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Welcome to Fiber Connect 2025

Gary Bolton, FBA President & CEO

By the time this edition of *Fiber Forward* arrives in your mailbox, hopefully you should be packing for or on your way to Nashville for the world's premier fiber broadband event, Fiber Connect 2025. I'm looking forward to celebrating the industry with our membership and tackling the challenges that remain in providing every household and business in the country with the only long-term reliable future-proof broadband solution that has been proven and documented to drive economic growth and job creation.

This issue's "The Keystone State's Path to Digital Opportunity" article looks at Pennsylvania's work to deploy fiber as discussed at the March 2025 Regional Fiber Connect in Philadelphia ("Go Birds!"). Nashville is our largest event and is expected to have over 5,000 attendees, but our regional conferences have been well attended this year, with standing-room only crowds.

There's plenty of information in this edition on how to deploy fiber faster and more effectively. "High-Tech Tools for Network Construction and Maintenance" looks at the timesaving and safety advantages ground-penetrating radar (GPR) and drones provide before you dig or have to climb up a pole to build, maintain, and repair outside plant.

Since fiber was first introduced, many companies have come up with innovations to make the process of building a fiber network and lighting up locations much faster. "Prepping Fiber for Faster Deployments" discusses how construction contractors and service providers can speed up the process of fiber deployment and service delivery by leveraging technology while at the same time reducing – but not replacing – the need for skilled technicians in the field.

There's no escaping AI and its relationship with fiber. "The Virtuous Circle of Fiber and AI" examines the many reasons why data centers are investing in fiber both inside and outside of their walls. AI is also contributing to better service provider operations within our industry. To track, measure, and contribute to AI's impact on fiber, the FBA has created an AI committee and released one AI white paper so far, with a second expected for release later this year.

As *Fiber Forward* tracks and documents the global trends affecting our industry, it also continues keeping its eyes on the local communities across the country and their many various and unique fiber stories. "Fiber From Danbury to West Des Moines" interviews the mayors of those towns and is a good preview for the Fiber Connect State Broadband Summit fireside chat "Mother, Mayor I Deploy Fiber" taking place on Wednesday, June 4, 2025.

"Middle Tennessee's Uniting Fiber" discusses United Communications and its ongoing efforts to connect unconnected communities and businesses throughout its territory, including those a stone's throw away from the Gaylord Opryland Resort & Convention Center.

And for all our 21st Century talk about AI and robots, sometimes the best tools are the ones we've had for hundreds of years. "Colorado's ARPA Horse-Drawn Fiber Lights Up National Park" follows the trail of Delta-Montrose Electrical Association (DMEA) as it brought high-speed connectivity to the rugged terrain of Gunnison National Park and the surrounding area. Using four-legged animals to pull fiber up and down the mountains was easier and far less disruptive than having to chop down trees and bring in four-wheeled vehicles.

I hope to see you all in Nashville, June 1-4, 2025, for Fiber Connect 2025 and catchup with as many of you as I can.

Sincerely,

Gory Bolton

About the Cover

By Rich Williams, Publisher Fiber Forward

As we continue the ode to classic movie posters, we felt that the iconic E.T. poster with two fingers connecting and lighting up was the ideal image to pair with the Fiber Connect 2025 "Light It Up" conference theme. In our cover, we are working to connect every home, everywhere with fiber broadband.

Because the BEAD program was the result of a bi-partisan supported law, we've added a cuff link on each of the hands connecting to create light, one for Republicans that supported the bill and one for the Democrats, to honor the effort to make this program about people, not politics.

We've got our safety conscious OpTIC Path graduate heading to work, with his trusty FBA beagle sidekick in his basket. If you've been paying attention, this is the fourth appearance of the FBA beagle since he debuted on the cover of the Q1 2023 issue.

E.T. the Extra-Terrestrial movie released in movie theaters -- remember those? -- in 1982 and grossed \$797 billion worldwide. That's quite the haul for a movie that cost just \$10.5 million to make.

It was a very busy year for technology, too. Time put the personal computer on its cover for the "Person of the Year" issue, the Commodore 64 personal computer was released, and the Internet Protocol Suite (TCP/IP) was standardized, providing the foundation of the modern internet.

On a side note, Vint Cerf, one of the creators of the TCP/IP protocol is one of the legendary people interviewed as part of the ThoughtWaves documentary which will be shared as a First Look at Fiber Connect 2025.

Finally, in 1982, we saw the invention of the Simple Mail Transfer Protocol (SMTP) which allowed for emails to be sent between computers. Speaking of which, in the time it took me to write this About the Cover, I received 37 new emails.

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EDITOR'S MOMENT Behind the Editorial Curtain

By Doug Mohney, Editor-in-Chief

Fiber Forward magazine operates under two core principles. The first is to educate our readers, both within and outside the field, on fiber and the fiber optic industry in broad strokes. More specifically, we have and will continue to talk about the economic value and benefits of fiber, how to install fiber optic broadband networks better and more efficiently, what technologies make fiber network within homes and businesses better, and what applications and industries use and need fiber. We'll also continue to discuss how the industry and field continues to grow in North America.

Complementary to education is documentation, as we chronicle who is doing what and where within the Fiber Broadband Association and its ecosystem of participating and supporting members. We're on our (gulp!) fourth year of print publication, producing a quarterly 60-page magazine that highlights the news and efforts of an industry that continues to growth and thrive. As a quarterly, we have time to conduct more substantial pieces which often reveal more than first expected, such as this issue's discussions with DMEA and United Communications. The phrase "You're doing the Lord's work" comes to mind when I talk to many service providers who have brought fiber to places where it wasn't available, overcoming challenges such as economics and geography.

Every *Fiber Forward* issue starts off with the best laid plans in the Editorial Calendar and then encounters the real world. For example, interviews fall through, leaving us to call audibles on what appears in this edition of the magazine and moving other features to the future. If you'd like to know more about *Fiber Forward* on the editorial side, I'll be at Fiber Connect 2025 in Nashville, June 1-4, 2025.

Doug Mohney

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By Doug Mohney



Mayor Roberto Alves (left) is leveraging state Department of Transportation funding to extend fiber through the city. **Source:** City of Danbury. Bringing more fiber and a competitive environment to the City of West Des Moines meant cleaning up the city's right-of-way and installing new conduit, said Mayor Russ Trimble (right). **Source:** City of West Des Moines.

On June 4, 2025, civic leaders, state officials, and industry representatives will gather together in Nashville, Tennessee for the second annual State Broadband Summit being held at Fiber Connect 2025. One feature of the summit is the "Mother Mayor I Deploy Fiber" fireside chat, where elected executives from several cities will discuss their challenges, solutions, and benefits in deploying fiber within their communities.

Danbury, Connecticut and West Des Moines, Iowa are two very different towns with leadership in search of the same goals, improved public safety, better quality of life, and continued economic development. Fiber continues to play a vital part in reaching these objectives, but the two areas are taking different approaches for their citizens.

Once known by the nicknames of Beantown and Hat City, the city of Danbury today has about 86,000 residents and encompasses about 44 square miles. Currently operating a 10 Gbps fiber network between its primary facilities and agencies, including City Hall, the public works complex, and police and fire departments, Danbury is embarking on a major expansion to extend its network across the town.

It's been a challenge to secure the funds for needed connectivity upgrades. "In municipal government, you

find creative ways to fund anything," said Danbury Mayor Roberto Alves, "We've gotten \$6.9 million from the state through LOTCIP. We're getting fiber put in because it's going to improve traffic lights [management] and we get all the benefits of fiber for every other purpose. We want to capitalize on that."

Once installed, Danbury will have 40 miles of new fiber to support centralized traffic signal management and cameras to monitor traffic flow. The Mayor is hopeful the network will also facilitate upgrades to other city services, including connectivity for every city building and additional robustness and redundancy for the city's 911 call center. Connectivity for the city's five current fire stations, with a sixth under construction, would be migrated from three existing separate providers onto the new fiber.

"These are public service enhancements," said Alves. "While we can talk about other benefits for the city and its residents, public safety is always first and foremost. But this fiber can also be used for health care and other, more efficient use of digital communication services. We're looking at broad ways to capitalize on fiber to enhance what the city of Danbury is doing." business-friendly place, but that couldn't be further from the truth. We work really well with the business community and learn from them. Where there's opportunities to make things better for them to operate, we do. And I'm lucky to have a partner in Governor [Ned] Lamont, who comes from the business sector through communications."

Alves views fiber as one component to revitalize downtown and bring new businesses to main street. "Fiber is just one piece of the puzzle," he said. "I look at everything we're doing like we're putting this jigsaw puzzle together to create a beautiful picture, a mosaic. To me, I go back to the benefits of fiber and what it means to your business community. It enhances economic growth. We want to be a smart city and leverage fiber to get us there. Consolidating broadband connections from a couple providers to the city network, we're going to see savings."

More efficient and effective government services delivered through fiber as well as multiple high-speed broadband options from different service providers should offer Danbury a competitive edge over other cities in the state, providing benefits such as smart infrastructure, robust mobile services, and a sustainable telecommunications network.

Fiber is just one piece of the puzzle. I look at everything we're doing like we're putting this jigsaw puzzle together to create a beautiful picture, a mosaic. To me, I go back to the benefits of fiber and what it means to your business community. It enhances economic growth. We want to be a smart city and leverage fiber to get us there.

- Danbury Mayour Roberto Alves

Migrating the city's 20 schools from their current portfolio of diverse providers and networks on city fiber is another opportunity for providing better services while saving money for taxpayers. From a construction standpoint, the state of Connecticut has provided a very friendly regulatory environment for municipalities, allowing towns and cities to deploy communications cable overhead on utility poles or underground within the city limits. Commercial entities deploying fiber, such as new entrant GoNetSpeed, need to work with the utility companies for the appropriate licensing agreements, with the local government facilitating when it can.

"We work very closely, hand in hand, to make that process as easy as possible," said Alves. "I know people think Connecticut and think overregulation and it's not a "All those benefits of the features of fiber, then translate into our sales pitch for the business community," said Alves. "I talk about fiber as one of the key initiatives that we're doing as part of the value-add of investing in our community. You leverage that, you show what you're doing, because businesses are looking for cities that are ahead of the curve and making sure they're doing everything to do to get where they are. That's what we want to do here."

Danbury is served by a mix of providers, with Comcast and Frontier the incumbents and GoNetSpeed deploying a new fiber that is expected to reach many currently unserved locations throughout the city as well as providing additional competition on residential and business service pricing.



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We've got a lot of incredible businesses here and we really punch above our weight class for a city of our size. ChatGPT was developed here in one of the Microsoft data centers.

- West Des Moines Mayor Russ Trimble

West Des Moines Concrete Infrastructure Investment

A major economic hub and with a population of approximately 76,000, West Des Moines, Iowa spans four counties in the state and hosts five Microsoft data centers along with a corporate campus of Wells Fargo, and the headquarters of Sammons Financial Group, IMT Insurance, Athene and the Hy-Vee grocery store chain.

"We've got a lot of incredible businesses here and we really punch above our weight class for a city of our size," said West Des Moines Mayor Russ Trimble. "ChatGPT was developed here in one of the Microsoft data centers."

Trimble and the West Des Moines government adopted a novel approach to communications that required a leap of faith and significant capital investment but opened the door to providing a marketplace for multiple providers and continued competition on price and services.

"We took a look at our right of way," said Trimble. "Our right of way was what I like to refer to as like a college stereo system. There were utilities everywhere. The right of way was becoming overcrowded and unmanageable in certain areas of the city. We thought, 'Why don't we look at running conduit throughout the city to take care of that? It will clean up the right of way."

In addition, the city surveyed residents in 2015 as a part of its work in writing WDM 2036, a roadmap for future economic development. High-speed, affordable, reliable broadband emerged as the most important utility people wanted to incorporate in their daily lives, on par with other essentials such as water and electricity.

These two issues led to a city-funded project launched in 2020 to build a city-owned city-wide conduit network, solving two problems at once.

"We thought if we do this conduit network and run it in front of every resident, home, business, and offer a space for internet service providers to go in to snake their fiber through, we are going to not only clean up our right of way, but we're going to meet the number one thing that citizens said was important to them, and that is having high speed, affordable, reliable broadband, more competition, more providers in the area," said Trimble.

As Wes Des Moines started working on how to finance the project, GFiber (formerly Google Fiber) heard about the effort and showed up at City Hall wanting to lease space in the tobe-built conduct network to provide fiber service citywide. "The revenue that we were going to be getting every year from GFiber was going to be enough to help us to get this conduit put across the entire city in a much faster way manner than we originally had planned," said Trimble. "Over a four-year period, we ran our city conduit throughout the entire city, in front of every business, every residence. It was 40,000 some different properties that we ran through in the right of way."

Mainline conduit across the city is designed to provide space for multiple providers' fiber, with city-owned conduit going into individual neighborhoods able to support two providers worth of cable. Trimble estimated the entire project cost \$60 million to \$70 million, funded by bonds that are paid off through a combination of leasing revenue by GFiber, Lumen, Mediacom, and other service providers taking advantage of the availability and a separate debt service levy.

"Running the conduit through the entire city and in front of every resident and business has taken away barrier to entry for different providers and it's allowed for competition," said Trimble. "We have some providers that do not provide service citywide but just lease parts that they need. "Probably two or three of those at least and we expect to have more."

While financing and building the city-owned conduit was a "heavy lift," said Trimble, having the pre-built infrastructure has made it substantially easier and faster for other service providers to come into the city, using what is available for their needs in some cases. Since the city owns and operates the conduit and associated vaults, permitting is faster, as is delivering residential services.

For new entrants, the only construction challenge are areas off the main conduit run with the branches where two providers are already in place in the local neighborhood runs, leaving them with the responsibility and expense to secure permitting and build from a nearby vault to where they need to deliver service.

Looking back, Trimble has no regrets despite the hard work it took to implement the conduit system, but providing infrastructure that is as important as streets and sewers was needed and necessary.

"Running conduit in front of every home and business in your city is certainly not a project for the faint of heart," Trimble said. "It was great risk and it's been absolutely incredible reward. It's done everything we wanted to and more. It was certainly not an easy project, having to communicate with every one of the homeowners and businesses, having to restore each one of those right of ways to get it back to how it looked before we got into it."

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Prepping Fiber for Faster Deployments

Pre-measured and preconnectorized fiber solutions custom built at the factory can significantly speed up network deployment, saving money and field technician time. **Source:** Corning Incorporated.

Early fiber deployments were dependent upon field technicians pulling, cutting, and splicing fiber for everything, leading to bespoke networks as finely tailored as a customized suit and just as expensive and time consuming to build. With the cost of labor making up 80% of a fiber build, the need for faster planning, deployment, and connecting homes and businesses is always at top of mind.

Contractors and service providers alike have one eye on the budget and another eye on the calendar, as financial stakeholders want the network completed on time and budget (preferably ahead of schedule and under budget), so customers can be turned up as quickly as possible to generate revenue. Meanwhile, long-awaiting customers who have seen the construction crews on the streets disrupting traffic and tearing up roads want high-speed broadband connected as quickly as possible, especially those who have suffered through service interruptions and sub-par speeds from legacy or no infrastructure.

The fiber industry is well aware of these pressures and over the years, has continuously rolled out improvements to processes and new products to increase the speed of fiber deployments and lower labor costs. For many service providers, plug-and-play pre-terminated connectors, preloaded reels, and cassettes are among the many tools used to light homes and businesses faster. There are numerous solutions available from multiple vendors, providing healthy competition and continuing to drive innovation in the market. To be sure, there are as many "perfect" solutions for contractors and service providers as there are service providers. One-size doesn't fit all, doesn't have to, and shouldn't, since every fiber operator will have its own preferences and ways of doing things, based upon its culture, history, and budget. *Fiber Forward* interviewed Clearfield, Corning, and Lightera (formerly known as OFS) to get a flavor for what is possible today and what we might see in the pipeline in the future to make everyone's life easier when it comes to building a fiber network and connecting customers faster.

Prepopulate and Prepare

Saving network construction time can take place anywhere within the build timeline, but certainly one of the easiest wins starts at looking at the outside distribution plant at the edge of the network and avoiding as much on-site configuration as possible. Like buying a personal computer these days, it's a lot less painful and faster to simply procure a cabinet off the shelf than custom build one, with the savings multiplying considerably when you have hundreds of cabinets to deploy and install throughout the network.

"Powered cabinets are kitted out at the factory," said Michael Wood, Broadband Market Manager, Clearfield. "We've done all the thermal calculations, for example, so you don't have to. We install all the power components, the



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Buying and deploying a standardized cabinet type that is factory built, assembled, and tested saves significant time over in-house custom builds for every network location. **Source:** Clearfield, Inc.

required to run the electronics, as well as calculated the thermals required to exhaust the heat that they produce."

Since everything is built and tested at the factory to exact specifications before shipping, the likelihood of success after installation and powered up is greatly increased. Technicians can spend relatively no time at a warehouse building and prepping cabinets for deployment and more time on connecting other parts of the network.

The time savings gained by aligning on re-populated cabinets and other preconfigured solutions in the network flows into other parts of the build. "We provide templates for the concrete pad, so you know where to block off where to leave the opening for the cables entering and leaving the cabinet as well as cabinets that mate with our vaults, so that you don't have to drill and cut with all that added hand work," said Wood. "Again, saving time at the site."

Many fiber plant providers also may provide specifications for their cabinets in electronic form that can be integrated into network construction management software. This helps with documentation, a vital if often overlooked aspect of the network lifecycle. Down the road, parts of the network will need to be repaired and upgraded and having the logged details of cabinets and other bits in the work will help reduce field time when maintenance is required.

Other areas where build time can be saved include drop reels pre-loaded with fiber, and those fiber cables pre-connectorized and tested at the factory, so technicians can simply plug in connections to the end of the network or individual homes without having to do that work or splicing in the field.

"That saves a ton of time, obviously, as well as sharing those [features] across different products by using the same standards," said Wood. "And then, of course, the cassettes are used in cabinets and wall boxes and shared across applications as well. It's that sort of flexibility and configurability that reduces warehouse inventory and makes it a lot easier to do a lot of different things with fewer products."

Many fiber plant providers also may provide specifications for their cabinets in electronic form that can be integrated into network construction management software. This helps with documentation, a vital if often overlooked aspect of the network lifecycle. Down the road, parts of the network will need to be repaired and upgraded and having the logged details of cabinets and other bits in the work will help reduce field time when maintenance is required.

Plug and Play vs Splicing

Lightera's service provider customers tend to choose between traditional splicing and pre-connectorized fiber, with plug-and-play solutions available from the curb to the home.

"Quite a few are electing to fusion splice," said John George, Senior Director, Solutions Engineering, Lightera. "It depends on the capabilities of the service provider, their labor pool, their availability of fusion splicers, whether they will use hard splicing or a plug-and-play connectorized kind of drop. We offer both. While plug and play can save time, the cabling is more expensive. Our approach is to listen to the customer's needs and recommend what we think might best meet their needs but let them ultimately decide the approach."

Fusion splicing provides some advantages over plug-andplay solutions, with lower loss, higher performance, and higher reliability. Since the glass is directly fused together, connectors cannot get dirty or damaged during installation, preventing signal losses that could affect service turnup or future speed upgrades.

"The fusion splice machines are very inexpensive for drop applications," said George. "You're not going the have the same loss as a long-haul splicer, but it's lower than a connector. Yes, someone has to be trained on it, but the new ones are fairly easy to learn. We have some service providers that do both [fusion and plug-and-play]."

Within the home, Lightera believes connectorized is a much better approach than splicing, because of the potential safety risks of glass shards and the simplicity and speed of being plug-and-play within the home.

Measure Twice, Cut Once

For service providers that really want to simplify their hands-on fiber labor, Corning offers a service that will custom cut cables to the needed length for the entire network and pre-connectorize the ends for rapid deployment and cost savings. "Just think of it as a factoryspliced cable assembly," said Joe Jensen, Director of Market Development, Corning. "What we do is take the field splicing labor and replace it with factory splicing labor,

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which allows our customer to deploy up to five times faster. Our customers typically see \$25 or more per home passed cost reduction, but it is usually much higher depending on the circumstances. That number will vary depending on geography, aerial vs underground and so forth."

By replacing field work with factory work, Corning can reduce the onsite labor needed to deploy and connect fiber more quickly by working with the customer to get the planning and engineering more precise at the beginning through importing design data from network construction management software systems and simply measuring the distances between poles and handholds. Corning takes the provided data and builds the cable to the needed lengths with slack coils allowances added as needed, put connectors on it, tests everything at the factory to precise tolerances multiple times, and then ship it to where it is needed.

"This is a different workflow than a lot of our customers are used to," said Jensen. "A couple of things change with this process. For instance, with traditional solutions, folks may just take the bulk cable and allocate it in the field, crews will install it, and they'll take the measurements and record it in their [network documentation] when they get done. In our process, you need to go out and capture a little bit more data up front, because the information you're giving us is to create the cable. It takes a lot of ambiguity out of the back end on the as-built. When you later go to do maintenance and repair, you know exactly what is out there."

When the cabling is deployed in the field, the connectorized fibers connect in minutes without the need for technician time to prep and splice the cable. Since every customized Corning cable built in this process is tested five times in the factory before it is shipped, the quality of cabling is verified before it arrives in the field.

Service providers can take and provide cable measurements in several ways, with some of the earliest methods very low tech. "We started with just rolling wheels off between poles," said Jensen. "Then we moved into laser range finders like you might use on a golf course. If it's a duct installation, you can use mule tape. A lot of our customers will give us a map from Google Earth that's got the houses identified. We'll do [estimates] with GPS coordinates and make it work."

Measurement data can also be imported from GISbased network construction management software packages like IQ Geo and Render. For the inevitable times when ideal CAD blueprints meet field reality, where measurements are off or cable otherwise needs to be moved and adjusted, Corning adds slack loops to the prepared cable at regular intervals and can also add "extension cords" if needed.

Having construction plans on file with Corning also provides advantages for restoration of services during extreme events. "We store our records for 10 years," Jensen said.



Moving fiber from the traditional demark entry point to a more centralized location inside the home has become necessary in order to optimize Wi-Fi coverage in. **Source:** Lightera.

(cont. on page 57)

Transforming Network Deployment

Effectively Harnessing the Power of AI, Machine Learning, & Automation

In today's fast-paced world of network deployment, speed and accuracy are critical to staying ahead. By harnessing the power of AI, machine learning, and automation, network design can be transformed into a more efficient, precise, and cost-effective process. These technologies streamline every stage of the network design process, empowering teams to make faster, smarter decisions.

1. Virtual Survey

The first step in streamlining the network design process is conducting a survey. Traditionally, surveys required on-site visits, but with advancements in AI and machine learning, virtual surveys can now be performed more efficiently and accurately. These desktop surveys utilize an AI model to automatically obtain aerial survey data from platforms like Google, helping to predict optimal access point placement and simulate the impact of various network configurations.



2. High Level Design (HLD)

Through an automated approach to High-Level Design (HLD), a detailed Bill of Materials (BoM) can be generated. This BoM can then be utilized for Return on Investment (ROI) analysis and field surveys, ensuring the design is both cost-effective and aligned with performance expectations. Integrating tools like i-FAST (Intelligent-Fiber Automated Solution Tool) further enhances the process by predicting network behavior and generating precise cost assessments. This integration is especially valuable for large-scale fiber network optimization.





3. Semi-Automated Field Survey

The semi-automated field survey process can combine advanced drone imagery and real-time collaboration software to enhance the accuracy and efficiency of network design. By integrating drone technology with Al-driven models, geospatial data can achieve survey-grade accuracy for network construction. Additionally, advanced automation tools can track construction progress, manage work orders, and optimize resource allocation. The combination of these technologies helps expedite data collection, simplifies management, and enables more costeffective network deployment.



4. Low Level Design (LLD)

The Low-Level Design (LLD) process can be semi-automated to incorporate field data and adjust the design to meet project specifications. Additionally, the process generates the final Bill of Materials (BoM) and activity cost estimates, offering a detailed overview of resources and expenses. By producing forconstruction plans, this semi-automated approach streamlines the construction process, reduces errors, and accelerates deployment, while ensuring alignment with the original design specifications.



5. RoW Permits & TCPs

The Permits & Traffic Control Plans (TCP) process can be expedited by using for-construction drawings to accelerate the process of generating permit drawings. Al and machine learning tools can also be leveraged for surface detection, automating the identification of key elements and ensuring accuracy in the permit creation process. This combination of automation and advanced technology streamlines the permit workflow, reduces manual effort, and accelerates approval timelines, ensuring a more efficient path to project execution.



6. Construction

The construction process can be streamlined by refreshing the data in the field app with the finalized design for construction. Applications like iBISS[®]eliminate the need for paper maps, providing the crew with more readable and understandable digital drawings. The app also helps track build progress, validates photos captured in the field and monitors productivity by offering dashboard views and detailed reports, enabling real-time insights into individual and team performance. This not only simplifies the construction process but also enhances overall project visibility and efficiency.



7. As-Built & Completion

The as-built & completion process can be semi-automated, similar to the field data integration in the LLD stage, to ensure accurate updates to as-built records. Al and machine learning tools can be used to validate claims and built records, helping to maintain the accuracy of the as-built data. More importantly, these technologies assist in avoiding underclaims and overclaims from the construction phase, ensuring that the final records are precise and reliable. Tools like i-Validator can further streamline this process, providing automated validation to ensure consistency and accuracy in the as-built documentation.



8. Construction Validation

Construction validation ensures that network builds meet design specifications and quality standards. Tools like iValidator streamline this process by automating key validation tasks, such as pit checks, route validation, and material validation. These tools compare field installations to the original design, ensuring accurate placement of infrastructure and the correct use of materials. Additionally, iValidator's installation compliance and quality assurance checks help identify issues early, reducing errors and rework. By leveraging such validation tools, the construction process becomes more efficient, reliable, and aligned with the intended design.



Conclusion

By leveraging AI, machine learning, and automation throughout the network design process, industries can unlock a more efficient, precise, and cost-effective approach to network deployment. These technologies not only enhance workflow efficiency but also improve accuracy, optimize management, and accelerate project timelines. As these tools continue to evolve, they pave the way for further innovation in network design, laying the foundation for the next generation of infrastructure development and maintenance.



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High-Tech Tools

FOR NETWORK CONSTRUCTION AND MAINTENANCE

By Doug Mohney

Everyone loves gear that can help them do their jobs better and save time. No good chef would go into a kitchen without his own knives, while every auto repair location has an OBD2 code scanner close at hand for quickly deciphering the mystery of the infamous "Check Engine" light.

Over the past few years, technologies such as ground penetrating radar (GPR), drones, and LIDAR have been incorporated into the network construction and maintenance toolboxes of contractors and service providers to improve safety, efficiency, and provide more detailed information and documentation on the physical state of outside plant. While these tools and services may have a higher price tag than traditional methods, they typically provide a return on investment through more targeted use of field crews and truck rolls, along with increased worker protection.

Peering Underground

Having a good idea of what is below the surface before the movement of the first shovel or backhoe of dirt is essential in underground network construction, be it a greenfield installation or the need to unearth conduit for repairs or replacement. A locate service is a great first start, assuming buried utilities have metal incorporated into their structures for easy discovery. But there are many situations where more subsurface detail is required, especially in older cities and townships where there are legacy utilities that weren't designed for ready discovery and historical areas that could hold significant archaeological value and cultural significance.

"For me, one of the biggest issues is trying to figure out where these [underground utility] networks are, as no one has a clue what's down there in the first place," said Simon Pedley, Sales Director, Detection, US/Canada for Hexagon Geosystems. "You've got an idea where they should be, because that's what the plans say today. But you've also got the 200 years of history that we've been burying utility lines, fiber lines, telecom. It's a difficult world trying to figure out what's under the ground."

Ground penetrating radar provides a window into what's buried below, but it's not a perfect view by any stretch of the imagination. "In its simplest form, GPR finds material density changes," said Pedley. "Its greatest asset and biggest Achilles heel is that it finds everything. GPR comes down to the operator of that piece of equipment that needs to pick through and try and determine what's a line, what isn't a line. Some of the newer software can help with this interpretation."

A GPR designed for utility subsurface survey typically looks like a push lawnmower with a tablet at the top of the handlebar, but instead of a motor and a whirling blade there are antennas and electronics, with radio frequency signals sent out, received, and processed into an image. Global positioning system (GPS) information is simultaneously collected to provide location data with the GPR imagery.

Single channel GPRs costing in the range \$15,000 to \$20,000 provide what Pedley compared to a simple X-ray that can indicate structure and what may be broken, while more sophisticated multi-channel GPRs provide significantly more detail, like an MRI, at a cost of anywhere between \$60,000 and \$80,000.

"Using multi-channel becomes easier because we have more data, and we work more with a sliced image of an object, like a thermology view, versus a radar gram [blob] where you're trying to guess is that a pipe, a tin can, whatever," said Pedley.

Today's off-the-shelf GPR's typical view of depth is anywhere from 8 to 10 feet, but performance can vary depending on the type of soil and moisture. Advancements in technology are enabling GPRs to penetrate depths of up to 50 feet, but for most utility applications three to four feet of the surface is sufficient.

Pedley points out that utilities don't typically take anything out of the ground, with decommissioned pipes abandoned in place next to newer lines. A locate may discover and mark a decommissioned metal gas pipe because the signal is stronger than the newer in-service plastic pipe, and the contractor discovers the difference when they hit the live line.

Given the RF sensitivity of GPR, building an autonomous driving robot around one is challenging and expensive. "The robotic GPR is interesting, but it's always cost," said Pedley. "It depends on the workflow. Typically, you've got to have someone in the field anyway to interpret the data. It's quite complex to do just because of the fundamentals of radar to make things purely robotic. When you've got motors near radar that are made of metal, you're going to introduce a lot of noise into the antenna, so there will have to be a lot more shielding. Battery life would be a killer."

Al and cloud services provide a boost to analyzing GPR data sets, taking collected data and filtering out background noise to present clean information on where utilities are located faster than having humans read and interpret imagery, with the speed advantage increasing with the more data collected.

Pole Flying

Once a novelty, aerial drones are a now a fundamental tool for assessing, documenting, and inventorying above ground assets, including enclosures, poles, and towers. A drone can use its onboard high-resolution cameras to safely visually inspect assets while larger platforms can be equipped with LiDAR laser and thermal heat sensors to provide additional precision and detail for issues such as vegetation management. It can also be utilized to ensure safety prior to field crew operators and provide maintenance recommendations.

Engineering firm PLP has been using off-the-shelf drones since 2016 for surveying and currently operates a fleet of drones for its inspection services. PLP first started using drones to inspect utility transmission and distribution lines and later expanded their offering to broadband providers for their outside plant assets.

A typical drone inspection by PLP will include a field crew with one or more drones and a pair of FAA-certified commercial pilots, one to operate a drone and the other serving as a safety observer. The deployment vehicle will also have extra batteries and a way to recharge them to maximize flight time when conducting a survey. The drone provides still images, video, and location information as it flies up and around the assets being evaluated, providing the advantage that the drone provides a 360-degree view of all the equipment on a pole, as opposed to the more limited perspective from a ground inspection.

"We have an active dashboard we utilize that the drone pilots put their information into, so you'll have photos, video, location, pole number," said Dan Levac, Senior New Business Development Manager, PLP. "What that does is provides us with a real time opportunity to share with our customers where we are, what we're doing and what we're inspecting. This also permits real time adaptability to change locations so as to not interfere with ongoing construction or maintenance"

The recorded video is also evaluated by a separate analytical team back at the office to evaluate and spot potential problems. PLP uses a color code system inside the dashboard to flag issues discovered during inspection. Green means the asset is good, yellow

Ground penetrating radar (GPR) can provide a higher level of detail on underground utilities prior to construction, especially for identifying older pipes and lines installed before modern locate requirements. **Source:** Hexagon's Geosystems division.

Mill Colorado's ARPA Horse-Drawn Fiber Lights Up National Park

By Doug Mohney

Pulling fiber across rugged terrain without disruptions to the landscape requires a horse or two. Source: Delta-Montrose Electrical Association

Delta-Montrose Electrical Association (DMEA) electric cooperative has been steadily deploying fiber to its 30,000 members and local businesses in the Montrose and Delta Counties of Colorado since 2017. As it continues to connect locations with the end-goal of delivering reliable highspeed broadband to all addresses in its service area, it has seen its share of challenges as it moves into the more remote and rugged areas of Colorado's Western Slope.

Bringing fiber into the Greater Gunnison Gorge area and Black Canyon of the Gunnison National Park was no small undertaking but was a vitally necessary upgrade for basic commerce and public safety. The park, which attracts around 350,000 visitors annually, had suffered for years with legacy DSL plant from the incumbent provider that was oftentimes overloaded and/or unable to deliver basic services.

"There were long periods of time where [Gunnison National Park] couldn't collect entry fees," said Kent Blackwell, Chief Administrative Officer, DMEA. "It was a huge impact to their annual revenue, because those [credit card processing] services were so hit and miss. Three different times I've been out there, taking friends and family to visit, and each time, I didn't have to pay the \$30 park entrance fee [because the connectivity was down]."

"The unreliable connectivity also caused safety concerns, with the visitor's center emergency services

communications intercom unable to work for four years without sufficient reliable connectivity," said Blackwell. With the new fiber in place, additional broadband capacity has provided the ability to set up a communications tower in the park that will be able to relay signals down into the bottom of the canyon to provide much improved park staff and first responder communications.

Pulling fiber across National Park lands required some sensitivity and forethought, since Gunnison managers and DMEA wanted construction to have minimal impact and disruption to the park's operation and its scenic beauty.

"The crews we hired brought in a team of horses to pull fiber through the trees and up the mountain so that we didn't have to unnecessarily cut a bunch of vegetation and do a lot of destruction to a national park with heavy machinery," said Blackwell. "They looked at mules but ended up using horses because they could put a rider on them and get through the thick vegetation without damage."

Like many electrical cooperatives, DMEA was brought into the fiber service provider business by their membership. "As an electric service provider, we didn't have an appetite to get in the broadband business," Blackwell said. "In 2016, we had a sizable number of our members come to a board meeting with the knowledge that the coop had been building fiber optics to connect all our electric substations together, and their dissatisfaction with the incumbent providers, dissatisfaction with the rising cost of services for broadband, and in [local] communication services as a whole. Those members spoke in mass to our board members and heavily encouraged our board to consider getting into the broadband service arena."

DMEA followed the urging of its membership and started to deploy fiber in 2017. It initially planned to self-fund the entire build on its own but was able to initially leverage Colorado's state broadband grant programs to reach some of the more challenging territories in its service area more rapidly and later got access to federal monies to subsidize some of the overall build cost, such as using a \$6.5 million American Rescue Plan Act Funding (ARPA) grant, with DMEA providing a \$3 million dollar match for the Gunnison area project. The Gunnison project connected around 1,200 locations in the Montrose area, including the national park.

Connecting the last portion of DMEA membership is expected to be particularly challenging. "On average, we have 10 and a half meters per mile of plant," said Blackwell. "We've built fiber to 85% of the membership so far. The last 15%, like the National Park drops, are truly at the far ends of our lines. We're building three, four miles of line just to get to a pocket of 3, 4, 5, 6 meters. Out in rural parts of our service territory, we are building up into the mountains, ascending to 10,000, 11,000 feet, while our offices in Montrose sit at about 5,000 feet in elevation. Truly some mountainous, tough rocky terrain."

While DMEA might be using horses instead of machinery to pull fiber, its residential and business customers are doing a lot of broadband heavy lifting. The electric coop offers several tiers of residential service starting at 400 Mbps symmetrical and going up to a whopping 6 Gbps, while business locations can get up to 10 Gbps broadband.

"Building fiber to a home affords that residence an opportunity for economic equivalence of somebody in in an urban area," said Blackwell. "They can find themselves a remote job, or opportunities to create income for their households that otherwise may not have that luxury. We have software programmers that have relocated out of California to Paonia, Colorado. They're using our 6 Gbps services to program video games. Call of Duty is one they are partially producing in our service territory."

Businesses leveraging DMEA fiber to reach national and international customers include local distilleries and breweries like Snow Capped Cider and Storm King Distilling Company, an e-bike manufacturer, and fly fishing reel manufacturer Ross Reels.

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Fiber Broadband Association Photo Gallery (All images source credited to FBA)



FCC Commissioner Anna Gomez discusses the impact of fiber broadband with FBA Board Chair Ariane Schaffer at the FBA's Public Policy Summit.

Representative John Joyce (R-Pa.) addresses attendees at FBA's Public Policy Summit in D.C. this February.

Fiber Broadband

PUBLIC POLICY SUMMIT



Pia Orrenius, PhD, Vice President, Federal Reserve Bank of Dallas, provided the opening keynote at the Regional Fiber Connect workshop in San Antonio.





Nid-South Energy Co-op's William Graves discussed fiber broadband deployment challenges and opportunities with panelists in San Antonio.

FBA members welcomed Congresswoman Doris Matsui (D-Calif.) as a speaker at the FBA Public Policy Summit.

Fiber Broadband

PUBLIC POLICY SUMMIT



and Broadband Development Council Member.

At the Philly Regional Fiber Connect workshop, National Digital Inclusion Alliance's Angela Siefer had a fireside chat to dig into fiber adoption.







Christopher Ali, Ph.D., from Penn State University delivered the opening keynote in Philly, highlighting "The Life and Times of the Digital Divide."





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FiberConn

The Honorable Uri Monson of the Pennsylvania Broadband Deployment Authority keynoted at the March Regional Fiber Connect workshop. He explored broadband priorities for the state.

FiberConnect

PHILADELPHIA

Kyle C. Kopko, Ph.D., J.D., Executive Director, Center for Rural Pennsylvania, held a fireside chat in Philly to discuss the future of broadband and public policy.



Ash Brown, Adtran Senior Director of Field Marketing and FBA Board Vice Chair, had a fireside chat with Texas Broadband Development Office Director Greg Conte at the workshop in San Antonio.



OFS' John George shows off a fiber cable at the RFC workshop in San Antonio.

The San Antonio Regional Fiber Connect workshop featured a keynote by Colby Humphrey, Ph.D., Research Officer, The Pew Charitable Trusts' Broadband Access Initiative, exploring the factors driving broadband affordability.

























The Virtuous Circle of Fiber and AI



The combination of fiber and AI has led to time savings in a number of fields, including occasionally producing images for Fiber Forward magazine. **Source:** Microsoft Copilot generated image.

rtificial Intelligence (AI)'s explosion is one built and dependent upon fiber to continue its rapid growth, both within and outside of existing and new build data centers. Rocksolid, high-speed, low-latency broadband is necessary and vital to feed the ever-growing demand

for data to train AI models, enabling businesses and households to unlock new productivity.

While new software models, chips, and nuclear power plants have received the bulk of attention, fiber deals and investments aren't far behind. Zayo's March





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announcement to acquire Crown Castle's Fiber Solutions business for \$4.25 billion cited the need to invest in fiber to support the growth of Al across the United States. In August 2024, Lumen announced it was working to more than double its intercity network miles to support Al for cloud data centers, enterprises, and public agencies, reserving 10% of Corning's global fiber capacity for each of the next two years.

"We've made several key announcements over the last nine months, particularly with the hyperscalers," said James Feger, Senior Vice President, Product Segments, Lumen. "Microsoft, Google, AWS are all building to get data in and out and between data centers at an aggressive rate."

Large scale data service companies are buying 400 Gbps and faster services in multiple quantities across different locations to support large clusters and get their language models distributed closer to their workloads and users, with some very interesting implications beyond straightforward human to machine interactions.

"Traffic's traversing between those data centers and what I would call the end user," said Feger. "To me, an end user doesn't have to be a human. It can be an application, another Al engine, a variety of things that would be consuming the information out of the language models. We're starting to see this trend [where] inference and Al is becoming more specialized – deployed into distinct segments or virtualized domains tailored to specific tasks. But they still need to talk to each other, share context and operate with intelligence across boundaries."

Al to Al communication or Al rings of processing is something that Feger expects will generate a "massive step change" in traffic, with humans the slow part in the value chain.

"When AI starts talking to AI and they're learning from each other at the speed of machine, that's a very different traffic set," Feger said. "I don't know that anybody has a real understanding of how much traffic that can generate. I remember the movie Short Circuit with Johnny 5, 'Need more input!' We have set ourselves up for 'need more input.'"

The continued investments in both fiber and faster electronics by Lumen and other service providers ensures that broadband won't be the bottleneck for AI, but power is likely to be an ongoing issue, resulting in a reassessment of network models from centralized data centers to an everything-old-is-new-again revival of edge computing and smaller distributed data centers.

"To me, it's the edge out solution," said Feger. "The term 'mini data center' is not accurate. What we're seeing is purpose-built for edge use cases. Look at what Microsoft announced at their Azure conference for example. You're starting to see this push into the edge, where massive enterprises get their own [dedicated] versions of these deployments. To me, that's where the 'edge' or mini data center concept exists. It could still be sitting in a massive data center, but that's where the applications are distributed, how they're viewed, and where they sit in architecture."

Moving compute functions closer to users with available power to run them is cheaper than "pulling the power supply to where the data centers are," Feger said, with Lumen and its customers looking at new build locations based on where there is available power, since it's exponentially easier to bring fiber to a new building or campus than to build new transmissions lines or the years it would take to get a small modular nuclear reactor licensed, built, and placed on-site.

Drinking the Al Champagne

However, Lumen is doing more with AI than simply selling bigger pipes to feed the needs of data centers. The company is embracing the technology for network management and applying it to provide better service, as well as using it for cybersecurity.

"Internally, we're driving very aggressively for full Al automation," said Feger. "People like the AIOps concept, so we're focusing on reduction in human error, network reliability, faster restoration times."

Lumen was reluctant to share details at press time, but Feger indicated that the company would have more public discussions of its AI usage in the near future. Some of its work has centered on improving customer experience and time to restoration of service, building on its ongoing work to build and operate a digital twin of the entire network in support of Lumen's Quantum Fiber service, as discussed in the *Fiber Forward* Q1 2024 edition.

"We're able to simulate configuration, network behavior changes, so we do a lot of pre-work modeling," said Feger. "Al is looking at this, to test new configurations, do traffic flow analysis and really give us a better level of confidence before we go in and put 'hands into the network.' The other piece is using the digital twin for predictive analytics in customer support. We also have a product that leverages AI at the core through our threat research team, Black Lotus Labs. Because so much internet traffic rides through Lumen's network, we have unique visibility into the internet backbone and we're using AI algorithms to generate threat intelligence to help detect malicious traffic much faster. The whole concept of Zero Day starts becoming Zero Hours, Zero Minute type of stuff, versus waiting for the end of the day to find out that something's happened."

At the applications level, Lumen sees customers leveraging higher fiber bandwidth and AI for different verticals to

deliver more efficiencies that Feger could only speak of generally due to proprietary considerations.

"We have customers in all verticals that are presenting extremely interesting use cases, which is driving them to consume more services across our fiber network, and utilizing our Private Connectivity Fabric infrastructure," said Feger. "It's simple things. A long line at the [checkout] register can be a bad customer experience and can result in lost sales. Think of a retail store looking at their security camera footage [in real time] and counting the number of customers that are showing up to help with checking customers out. There are three or four associates in the back restocking or doing other work. They get an alert and start coming forward automatically to staff the registers rather than having the lines back up and having to page people."

Financial services have long used AI for fraud detecting, to deliver better experiences with how customers work with their money, and by providing insights for retirement plans, but today's tools and agents are becoming much more intelligent, customized, and tailored to the individual, instead of offering relatively generic advice.

"It's fascinating going out and chatting with the customers to hear how they plan to use AI and why they are coming to us for different connectivity and security

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options," said Feger. "An industrial drill manufacturer now has intelligence inside the drill. Those large drills have compute and sensors on them now. The drill is feeding data back up to the surface to make sure they're at the right speed, checking for the sediment they are going though, ensuring they are not headed for an expensive blowup."

At Fiber Connect 2025 in Nashville, Feger will be discussing the impact of AI at a keynote session on Tuesday, June 3, 2025. It should be no surprise that the Fiber Broadband Association (FBA) recognizes the symbiosis of AI and fiber and its importance. FBA released the *Accelerating AI with Fiber: Systems and Strategies* white paper in March 2025 and embarked on created an AI committee at the December 2024 Premier Members Meeting. The committee's first official meeting took place at the end of March and chairs are expected to be announced in the near future.

The 24-page Accelerating Al with Fiber: Systems and Strategies paper examines fiber's critical role across three areas of Al-driven innovation: data centers, fiber networks, and homes. FBA expects to release a second report, Al Fiber in Perspective, in the second quarter of 2025. The report will present Al fiber trends using a People, Process, and Technology model and an assessment from growth and industry leaders.

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Middle Middle Tennessee UNITING FIBER

By Doug Mohney

United Communications ultimately plans on offering service to half a million locations in middle Tennessee by the time it finishes building. **Source:** United Communications.

AST. LOCAL. FIB

United Communications is spread across 11 counties in Tennessee, as far north as the Nashville suburbs of Davidson County and next-door Wilson County, reaching as far south to the Alabama border an hour and fortyfive minutes' drive away. The fiber provider passes over 100,000 locations and has connected nearly 40,000 homes and businesses with over 3,700 miles of fiber so far but continues to maintain a friendly small-town philosophy for customer service while providing high-reliability broadband.

"I like to affectionately say we're a 77-year-old startup," said William Bradford, United's President and CEO, alluding to the company's start as Cities Telephone Company in 1947. "My business partner and I bought a legacy ILEC serving portions of middle Tennessee in late 2011. It was primarily a copper-based network with some fiber backbone. We felt there was a big need for better rural and suburban internet. We bought it with the plan to upgrade to fiber and use it as a platform to serve those unserved communities in middle Tennessee that were largely ignored at the time."

Today, United is following an "outside in" approach to expansion, starting in rural, unserved areas and working its way towards the center of towns, unlike traditional providers that follow a more old-style approach of starting in town and working their way out to less densely populated areas. Since 2011, United has reinvested 100% of its operational surpluses back into the business every year to support its growth into unserved areas, along with supplementing its funds with a CoBank \$130 million credit facility and leveraging \$110 million in state and federal grant opportunities. Project UNITE is the company's formal name for its ongoing efforts to bring fiber to under-connected communities and is built around partnerships with two electrical cooperatives, Middle Tennessee Electric and Duck River Electric. The UNITE effort has brought fiber to around 40,000 homes and businesses in the middle Tennessee area that previously lacked access to highspeed broadband.

Being focused on middle Tennessee provides United the ability to "scale local," said Bradford, tailoring network expansion and marketing efforts to individual towns. "I came out of meetings today where we're talking about the difference in marketing fiber in Smyrna and Franklin that are 40 miles apart," said Bradford. "We look at it at a very micro level. We have very different approaches to the independent, unique communities [in middle Tennessee] and we have different approaches in all of them, even though we're in one big market."

United has four distinct lines of business, residential broadband, small business, multi-location and enterprise customers, and a communities division. As a phone company, United continues to do a significant proportion of business with voice services, including SIP trunks and hosted VoIP for its enterprise customers. "Given the densification happening in Nashville a few years ago, we launched the communities division dedicated to serving apartments and HOA neighborhoods that wanted broadband as an amenity," said Bradford. Supporting community institutions has taken on a unique twist. "We provide free internet to any volunteer fire department in our community," Bradford said. "We found, years ago, they were struggling to get volunteers to stay at the fire hall because there's no internet. They didn't have anything to do while they were waiting on call."

The middle Tennessee region continued to thrive due to several factors, including health care and the country music industries as economic anchors, no state income tax, affordable housing relative to the rest of the nation, and great schools. "It's attracted people from all over," said Bradford. "We want to be positioned to capture that."

With the regional quality of life, and steadily thriving economy, Bradford expects United to continue to be the preferred provider of the area, with a potential market of half a million homes and businesses once they finish construction. Bradford said that United hopes to be at over 200,000 homes passed in the next two years.

To maintain its competitive edge as it grows and competitors ranging from venture-financed fiber to LEO satellite entering the market, five years ago United focused on network reliability as a company-wide goal. "We took a business-level SLA goal and applied it all the way down to the individual residential customer and we measure down to the customer outage duration," said Bradford. "We measure down to the minutes of any downtime. The team is empowered in terms of proposing budget for redundancy and response initiatives that are focused on having an industry-leading network reliability."

High-network reliability is teamed with a culture of customer excellence, including a customer experience team with representatives from every department that meets regularly, and surveying the customer every time they have an interaction with the service provider and on the customer's anniversary date. Every manager gets a summary of the survey results from the previous day, with customers who don't rate service at an eight or higher out of 10 getting a follow-up call to see what United can do to fix it.

The combination of high-quality customer service and reliability has resulted in NPS scores far above the industry average. "As of today, we're at a 78 for our net promoter score," said Bradford. "We stopped benchmarking ourselves even against other internet providers. At this point, we like to say we're benchmarking ourselves against the Ritz Carltons, Disneys, and other brands that have high net promotor scores."

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The Keystone State's RURAL PATH TO DIGITAL OPPORTUNITY

By Doug Mohney

Pennsylvania is a state full of broadband deployment challenges, including its physical geography, workforce availability, and a steadily declining population base. The Fiber Broadband Association's Regional Fiber Connect event in Philadelphia ("Go Birds!") on March 25, 2025, delved into the issues affecting fiber deployment and the ways stakeholders from local and state government, ISPs, and non-profit organizations are working to close the digital divide and develop modern, sustainable high-speed telecommunications networks for the decades to come.

In April 2024, the state approved \$204 million in ARPA Capital Project Fund grants to 53 broadband infrastructure projects and is paving the way for spending nearly \$1.2 billion in BEAD funding, investments expected to significantly boost local and state economies.

"Every dollar invested in broadband, can return three to four dollars," said the Honorable Uri Monson, Secretary of the Budget and Chair of the Pennsylvania Broadband Development Authority (PBDA), Commonwealth of Pennsylvania stated in his keynote address discussing the Commonwealth's broadband priorities. "If we're able to leverage these federal investments, it could add three to four billion dollars to Pennsylvania's economy."

Monson said the Commonwealth is focusing on aspects it can control to facilitate broadband construction, including permitting at the state and local levels. PBDA created the Broadband Ready Communities Program to enable municipalities to demonstrate their commitment to broadband and a willingness to work through local ordinances to make construction projects work smoothly.



Pennsylvania's Secretary of Budget The Honorable Uri Manson discusses the commonwealth's broadband building plans at the Regional Fiber Connect event in Philadelphia. **Source:** Doug Mohney.

"We actually made it part of the points of evaluating any of the grant programs we run, really highlighting this value to have the early buy-in from local officials for moving permitting along," said Monson. "As I mentioned before, we're working a lot with Department of General Services as well as the Department of Natural Resources, pre-identifying areas and guidelines around the use of [Commonwealth] publicly held land in the build out."

The ARPA CPF investments have already reduced the number of unserved and underserved locations in Pennsylvania from around 330,000 to 255,000 — more than a 20% reduction. Additionally, another 95,000 are in areas where projects are already underway in various stages of construction. The first round of PA BEAD applications closed



Dr. Kyle Kopko, Executive Director, Center for Rural Pennsylvania (L) and Jessica Koch, Senior Manager Industry Associations & External Affairs, Calix (R) lay out the geographic and demographic challenges for delivering broadband across the commonwealth. **Source:** Doug Mohney.

on February 7, 2025, with 239 applications covering 97% of eligible locations with at least one bid.

Bringing broadband to rural Pennsylvania is a big job. "We classify our counties using population density," said Kyle Kopko, Executive Director, Center for Rural Pennsylvania. "Of our 67 counties, 48 are considered rural, with 3.4 million people....If they were to become their own state, they would have a population greater than 21 states and the District of Columbia. There's a lot of important economic activity occurring all within our rural communities."

The Center for Rural Pennsylvania is a legislative agency of the Pennsylvania General Assembly, serving as a resource for rural policy. Kopko said the Center has been focusing on population change and how it affects the future of the Commonwealth as its resident population remains stagnant, impacting healthcare access and the local economy.

"We're also going to have an increased number of senior citizens and fewer young people," stated Kopko. "It's one of the reasons why we're having workforce shortages. We simply have fewer people, not just in Pennsylvania, but much of the Northeast. As policy makers, as community leaders, we really need to start thinking about what that means for the future of our communities and how we sustain our communities in the long run."

In response to this issue, the State Assembly created the Pennsylvania Rural Population Revitalization Commission to examine the issues and solutions needed to stabilize the population base, which has seen drops of 5 -10% over the past few decades.

"We just want to make sure that these communities continue to be the same communities that we all know and love for generations to come," said Kopko, adding that achieving a population level that supports sufficient economic activity is essential to maintaining anchor institutions like hospitals and schools without the need for consolidations and closures.

Broadband access is a "necessary but insufficient" condition for community revitalization. The Pennsylvania Broadband

Development Authority— where Kopko is a voting member — is looking at next steps to support internet availability and access in the future. Digital skills training efforts, such as a "Senior to Senior" program utilizing high school seniors to assist senior citizens with basic digital literacy, are being emphasized. However, the elimination of the Affordable Connectivity Program (ACP) has hindered broadband access for those who most need it.

"By the Census Bureau's estimates for the American Community Survey, between 10—11% of Pennsylvanians don't have home internet access," said Kopko. "In our urban areas, it's closer to 10% but in rural areas, it's perhaps as high as 14%. A lot of the folks that don't have internet access are probably from a lower socioeconomic bracket. Of those individuals who don't have internet access, 20% of them are at the poverty level. The average age of these individuals is 69 years of age, so disproportionally for senior citizens. Their average household income, \$23,000 a year. Forty percent of these individuals have a selfreported disability, either physical or mental, and 70% of these individuals are not in the labor force."

Elimination of the ACP has forced individuals and households to choose between paying for groceries and the electric bill or internet access. This has had a health care knock-on effect for people with limited income and resources, as they struggle to receive telemedicine services and face challenges in being effectively monitored at home or getting to in-person medical appointments.

Providing broadband to rural communities could also support and enhance small and medium-sized farms throughout the state in transformative ways.

"Our agricultural industry in many ways follows the workforce trends that we're experiencing everywhere else," said Kopko. "Our farmers, they're aging out and oftentimes family members don't want to take on that farming operation. Precision agriculture is a potential solution. It can help streamline efforts, but you need to have that connectivity in rural areas to facilitate that."

Both the legislative and executive branches are working closely with Penn State, home to the only veterinary school in the Commonwealth, to promote precision agriculture and equip farmers with new tools. Last year, Pennsylvania established a \$10 million grant program through its Department of Agriculture to help farmers adopt new technology and innovative practices. The governor now seeks to increase that amount to \$25 million in the next legislative session.

"[Penn State is] already doing some innovative things with augmented reality and large farm animals," said Kopko. "If a vet can't be there in person, they can at least look at and try to diagnose a problem from afar. But you can't do that if you don't have a robust internet connection. If we're not able to support our agricultural community in that regard, that's not going to go well for the future of the industry."

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NIT Public Policy Update PUBLIC POLICIES THAT DRIVE FIBER FORWARD

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

The Fiber Broadband Association (FBA) continues to advance its agenda in Washington and marked a significant milestone in February with the inaugural Public Policy Summit. The event brought together FBA members, Members of Congress, regulators, and industry leaders to emphasize the urgency of accelerating fiber broadband deployment nationwide.

FBA President and CEO Gary Bolton highlighted fiber as essential infrastructure, enabling telehealth, education, and Al. Without strong fiber networks, millions risk falling further behind in the digital divide The Washington Post's Senior Congressional Reporter, Paul Kane, provided insights into the evolving political landscape and strategies FBA should adopt to remain effective.

Policymakers dedicated to ensuring every American has access to broadband such as Congressman John Joyce (PA), Vice Chair of the House Energy & Commerce Committee, and Congresswoman Doris Matsui (CA), Ranking Member of the House Communications & Technology Committee, and FCC Commissioner Anna Gomez reiterated the importance of fiber expansion. Discussions with House and Senate staff reinforced bipartisan support for Broadband Equity, Access, and Deployment (BEAD) program while calling for improved efficiency in its implementation.

State FBA Activities

Texas

On February 13, FBA hosted its first state capitol visit of the year in Austin, TX, with 20+ members engaging Texas policymakers and industry leaders who play a critical role in shaping broadband policy. Discussions emphasized the importance of expanding high-speed, reliable broadband access to all Texans, particularly in underserved and rural communities. By collaborating with key decision-makers, we continue to drive forward initiatives that support digital equity, economic growth, and technological advancement across the state.

Pennsylvania

On March 26, FBA members gathered in Harrisburg, PA for a day dedicated to modernizing networks in Pennsylvania and to support state Senator Kristin Phillips-Hill's Senate Bill 491, which aims to remove barriers to fiber deployment.

"In Pennsylvania, nearly 280,000 households, businesses, schools, and libraries still lack broadband access," said Senator Phillips-Hill. "This legislation is about more than just improving internet connectivity—it's about expanding opportunities in education, jobs, and healthcare for all Pennsylvanians. By streamlining regulations and spurring investment, we can bring Pennsylvania's infrastructure into the 21st century."

Key provisions of this bill include network modernization, flexibility in service technology, and streamlined PUC regulations. This bill would cut red tape for expansion and investment in broadband and telephone connectivity, and by addressing outdated regulations and fostering innovation, this legislation lays the groundwork for a more connected and competitive Pennsylvania.

National Broadband News

SPEED for BEAD

Chairman of the House Energy and Commerce Subcommittee on Communications and Technology, Rep. Richard Hudson (R-NC), introduced the Streamlining Program Efficiency and Expanding Deployment (SPEED) for BEAD Act. This legislation would address existing inefficiencies within the BEAD program, seeking to expedite funding and infrastructure deployment while ensuring that reliable, high-speed internet deployment is not compromised. FBA strongly supports measures intended to accelerate access to critical broadband resources.

BEAD Review

Secretary of Commerce Howard Lutnick announced that the Department would conduct a comprehensive review of the BEAD program, focusing on reducing governmental red tape. This review aims to streamline permitting, eliminate bureaucratic delays, and promote collaboration. FBA will continue to work with the Secretary to ensure continued progress towards full connectivity.

Delete, Delete, Delete

FCC Chairman Brendan Carr launched a significant new initiative aimed at reducing unnecessary regulatory burdens on broadband deployment. Through a new docket titled 'In re: Delete, Delete, Delete,' the FCC invites public comments on which agency rules, regulations, or guidance should be considered for elimination. FBA has submitted comments in support of this initiative and welcomes this proactive stance on removing barriers to fiber deployment.

Modern Policies for Modern Networks

FCC's Wireline Competition Bureau issued a series of orders to "help accelerate the transition from aging copper lines to modern network infrastructure." This is a win for American consumers and communities. Modern, fiber-based broadband networks are the foundation for economic growth, improved education outcomes, expanded healthcare access, and technological innovation. By streamlining the process for retiring outdated copper infrastructure, the FCC is helping service providers focus investments on delivering the fastest, most reliable, and future-proof broadband technology available today. FBA appreciates Chairman Carr and the FCC for recognizing the urgent need to modernize our nation's broadband infrastructure.

White House Al Action Plan

The Fiber Broadband Association submitted comprehensive comments to the recent AI Action Plan Request for Information issued jointly by the White House Office of Science and Technology Policy (OSTP) and the National Science Foundation (NSF). In its comments, FBA underscored the essential role fiber broadband plays in enabling robust AI infrastructure, emphasizing the unmatched performance of fiber-optic technology in terms of bandwidth, latency, and reliability. FBA also called attention to persistent regulatory barriers—such as cumbersome permitting processes at both federal and local

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levels—that impede the rapid deployment of necessary fiber connections to data centers crucial for AI innovation. Specifically, FBA's comments addressed the bureaucratic hurdles and offered practical solutions, such as streamlining permitting processes and implementing "dig once" policies. These recommendations, if adopted, would significantly mitigate the delays that currently plague fiber infrastructure projects essential to maintaining America's AI leadership.

Nominations and Confirmations

NTIA

President Donald Trump nominated Arielle Roth to the role of Assistant Secretary of Commerce for Communications and Information and Administrator of the National Telecommunications and Information Administration (NTIA). Arielle Roth currently serves as Policy Director, Telecommunications for Chairman Ted Cruz on the Senate Committee on Commerce, Science, and Transportation. Roth previously worked at the Federal Communications Commission as a Wireline Legal Advisor to former Commissioner Michael O'Rielly, serving as Legislative Counsel to U.S. Senator Roy Blunt and as counsel on detail to the House Committee on Energy and Commerce. Before entering government, Roth was a Legal Fellow with the Hudson Institute's Center for the Economics of the Internet. Roth and her commitment to closing the digital divide will be invaluable as NTIA continues to build historic support for critical broadband initiatives.

FCC

President Donald Trump has nominated Olivia Trusty to the role of FCC Commissioner. Trusty has a proven record of public service and expertise working on issues critical to advancing broadband for all Americans that support economic growth and technological advancement. Trusty works for U.S. Sen. Roger Wicker (R-MS) on the Armed Services Committee now and previously when he chaired Senate Commerce, she also worked for Congressman Bob Latta (R-OH) and was a staff member on the House Committee on Energy and Commerce's Subcommittee on Digital Commerce and Consumer Protection. A confirmation hearing date has yet to be set.

The FBA Public Policy Committee is led by co-chairs Chris Champion, Vice President of Government Affairs, C-Spire, Jordan Gross, Director of State Government Affairs, Lumen, 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, Google Fiber is the FBA Board Liaison. If your company is interested in joining the public policy committee, please email mmitrovich@fiberbroadband.org to join.

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2025 Industry/ Partner Event Calendar

Broadband Communities Summit 2025

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

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.

Northeast Telecommunications Showcase

October 9-10, 2025 Pocono Mountains, PA

Broadband Communities Summit West 2025

November 5-6, 2025 | San Diego

Broadband Nation Expo 2025

November 17-19, 2025 | Orlando, FL

NTCA 2025 Summer Symposium

Jult 27-29, 2025 | Hiltonm Head, SC

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

Mountain Connect 2025

August 4-5, 2025 | Denver

Virginia, Maryland & Delaware Association of Electric Cooperatives Meeting

August 18-21, 2025 | Richmond, VA

IBTA 2025 Vendor Showcase

September 3-5, 2025 | Jekyll Island, GA



FBA 2025 Events

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.

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Palm Springs, Calif.





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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 Al
- Executive Insights | Federal/State Update Community Profiles | Innovation at Work

November 2025

Ad Space Closes 10/2/25

- Premier Members Meeting Edition
- Year-End Wrap-Up
- FBA Chair on the State of the Association and Industry
- BEAD Report Card
- Executive Insights | Federal/State Update
 Community Profiles | Innovation at Work

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Contact Lucy Green at Igreen@fiberbroadband.org for sponsorship opportunities. Please note editorial topics may be subject to change based on future events and market shifts.

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(cont. from page 21)

"During a hurricane or fire event, cables go down, poles get taken out. Customers can call us, and we can rebuild sections for emergency repairs, usually one or two cables. In those instances, we can typically do a two-to-three-day turnaround putting them at the front of the line. If instead they want to take splice in regular cables that's fine too- our precon cables are made from regular cable types."

Signal loss from using connectorized cable is minimal compared to the standard permissible ~30 dB dynamic range for a PON connection. "Our typical loss on these connectors is about 0.15 dB," said Jensen. "You only have two or three connectors between the home and the OLT, so it's very marginal."

Extending Fiber into MDUs and Every Room

Speed of installation concerns aren't just limited to the outside of the home. Multi-dwelling units such as apartments, condominiums, and business towers present their own challenges. Tenants and owners alike don't want the headaches and disruptions that come with having to fish cable through walls and ceilings and the noise and mess of drilling and cutting to deliver fiber withing an existing building. Meanwhile, service providers are embracing the value of locating fiber in a centralized location of the home, be it in an apartment or a standalone family residence, for optimum placement of Wi-Fi coverage. Corning, Lightera, and others in the industry are using single and multistrand strand bend-insensitive fiber to deliver connectivity in MDUs and homes without the need for fishing, running it discreetly along a baseboard or molding and holding it in place using staples or an adhesive system to glue the fiber into place. The fiber end can be inserted into a surface mount wall plate adapter which provides a connection for the household ONT.

"We're seeing increasing interest in these systems by service providers and homeowners to get that ONT/ Wi-Fi unit located in the center of the house as much as possible to improve Wi-Fi coverage and avoid the need for a Wi-Fi mesh system," said George. "People are paying for gigabit symmetrical service [that enters in through the standard telco demarc on the side of the house] and they're measuring 500 Mbps, 200 Mbps or less a few rooms away or catty corner from the router. XGS-PON at 10 Gbps is where we are today, but 25 Gbps is rolling out and we'll be at 50 and 100 Gbps in the future. The consumer is paying for that fiber connection and expects not just high speeds but low latency. Latency suffers with Wi-Fi, especially with distances and walls and building materials affecting the signal along with retransmission of signals. Someone who is doing video calls or gaming wants the lowest latency possible. Fiber extended into the home and apartment can preserve speeds and latency to enable a better customer experience." 1



Aerial drones provide both speed and safety when assessing outside plant, especially for remote and more challenging asset locations. Source: PLP.

(cont. from page 25)

indicates a potential problem, while red means there's an immediate issue that needs to be fixed.

Having a drone conduct the assessment provides enhanced safety in several ways. First, the drone can easily and quickly get to places and locations that would require a ladder or other equipment for setup. In instances where broadband equipment is sharing the pole with electrical services, there's no risk to field personnel. The availability of stills and video on hand prior to sending out a field crew enables dispatch and repair centers to plan out and walk through repairs and potential safety issues before a ladder or other piece of equipment is placed and a person starts touching assets, so repairs can move more smoothly and quickly once the field crew arrives.

Drones also save time when inspecting poles and lines. There's a savings of anywhere from 40% to 60% or more of the time it would take for someone to physically walk and potentially climb up for inspection, with additional accuracy and certainty provided through the secondary back-office review of imagery.

"There's a lot of time savings that come from the fact that if you're a drone operator you don't have to go to every single pole in person," said Craig Baldwin, Technical Sales Manager and the "Drone Guy" at PLP. "You can just hop from one pole the next. Flying the drone also gives you the ability to get to those poles up on hills, across valleys, or just inaccessible. They can just fly up and avoid obstacles if necessary."

Like their human counterparts, working in inclement weather can impede the effectiveness of drone operations. "The drones generally don't care, but you certainly have to think about the data you are collecting," said Baldwin. "If it is raining, the drone might not fall out of the sky, but you might get mist or droplets of water on the camera, which makes the images worse. Generally speaking, we like to avoid inclement weather, but if something comes in on the crews when they're out doing the work, there's no worry about the drone failing just because it got wet."

Additional sensor payloads come into play depending on the customer, with power customers desiring thermal imagery while LiDAR is used to create a 3D map in and around assets to identify vegetation problems that need to be remedied by field crews to trim tree branches and other overgrowth that could cause a problem with lines. LiDAR can also provide documentation for make-ready surveys and builds when third parties want to use poles.

"We're generally capturing five to 10 gigabytes worth of data on a given [visual] inspection," said Baldwin. "I forget how many terabytes that we've collected over the past five or six years. It's a lot to the consternation of our IT department, because we do a lot of this archiving internally." An older project using a 20-megapixel camera-equipped drone that surveyed 2,100 rural poles over 156 miles collected 52,000 images amounting to 300 Gb of storage. For more detail and faster surveying, drones can be equipped with an off-the-shelf higher resolution 100-megapixel camera.

Baldwin has found that asset owners he's talked to are adopting drones for use by their own field crews for repairs and inspection. "They'll have people out doing their normal work and if they need to get a closer look, instead of climbing or firing up the bucket, they'll toss the drone up there and have a look. From an image gathering standpoint, that's as good as being on a bucket truck and doing it by eyesight."

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