband Summit
March 31- April 2, 2025 | Chandler, Ariz.

2025 EXPO TCEI
April 1-3, 2025 | Belton, Texas

ITW International Telecoms Week
May 5-7, 2025 | National Harbor, Md.

WIA Connect(X)
May 12-14, 2025 | Chicago

Broadband Communities Summit 2025
June 23-25, 2025 | George R. Brown Convention Center, Texas

ISE Expo 2025
July 29-31, 2025 | New Orleans

Mountain Connect 2025
August 4-5, 2025 | Denver

Broadband MT Annual Meeting
August 18-20, 2025 | Missoula, Mont.

NTCA Fall Conference 2025
September 15-18, 2025 | Las Vegas

SCTE TechExpo
September 29 - October 1, 2025
Washington, D.C.

The Utility EXPO
October 7-9, 2025 | Louisville, Ky.

Calix ConneXions 2025
October 19-21, 2025 | Las Vegas

Broadband Communities Summit West 2025
November 5-6, 2025 | San Diego

Broadband Nation Expo 2025
November 17-19, 2025 | Orlando

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FBA 2025 Events

Regional Fiber Connect
March 25, 2025
Philadelphia, Pa.

Fiber Day on the Hill
April 9, 2025
Washington, D.C.

Fiber Connect 2025
June 1-4, 2025
Nashville, Tenn.

Regional Fiber Connect
July 17, 2025
Anchorage, Alaska

Regional Fiber Connect
August 19, 2025
Toronto, Ontario

Regional Fiber Connect
September 16, 2025
Spokane, Wash.

Regional Fiber Connect
October 16, 2025
Scottsdale, Ariz.

Regional Fiber Connect
November 11, 2025
Kansas City, Mo.

Premier Members Meeting
December 8-10, 2025
Palm Springs, Calif.

Fiber Broadband ASSOCIATION

2025 Editorial Calendar

Grab your spot now in the upcoming *Fiber Forward* issues!

May 2025

Ad Space Closes 3/20/25

- Fiber Connect 2025 – The Show Edition
- Connecting the customer
- High-tech hardware tools for building - Ground penetration radar, LIDAR, drones
- Executive Insights | Federal/State Update Community Profiles | Innovation at Work

September 2025

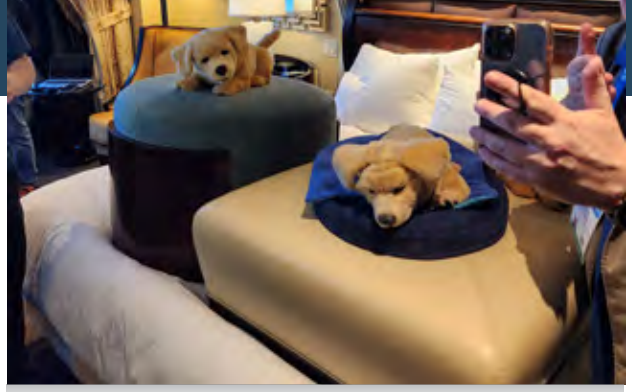
Ad Space Closes 8/9/25

- Perfecting the in-home experience
- Fiber Connect 2025 wrap-up
- Behind the Call Center Curtain – OSS/BSS and AI
- Executive Insights | Federal/State Update Community Profiles | Innovation at Work

Contact Lucy Green at lgreen@fiberbroadband.org for sponsorship opportunities.

Please note editorial topics may be subject to change based on future events and market shifts.

Walking robots such as this one are being used to survey crawlspaces and other tight locations and can even pull cable, saving time and improving safety. **Source:** Doug Mohney.



Realistic-looking robotic pets that react to voice and touch are now providing comfort to elderly people who can no longer taking care of a living one. **Source:** Doug Mohney.

(cont. from page 21)

Oshkosh, a manufacturer of purpose-built vehicles such as fire engines, airport cargo handlers, and refuse collection, was proud to show off HARR-E, an autonomous electric refuse collection robot offering on-demand trash and recycling pickup via smartphone app or virtual at home assistant. HARR-E, a prototype system autonomously collects waste and returns it to a central collection era. First responders got a look at an Oshkosh diesel hybrid fire truck that's been purchased by several departments around the country, while airports got a look at a full-electric driverless cargo handler designed to transport baggage between locations on an airport ramp.

Increasing numbers of autonomous and electric vehicles of all types in service and public safety industries drive the need for fiber in two ways. As noted previously, the continuous flow of data from autonomous vehicles will require broadband for data collection and centralized monitoring and control, especially in fleet operations with dozens or more vehicles in operation. Secondly, the need for more electricity and networks of distributed chargers ups the ante for Smart Grid deployment and operations. While AI data centers supporting autonomous fleet operations get the majority of the attention, electric suppliers in both commercial and co-operative sectors need trusted and secure, low-latency broadband to manage an increasingly complex ecosystem of power generation, storage, and EV chargers.

Iterating a Home Robotic Future

Many companies are seeking the next successful consumer robot beyond the Roomba line of cleaning machines, with robotic pets starting to gain traction. Making its debut at CES, Tombot is a robotic dog designed by its creator to be a companion for elderly adults with memory issues who can't safely care for a regular pet. The first-generation product can be held and moves its head, eyes, tail, and mouth, making realistic puppy sounds and reacting to basic voice commands.

Providing a robotic pet companion has proven to provide benefits to older residents living alone. New York State has provided 40,000 devices to older adults and found that 70% of pet recipients reported a reduction or significant reduction in loneliness plus a 75% decrease in chronic pain. The Washington Home Foundation in Washington, D.C., will be distributing and managing 1,000 companion robotic pets to residents 60 and older in 2025.

At an estimated $1,500 retail, Tombot will speak upon command and react to being petted, but it isn't mobile and needs to plugged in at the end of the day to recharge its batteries. Tombot spokespeople wouldn't openly speculate on what future products might include, but it's not unreasonable to imagine a future version recording motion data and incorporating other sensors to monitor daily physical activity and measure vital signs.

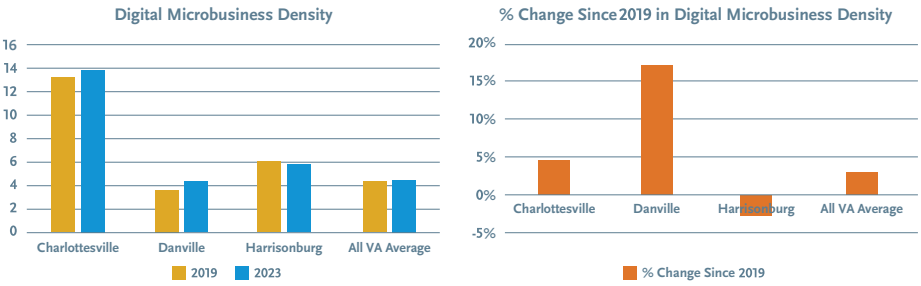
Robot mobility costs more. The Unitree Go2 Robot four-legged machine demonstrated at one CES suite by reseller Looking Glass XR listed at $2,800, with additional sensors, payloads, and larger batteries adding to the cost, but these plastic and aluminum devices are being used for real-world applications. The baseline model includes ChatGPT to interpret user instruction and better comprehend its surrounds, a front-facing camera, a wide-angle laser radar sensor, and multiple wireless connectivity options, including Wi-Fi 6, Bluetooth, and optional cellular.

Looking Glass knows customers using the Go2 to go into crawlspaces under homes to conduct a visual (and more comfortable) remote inspection of HVAC equipment, enabling field technicians to spend more hands-on time knowing what to repair and having a better idea of what tools and parts are needed to bring to the job. The robot has also been used to pull electrical cable underneath homes, suggesting that this could be a future companion for fiber installation technicians.

As robots move into mainstream use in the home and businesses, it's easy to imagine an affordable device that looks like a dog, walks more-or-less like a dog, and does much more than a simple companion to be petted. With mobility, it could watch over the home and its occupants, providing more information in case of a fire, home maintenance emergency, or individual health crisis. Such applications will add to the bandwidth load for the household through a flow of monitoring data going into the cloud with software updates and new applications downloaded as needed.

(cont. from page 25)

From Charlottsville to Across the Nation - Fiber's Measurable Economic Benefits



Digital Microbusiness Density in Charlottesville and Comparison Cities, 2019 and 2023

Source: GoDaddy Microbusiness Venture data, 2024

The availability of fiber in Charlottesville has fostered the creation of significantly more small businesses when compared to other Virginia cities of a similar size.

There's more than theoretical models to demonstrate the value of fiber. Two different sets of research generated in 2024 worked to quantify fiber's impact and value in real world settings. FBA's newly released "*Fiber Anchors Sustained Economic Development: The Charlottesville Impact*" study examined the transformative impact of fiber broadband in the Virginia town and surrounding area, underscoring its role as a catalyst for job creation, housing value growth, and digital entrepreneurship.

The findings underscore fiber's potential to transform communities nationwide, providing critical insights as federal and state governments continue to invest in broadband expansion under programs such as the Broadband Equity, Access, and Deployment (BEAD) and Virginia Telecommunication Initiative (VATI).

Fiber broadband's growth in Charlottesville over the past decade has contributed 35% of the city's private sector job growth between 2015 and 2019, adding nearly 735 new jobs especially in professional, scientific, and technical industries. Availability of fiber broadband contributed to an estimated $4 million annual increase in housing values in the Charlottesville area, enhancing wealth for homeowners and while expanding the local tax base.

Small businesses are crucial to the economy, because they generate millions of new jobs and drive innovation as well as economic growth. A 2019 report from Small Business Innovation found that small businesses generate 44% of U.S. economic activity. Compared to other cities of similar size in Virginia, Charlottesville ranks highly in Digital Micro Business Density, a key indicator of small business health size, thanks to reliable, high-speed broadband enabling access to global markets.

Peer-reviewed findings supporting the positive economic benefits of fiber were published by the nonprofit Center on Rural Innovation (CORI). The "Beyond Connectivity: The Role of Broadband in Rural Economic Growth and Resilience" economic study published in September 2024 compares economic data from three types of rural communities: underserved communities, communities with access to basic broadband services, and communities served by smaller fiber broadband providers offering access to experiences that go beyond fast internet.

CORI examined the impact of fiber service providers Paul Bunyan Communications in Beltrami County, Minn.; Bulloch Solutions in Bulloch County, Ga.; and Blackfoot Communications in Gallatin County, Mont. The study, sponsored by Calix, NTCA-The Rural Broadband Association, and FBA, found a more significant economic impact in communities that are better connected and have access to additional services that allow users to effectively leverage that connection, while comparable underserved communities experience economic stagnation. Data was analyzed from 2020-2022 for the study and found that rural counties with high broadband adoption rates of over 80% have significant advantages over those with low usage.

Advantages of rural counties with high broadband adoption rates included 213% higher business growth, 10% higher self-employment growth, 44% higher GDP growth, and 18% higher per capita income growth. Numerous factors were involved in these results. Rural counties with high broadband use saw more businesses opening, while similar counties with low broadband utilization are losing businesses. On average, rural areas with low broadband usage lost three or more businesses each year.

With broadband access, the barriers to starting a business in rural areas are lowered significantly by connecting them to essential resources, like access to banks, small business loans, and venture capital as well as global markets. Broadband enables small business owners to conduct market research, leverage digital marketing strategies, and expand their customer base beyond their local physical area through e-commerce.

Finding the Research

Most of the publications cited above can be found through FBA's website, fiberbroadband.org, at the Resources Menu under "Research." Access to the full CORI report, Report: The role of broadband in rural economic growth and resilience - Center on Rural Innovation, can be found on the non-profit's website for review and download.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