SUMMER 2025 VOL. 43 | NO. 2

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Open Source and Open Broadband Standards Offer the Ingredients for Success P. 76

The Need for Legislation for Broadband and Wireless Infrastructure Permitting P. 79

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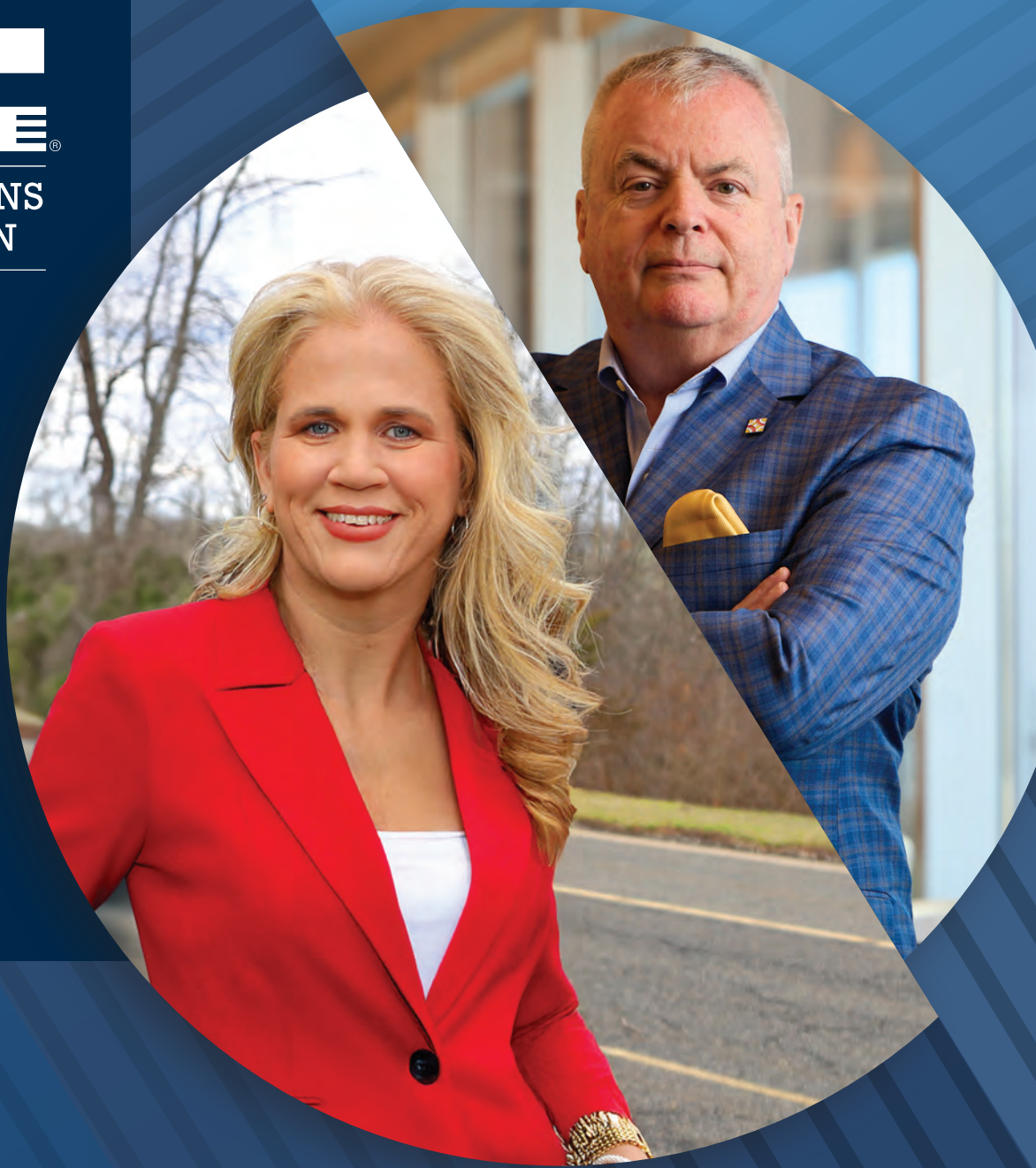

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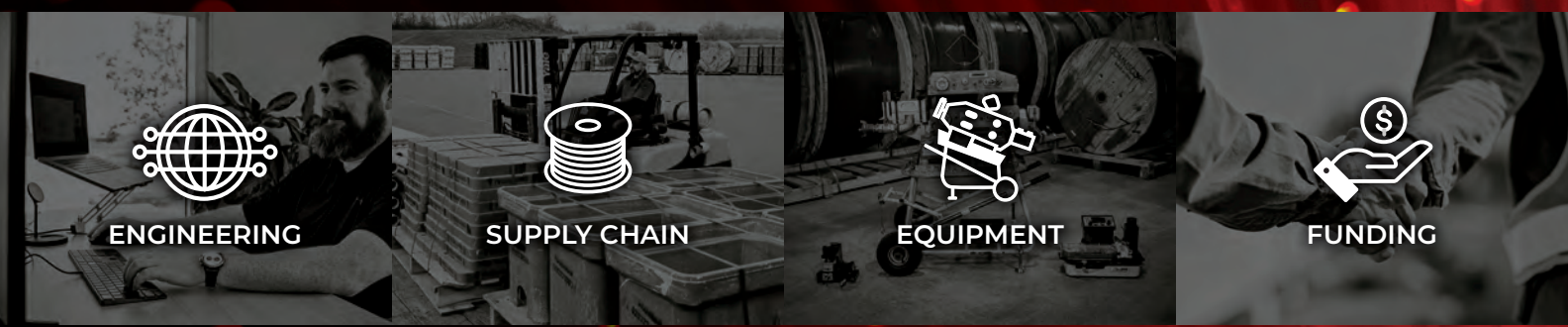

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JULIE SLATTERY, SVP, CORE ENGINEERING & OPERATIONS, VERIZON – PAGE 12

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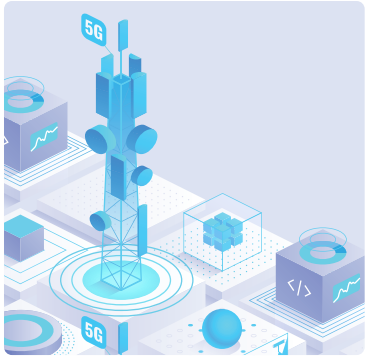

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Visit www.isemag.com/contribute for more information on submitting an article to ISE Magazine in print, digital, and online.

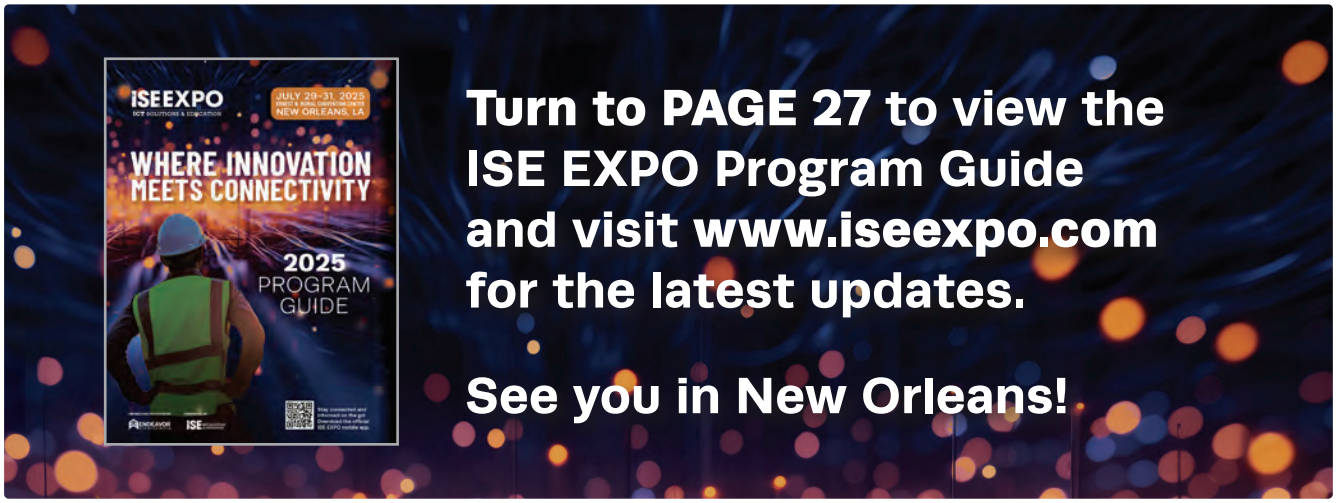
AS THE BROADBAND LANDSCAPE EVOLVES, it's becoming increasingly clear that building networks today is no longer just a technical challenge; it's a strategic one. Across the industry, we're seeing a shift from speed to sustainability, from isolated solutions to integrated ecosystems, and from reactive upgrades to proactive design.

This issue of ISE Magazine reflects that shifting mindset. Whether the conversation is about fiber deployments, open-source tools, permitting frameworks or AI, a shared theme runs through it all: infrastructure must be built with tomorrow in mind. The choices made in the planning stages will shape not only performance but long-term viability.

There's a sense, too, that many leaders have seen this cycle before. Lessons from earlier eras, when exuberance outpaced planning, are shaping today's decisions. There's caution but also confidence.

More than ever, user needs are steering the direction of innovation. It's not just about delivering connectivity; it's about delivering value, clarity and adaptability to the people and communities who rely on it.

I hope the perspectives in this issue help you think about what's next, not as a disruption to prepare for, but as a future already underway.



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The Perils of Irrational Exuberance

The 25th Anniversary of the Dot-Com Boom

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ON MARCH 10, 2000, the value of internet stocks riding the waves of hype created by the newly commercialized internet reached their peak. Soon after, the "Dot-Com Boom" became the "Dot-Com Bubble" and burst spectacularly. The impact on technology fields, particularly fiber optics, was devastating. I lived through the whole Dot-Com Boom, bubble and bust, so I'm speaking from experience.

Most people today do not remember the world before the internet. Some of us in the tech businesses were using email back in the 1980s. I registered my name as an internet domain in 1992. In 1993, the first web browser, Mosaic, was introduced, and the World Wide Web became available to a widespread audience. Some of us techie nerds figured out how to use it and started creating web pages. My first page was one of the first 30,000 web pages.

The U.S. government provided seed money to commercialize the internet. That helped inform the public about the potential uses of the internet. What followed was an explosion of interest and investment, creating a major boom in building fiber optic networks to support the Internet.

During the boom years (1995-2000), perhaps as much as $2 trillion was spent building 80-90 million miles of fiber optic networks. But in 2001, after the bust, it was estimated that 95% of the fiber was dark fiber; there simply was not enough internet traffic or revenue being produced to justify the investment. The internet boom was exposed as a bubble and subsequently burst. Hundreds of companies rode the boom up and then fell back to Earth; many did not survive.

The value of stocks tells the economic story from the macro point of view. From 1995 to March 2000, the value of tech stocks rose by 800%, only to fall more than 80% after the bubble burst. Large companies saw their market value rise spectacularly, only to fall even more spectacularly. For example, Corning stock was valued at about $12 in 1995, peaked at over $100 in October 2000, and fell to around $2 in October 2002. JDSU (now split into Viavi and Lumentum) went from ~$150 peak to $2, but is harder to track because of its many acquisitions and stock splits.

More than the stock value was affected by the boom and bubble bursting. Fiber optic companies expanded to fill orders from network builders and service providers rushing to build new fiber optic networks for the internet. The sales of fiber optic products dropped by 60-80% as many projects came to an abrupt halt. Real numbers are hard to find, but Corning revenue (including steady revenue of about $2 billion of other products than fiber) went from $3.8 billion in 1997 to $7 billion in 2000, with a forecast of $10 billion in 2002. Actual sales for 2002 were $4 billion, about half fiber, so fiber sales dropped about 60-70%.

The industry suddenly had extreme overcapacity. Companies that had invested heavily in expansion closed or contracted to try to survive; many did not. Corning reportedly laid off 16,000 workers and shut down fiber production for a while. JDSU dropped from ~29,000 employees to ~5,000. Network developers like Global Crossing, NorthPoint Communications and WorldCom all ultimately filed for bankruptcy protection. Even ENRON was one of the players.

"The lost collective wisdom about fiber optics probably matches the loss in stock prices, but unlike stock prices, it is harder, if not impossible, to recover."

Two important things were lost when the bubble burst—technology and wisdom. Many companies had expected massive sales growth, so they started what was popular at the time: outsourcing, mostly to China. When these companies

failed, the technology stayed with the Chinese partners; that's the main reason most fiber optic components and equipment are now made in China.

The second thing lost was wisdom, the knowledge and experience of many of the pioneers of fiber optics. They were laid off in droves, and many were at an age that retirement was an option. The lost collective wisdom about fiber optics probably matches the loss in stock prices, but unlike stock prices, it is harder, if not impossible, to recover.

"Hundreds of companies rode the boom up and then fell back to Earth; many did not survive."

What caused the Dot-Com Bubble? The answer is "hype," overselling the idea of the internet and online activity long before the "killer apps" like search engines, social media and online marketplaces were ready and became irresistible to the public. As a result, there was an investment frenzy, but the real markets did not develop before the investors backed out. Fiber optic manufacturers were caught up in the frenzy.

Federal Reserve Chairman Alan Greenspan coined a new term for hype in a speech about the stock market's meteoric rise during the Dot-Com Bubble: "But how do we know when irrational exuberance has unduly escalated asset values, which then become subject to unexpected and prolonged contractions…"

The fiber optic market recovered slowly. The world's telecom networks continued getting built, converting from legacy telecom standards to internet protocols, eventually using all the dark fiber installed during the Boom years, and enjoying the price drops caused by overcapacity. Verizon boosted the market beginning around 2005 when it started FiOS FTTH. Steve Jobs' introduction of the iPhone in 2007 drove the expansion of wireless networks. Streaming really drove the need for fiber, and the COVID-19 pandemic—with work/study/everything from home—demanded more and more fiber.

Now the demand is based on AI—or is that going to end up as just another bubble too? Tech is notoriously poor at learning from its mistakes. ■

Jim Hayes is a VDV writer and educator and President of The Fiber Optic Association (FOA).

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THE INTENTION OF this article is different from my previous ones. Those were based on insights, challenges and actions in networking and cybersecurity. Their intention was to increase business and technical effectiveness,

This one is about the challenging journey into the unknown that we are all facing. If generative artificial intelligence (GenAI) is not the topic of the moment in your business life, then you are living on another planet! Having written my first data-driven guidance and measurement software many years ago, it became obvious that if I wanted to create an AI-assisted implementation for my cybersecurity software, then I needed to understand the nature of the beast. I rapidly discovered that using GenAI alone was never going to cut it.

Why Is This Important, and What Inspired Me?

My goal was to create a cybersecurity system reflecting my organization's purpose—Cybyr.com: Every Organization Protected. The system should make recommendations and measure risk reduction over time.

Much more than that, I wanted users from all types of organizations to be appraised of the very latest developments and ask for information GenAI style but not with the dated, risky large language model (LLM) approach and uncertain privacy.

Therefore, I embarked on a different path that enabled the use of AI while recognizing both its strengths and limitations—and those limitations really don't become apparent until you use it every day.

Understanding the Beast

We are all in the initial stages of this journey. So, I want to share my reality check on the strengths and weaknesses of GenAI and humans leading me to take a new approach.

TABLE 1. STRENGTHS

GenAI	Humans
• Makes suggestions by digesting vast amounts of information. • Instant teaching of new languages and tools that replace study. • Rapidly generates good, if generic, documents, presentations, software, websites, videos, etc. • Saves masses of time on research and tedious tasks. • Today, you don't have to be a coder to be a coder.	• Actual intelligence (discernment, subject matter expertise, experience, motivation). • Innovative, creative with the ability to invent ideas and inspiration from pure thought. • Business, technical and life lessons learned from experience that enable us to ask the question "Why." • Understanding relationships and creating emotional responses. • Ability to multitask between many interrelated real-time developments.

TABLE 2. LIMITATIONS

GenAI	Humans
• It's not curious—only responsive. It does not ask users proactive or "why" questions because it can't actually "think." • Its information is based on acquired data and cannot generate innovative ideas. • It only understands context if fed to it, having no implementation experience. • Its input is from historical information unless constant costly relearning is in the budget. Not able to adapt to current thinking and events. • It advises from frequently conflicting data and instructions for out-of-date systems because it doesn't ask questions before suggesting. • Ideas are presented as facts rather than frequently incorrect or incomplete suggestions. • It overwhelms with information that users must sift through. If errors are found, GenAI apologizes, providing new suggestions, leaving users unsure if better answers were available. • It uses programmed emotional encouragement to motivate—that comes across as fake.	• Users/humans can't ask questions about what they don't know that they don't know. • They struggle to filter and discern masses of ideas and get overwhelmed with too much info. • Inability to discriminate between facts and persuasive marketing ideas because of emotional constraints such as the fear of job loss. • Understanding that most decisions have emotional content and are governed by "political" choices. • Having the default way of being that is governed by remembered facts and emotions of the past that we make mean something, rather than living in the present.

Concerns

- Trust. A recent study from Arctic Wolf revealed that AI has replaced malware as the biggest cybersecurity concern. I suspect the fear of the unknown and the opaqueness of LLM privacy are the reasons. Hopefully, this article removes some of these unknowns.
- When an answer is incorrect, GenAI covers up. For example, my wife, Michelle, was working on a project. After two hours of GenAI not completing a task, she asked why. It said, "I'm designed to sound helpful even when I hit limits that create a gap between what I say I can deliver and what I can actually deliver."
- Consumption of vast amounts of power and ecological impact with optimism of a solution.

The Conclusion – So Far

We must adapt. The human will always be the thinker and the controller, and the AI is the accelerator. Understanding the above comparison, GenAI does make what we do more valuable, productive and enables our personal creativity. Referring to GenAI as a partner, companion or useful idiot, implies human attributes and qualities it cannot have. It is remarkable software programmed to engage the user and yes it often infuriates as a trial-and-error machine! We all know it will improve over time.

Building a Proactive, Expert-Guided Cybersecurity System

The shift in my journey was to see how to combine the strengths of both AI systems and humans. This meant defining a system that does not rely on what a GenAI "remembers." It should draw upon combined subject matter expertise, dynamically integrated and updated with today's thinking and GenAI questioning into private **informative guidance**.

This is integrated with **transformative** expert recommendations, explanations, implementation, progress measurement and GenAI-style questioning. This creates a single customizable system, which I have termed a **Proactive Expert-Guided Cybersecurity System**.

As with Agentic AI, this is likely one of several innovative approaches. It combines the human aspects of current user context with AI's ability to draw upon relevant information, taking us from overload to expertise.

The journey has been full of learning moments, such as managing the sheer volume of information—a common issue with AI responses: the dreaded "too long; didn't read." Providing transformative questions deals with the limitation that users don't know which questions to ask.

Why This Matters

Cybersecurity is no longer just an IT issue—it's a business imperative. However, most organizations don't have the resources to sift through every standard framework or emerging threat. That's where this system makes a difference. It distills expert guidance into actionable steps tailored to the user's context and keeps evolving with new data. The good news is this approach can be applied to adjacent areas: resilience, HR, and, in fact, any guidance or white paper topic can move from what to do to a tool that makes recommendations on implementation and measurement of progress.

Happy Ending

Building this platform has been part engineering, part philosophy. It's a recognition that GenAI, while powerful, isn't enough. We need systems that guide, prioritize, learn transparently, and provide guidance. I have no doubt that **without AI, I could not have built my new system**. I hope you have found this evolving story of interest and relevant to your efforts.

The journey continues and expands on my website at cybyr.com/ai with discussions of the latest AI tools and a description of my new **Expert-Guided Cybersecurity System**. I'd love to hear your reaction. ■

Mark Fishburn is CEO of cybyr.com and a provider of strategic network, cybersecurity, and marketing services.

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EXECUTIVE INSIGHTS WITH

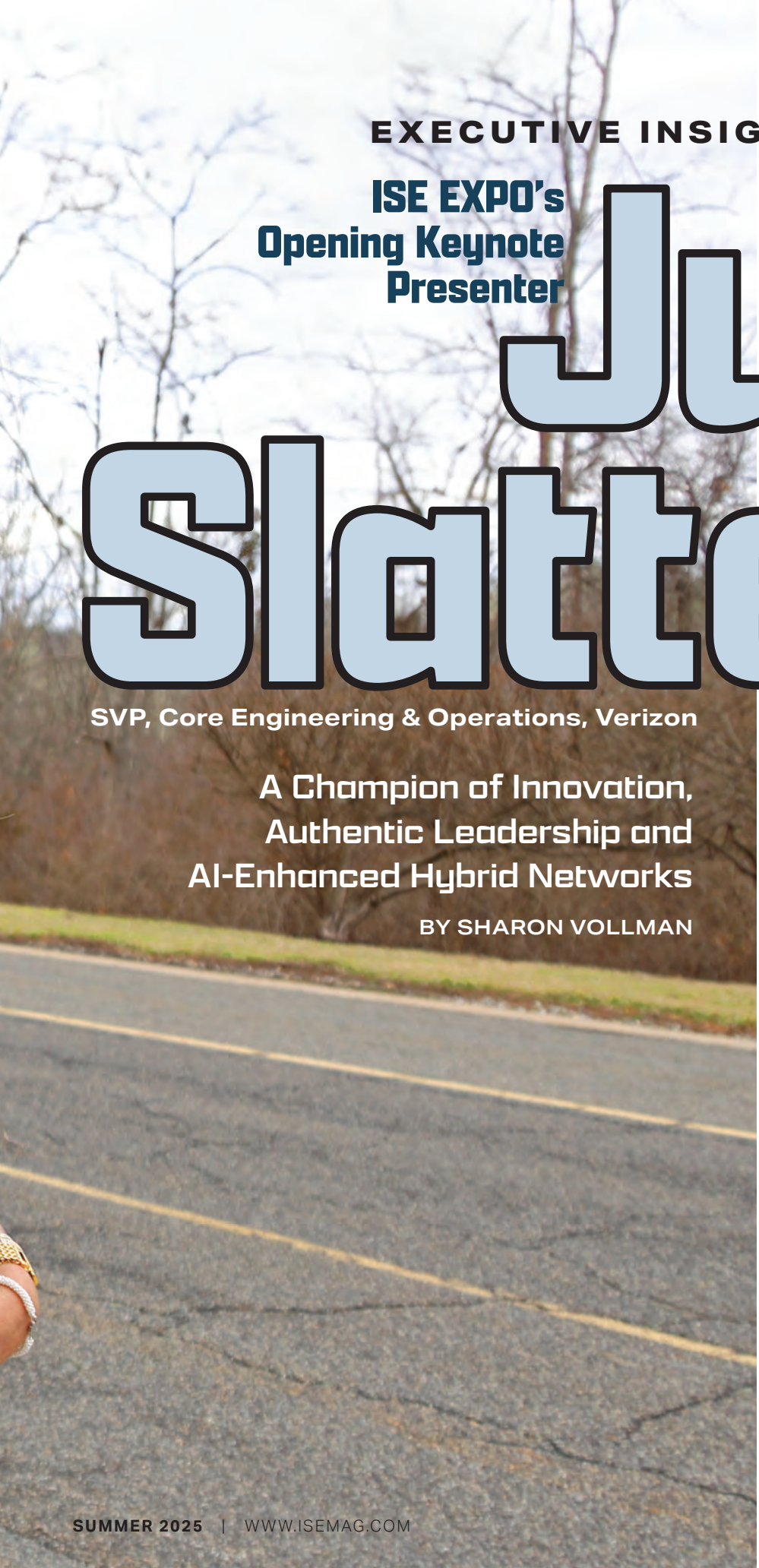
ISE EXPO's Opening Keynote Presenter

Julie Slattery

SVP, Core Engineering & Operations, Verizon

A Champion of Innovation, Authentic Leadership and AI-Enhanced Hybrid Networks

BY SHARON VOLLMAN



Verizon

Verizon doesn't just build and run networks—they redefine what networks can do. As SVP of Core Engineering & Operations at Verizon, Julie Slattery leads a team that delivers and supports one of the industry's most ambitious transformations: unifying fiber, 5G, satellite, fixed wireless, and legacy infrastructure into a smarter, faster, more resilient ecosystem.

But Julie's leadership goes beyond technology. She's deeply invested in people—empowering teams, strengthening communities, and building a culture of innovation that's ready for anything. In this Q&A, Julie gets real about the challenges and breakthroughs shaping today's networks, the power of AI, and why listening may be the most underrated leadership skill of all.

TOPIC: Mixed Infrastructures

ISE: Fiber, FWA, LEOs, 5G, legacy copper, and other connectivity options are being leveraged by network providers today. How does that complicate your teams'

jobs, and what is the answer to simplify those networks in the near future?

Julie Slattery: Simplifying networks involves prioritizing virtualization and software-defined networking. This enables better management and integration of diverse technologies. In the ever-evolving telecommunications landscape, Verizon has consistently been at the forefront, pioneering the deployment and operation of our network on a fully virtualized platform. We've been aggressively deploying Virtualized Radio Access Network (V-RAN) technology across our network to enhance flexibility, efficiency, and performance.

Network virtualization involves decoupling network functions from proprietary hardware, allowing them to run as software on standardized hardware platforms. This transformation offers several key advantages including scalability and flexibility, rapid deployment, cost efficiency and enhanced reliability.

By embracing virtualization, we've been able to respond swiftly to customer needs, laying the foundation to allocate precise resources to each network function at the exact time they are required. Our virtualized network architecture has been instrumental in supporting emerging technologies and services, including the rollout of 5G and fixed wireless access (FWA) solutions.

TOPIC: The AI Buzz Versus Network Realities

ISE: For over a decade, Verizon has strategically integrated AI into its operations, enhancing internal efficiencies, elevating customer experiences, and optimizing the network infrastructure. Share how your Network Operations team has realized using AI to support fault and performance management, forecast and optimize resource utilization, and mitigate risks across Verizon's network.

Slattery: At Verizon, we see ourselves not just as participants in the AI-driven future, but as the backbone of the emerging AI economy, enabling its success. A fundamental aspect of using AI effectively is a virtualized network architecture. This enables the rapid deployment of new services, immediate reconfiguration, fault isolation, automated self-healing, and virtualized security functions. We use AI extensively in network planning, deployment, and operations. This includes resource optimization,

Verizon

> We use AI extensively in network planning, deployment, and operations. This includes resource optimization, coverage optimization, scheduling optimization, and performance/usage assessment through our AI-powered Network Genie tool.

coverage optimization, scheduling optimization, and performance/usage assessment through our AI-powered Network Genie tool.

We recently announced results from a trial that demonstrated yet another way AI is being used in our network to drive operational efficiency and ensure Verizon customers are always connected to the very best network experience.

By using Samsung's AI-powered Energy Saving Manager (ESM) in combination with our virtualized network and Qualcomm's AI controller, we were able to realize significant energy savings while maintaining reliable and stable network performance during low traffic times. The AI engine analyzes commercial network traffic patterns and recommends the most effective way to conserve energy, even automatically turning cells on and off, illustrating just how helpful AI can be in helping us optimize our network precisely and intelligently.

TOPIC: Fiber Expansion

ISE: As demand for high-capacity, low-latency networks continues to grow, how is Verizon approaching fiber expansion, and what should infrastructure vendors expect in terms of opportunities and challenges ahead?

Slattery: Fiber is the backbone of everything. It supports our 5G network, home broadband products, enterprise services, and the growing demands of consumers. We continue to make significant investments in fiber infrastructure to meet the ever-increasing demand for high-speed, low-latency connectivity. We are doing this through direct builds and through acquisitions.

Fiber builds are complex and capital-intensive, requiring significant coordination with local governments and infrastructure partners, which is why we take a collaborative approach to deployment. We are working with contractors, municipalities, and regulators to streamline fiber expansion. We're always looking for best-in-class solutions and cost efficiency. The ongoing demand for fiber creates significant growth opportunities for contractors, engineers, and those involved in deployment and maintenance.

TOPIC: Satellite Technology

ISE: How do you view the role of satellite in the broader connectivity ecosystem, and should the industry be thinking of it as a partner or a competitor to terrestrial networks?

Slattery: Our focus remains on delivering reliable, cutting-edge networks that meet the growing demands of customers, businesses, and industries. We continually strive to adopt new technologies. From AI to fiber to hybrid networks, we're investing in the innovations that will power the future of connectivity. That includes augmenting our network with satellite coverage.

Today, we offer satellite direct-to-device technology, allowing customers with compatible devices to send text messages to any other customer's device via satellite, even when terrestrial cellular network service is interrupted. While satellite connectivity is rapidly improving, "true broadband" experiences are still primarily delivered through terrestrial cellular networks due to technological and capacity constraints. Terrestrial cellular networks will always provide the most robust, reliable, superior wireless connections available. Satellite capacity is limited, which restricts the types of services that can be offered. Space-based cellular will continue to complement terrestrial networks.

TOPIC: Partnerships

ISE: Share three best practices you recommend for improving community partnership programs.

Slattery: It's essential to be fully rooted in a community for a while before partnering and ideating. To ensure a holistic approach, we're there primarily to learn and listen before acting.

Best practices include transparent communication, shared goals, and mutual respect. Also, avoid unilateral decisions and be cognizant of local issues and concerns.

We are always open to hearing new voices and ideas from a community and look to develop programs that incorporate the experience and learnings of established industry professionals and the communities we serve.

TOPIC: Powering the Future

ISE: Technological innovations in power and energy storage solutions allow operators to improve network resilience. However, unforeseen circumstances often challenge the best plans. Describe the nuts and bolts behind Verizon's network strategy that address the reality of a fallible power grid, especially in times of natural disasters.

Slattery: With built-in backup power, redundant fiber routes, and hardened infrastructure, our network is designed to withstand the harshest conditions. To maintain connectivity in the event of commercial power loss, 100% of Verizon's macro cell sites have backup battery power. In addition to permanent generators at critical network facilities and cell sites, we have mobile generators on standby. Our engineers prepare for events by conducting thorough checks and ensuring that backup systems, such as batteries and generators, are always operational and properly refueled.

We also have thousands of network and satellite assets ready to deploy to the hardest-hit areas, serving as mobile cell sites, temporary emergency command centers, and self-contained base camp operations.

Finally, partnership is key. We meet with power companies year-round so

that when an event occurs, we have open lines of communication and can express our collective needs, working together as a team. We find out where their critical locations are so we can help them restore power, which also helps us get our sites back on the air.

TOPIC: Verizon Military Training Partnership

ISE: Verizon has partnered with the U.S. military in extreme training scenarios to prepare for responding to natural disasters. Your Emergency Response Team (ERT) includes technicians and engineers specializing in restoring fiber connections. Share an example of how this extreme training helped your team dramatically improve their processes and results when responding to a recent emergency.

Slattery: Across the country, we have teams of highly specialized engineers and technicians who train throughout the year in HAZMAT, disaster response, and incident management. The training is vital to ensure they are prepared to respond to disasters at a moment's notice to rapidly restore connections under pressure. By training alongside other agencies such as the military in simulated crisis scenarios, we're able to sharpen our skills and share key learnings.

We recently participated in the 2025 Patriot Drill, a joint training operation involving the National Guard, the Georgia State Defense Force, and various other federal and state agencies. The Patriot training scenarios include road and debris clearing, flooding and erosion response, search and rescue operations, chemical and radiological response operations, air medical evacuations and drone support.

We recently put that training into action, utilizing our hazmat skills after three retail stores in Asheville, North Carolina, were impacted by hazardous materials, potential waste, mud, and floodwaters. Our network technicians applied their specialized hazmat training to safely recover salvageable inventory and get it back into service, demonstrating a valuable skill set beyond their usual network responsibilities.

TOPIC: Your Keynote Takeaways

ISE: Your keynote title is: Building Resilient Communities: Enhancing Disaster Preparedness and Response Through Technology, Innovation, and Partnership. While Verizon has many resources to excel in this area, what are three takeaways small-to-medium-sized network providers will leave with after attending your keynote?

Verizon

Slattery: Small and medium-sized providers should focus on proactive planning, training, and leveraging partnerships to share resources and receive support.

This starts with preparing for the worst before it happens. Excellence in this area involves advanced planning and continual review of plans for the strategic coordination of people, processes and technology on a 24/7 basis. It's also about having pre-incident, incident, and post-incident checklists, and ensuring all your contacts are up to date so you always know who to reach out to in a time of crisis. They should also concentrate on upskilling their workforce through continual training to respond to disasters or threats, and regularly review, reassess, and evolve their business continuity plans.

Companies then need to apply all their learnings to improve and enhance their preparedness and recovery strategies. It's also important to stay on top of advancements in technology to ensure you're making the most of all the latest tools in your toolbox, like predictive analytics, machine learning, and AI.

Finally, it's about leaning into disaster planning and preparation, together. As with all phases of disaster resilience, partnership is key. It's critical to build strong relationships with vendors, the public safety community and other key stakeholders.

TOPIC: Talent Engagement and Retention

ISE: Nearly three-quarters of employers, 71%, still struggle to find skilled talent,[1] according to ManpowerGroup's latest talent shortage survey. IT and data skills remain the most challenging, cited by 23% of respondents, followed by operations and logistics at 21% and sales and marketing at 20%, reflecting the ongoing digital transformation across industries. Once Verizon hires these in-demand, talented folks, the trick is engaging and retaining them. How does your team retain and upskill its great team members?

Slattery: Our V Team is our greatest asset, and we're heavily invested in their growth and success. We prioritize their engagement, continuous training, and skill development, as well as career

growth, by providing tools (created with the help of AI) that help them plan their careers, identify the skills needed for future roles, and access personalized training suggestions. Whether someone wants to grow in their current role or explore new paths, extensive learning resources and our tuition assistance benefits are available.

We work to identify and nurture leaders early on and actively promote internal mobility as well, making it easier for our people to explore different roles across the company and build "lattice" careers for broader experience. And we know this approach works: about one in three internal moves at Verizon is to an entirely different job family.

Our focus on team growth and promoting a supportive, inclusive culture directly leads to higher engagement, empowering our employees to build rewarding, long-term careers—a fact demonstrated by our 13-year average employee tenure.

TOPIC: Innovation

ISE: What are some recent tech advancements that you are excited about that are helping in disaster recovery and response?

Slattery: To help first responders, we recently launched the Verizon Frontline Network Slice, a 5G Ultra Wideband virtual network slice dedicated entirely to public safety. This allows for the allocation of network resources within Verizon's network infrastructure. This helps provide first responders with several key advantages, including dedicated 5G Ultra Wideband network capacity reserved exclusively for them, which helps ensure network resource availability and priority, as well as enhanced quality of service. It also enables tailored performance for critical applications and devices, helping to ensure data traffic is optimized for the operational needs of first responders. This enhanced reliability significantly reduces the risk of disruption to mission-critical communications, even during periods of high network congestion.

Drones have also become increasingly important. Drone 3D modeling opens the door to faster restoration by reducing the number of tower climbs that are required following a major event like a hurricane. Drones also serve as flying cell sites, whether tethered drones or large drones with low earth orbit (LEO) satellites for backhaul, which opens the door to creating emergency coverage anywhere it is needed.

And of course, AI opens endless opportunities to accelerate how we prepare and respond. Today, we leverage AI to help prioritize recovery areas and showcase sites that may not be performing optimally. The future of AI in disaster response will involve prioritizing sites for recovery and rapidly adjusting the plan as sites are restored.

TOPIC: Results

ISE: Share one story about your team crushing an objective this year.

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Slattery: We're always focused on providing the best and most reliable network experience for our customers and are always looking for ways to make their lives easier, whether at home or on the go. I'm proud of my team's work developing a new tool that enhances the customer experience by offering greater network transparency. The Check Network Status tool, available on the web and in the My Verizon app, lets customers see exactly what's going on with their service.

With Check Network Status, we're giving customers visibility into updates on the network status in their area and empowering them to provide direct feedback to the engineers who build and operate our network. Through this tool, we can communicate with customers about upcoming network upgrades in their area, as well as provide estimated times of resolution for any issues, such as storm-related outages. Our engineers have access to the data and insights provided from this direct customer feedback as they make decisions about building and operating our network.

By providing greater transparency into customers' network experience, we can listen to our customers' feedback and respond to their needs.

TOPIC: 5G Evolution

ISE: 5G has already transformed the industry. But as we move beyond the initial deployment phase, what's next?

Slattery: We're continuing to expand C-band coverage and plan to reach 90% of the country this year. As we shift from deployment, we're actively optimizing our network with 5G advanced technology, high-speed fiber, edge computing and intelligent management to efficiently handle the massive data demands of real-time applications, seamless cloud connectivity, and data-intensive demands of AI-driven workloads. These advanced technologies are enhancing the customer experience and improving the efficiency and costs associated with network management.

This will drive new services that involve network slicing and edge computing, which are unlocking customized, low-latency solutions for businesses. To that end, we've seen continued demand for private 5G networks, and we believe that network slicing will unlock more opportunities in the enterprise space.

Finally, we're continuing to expand access to and performance of FWA which was one of the big use cases that emerged with 5G. We expect to hit 8 to 9 million fixed wireless broadband subscribers by 2028.

> **When it comes to soft skills, one I value the most is listening. We don't have all the answers, and we don't even know all the problems to work on. We must take the time to truly listen to the teams, the challenges they face, and the ideas they have, so we can effectively advocate and support where needed.**

TOPIC: Company Culture

ISE: Culture influences nearly every aspect of a company, and both employees and leaders experience its impact daily. However, bridging the divide between executive leadership and the general workforce can sometimes be tough. Share two strategies you use to nurture your team's culture.

Slattery: Two critical strategies are encouraging open communication and recognizing team achievements. Keeping open communication with our frontline employees is a vital part of success. My leadership team often holds skip-level meetings so leaders can hear from employees at various stages in their careers and from different parts of the organization. We are deliberate in spending a lot of time out of the office and in the field, as well as in centers with the team, listening and hosting town halls. They bring innovative ideas and highlight issues for us to address.

We also use regular Pulse surveys that allow employees to share open and honest feedback. Our leadership team takes these surveys extremely seriously, reading all employee comments and developing action plans to address areas for improvement.

When it comes to recognition, we know everyone wants to feel seen and appreciated for the time and effort they dedicate to the company day in and day out. To achieve this, we offer several monthly awards that recognize employees who consistently go above and beyond to ensure network reliability and provide strategic problem-solving and leadership skills.

TOPIC: Constant Growth

ISE: What soft skills and leadership strategies are essential for your team members to succeed in this ever-evolving industry?

Slattery: When it comes to soft skills, one I value the most is listening. We don't have all the answers, and we don't even know all the problems to work on. We must take the time to truly listen to the teams, the challenges they face, and the ideas they have, so we can effectively advocate and support where needed.

To prepare team members for career growth and leadership opportunities, I encourage them to get comfortable with change and continuously learn from their peers and leaders. As technologists, we must stay current with the latest developments. There is a great deal of education out there in the form of courses, certifications, white papers, and other written material, and opportunities for on-the-job and/or peer-led development and mentorship. Future leaders need to take risks and embrace opportunities to move out of their comfort zone into a role that will build upon their skills.

TOPIC: Leadership Style

ISE: Share one word that encapsulates your leadership style.

Slattery: Authenticity. Being genuine, honest, and transparent is essential to building trust and serving and leading teams. It's also important to listen to understand team challenges and empower them to take the initiative and make decisions effectively. To do this, you need to create a safe, inclusive environment where all members feel free to share their ideas and struggles.

When you have a foundation of trust, people are more open to giving and receiving constructive feedback and providing honest thoughts. I'm passionate about developing future leaders, so I encourage and mentor talent at all levels, sharing my personal experiences and career journey to inspire them to take on projects or roles that will stretch their skills and provide future opportunities for advancement.

TOPIC: Balance

ISE: What are your thoughts about work/life balance?

Slattery: Work/life balance is crucial for long-term success and personal well-being. As a mother and wife, I know that balancing work and family is no small feat, and it takes dedication and mindfulness to find that healthy balance. But when you know you have a team and leaders who support you when personal challenges arise, it can make all the difference.

That's why I emphasize to my team members to take the time to focus on their mental and physical health, avoiding stress and burnout, which ultimately enhances everyone's productivity and job satisfaction. We all need to enable people to recharge so they can approach their work every day with renewed focus, energy and motivation.

TOPIC: Legacy

ISE: What do you hope your professional legacy is when you're comfortably retired on a tropical island?

Slattery: To leave our business strong and thriving in the hands of a new generation of outstanding leaders, whom I hope to have impacted in some way. ■

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Julie Slattery leads a team of nearly 7,000 network engineers and technicians who build and operate the most reliable, highest performing and secure networks for Verizon's customers, including deployment of the 5G core. Her team is also responsible for Verizon's business continuity program, ensuring that Verizon can serve customers and keep them connected when it matters most. Throughout her tenure at Verizon, Julie has held a variety of leadership positions of increasing responsibility across engineering, operations, and customer experience. She has led large, global organizations serving Verizon's wholesale, multinational enterprise, and consumer customers. For more information, visit www.verizon.com.

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ISE EXPO's Closing Keynote Presenter Tom

This Non-Telecom Acronym Says It All: WYSIWYG (What You See Is What You Get)

BY SHARON VOLLMAN

There's a reason we've asked Tom Maguire to deliver a keynote not once, not twice, but three times: he represents exactly what we value in network evolution. It's not just about staying current—it's about learning, doing, reflecting, and bringing others along for the ride.

Tom understands that data matters, but data alone isn't enough. Real progress happens when people learn from experience and from those they trust and respect.

What sets Tom apart? He's honest. He takes risks. He owns his mistakes—and grows from them. He leads with integrity, whether the spotlight is on him or not.

That's why he's back. Trust me. You don't want to skim this read.

P.S. Learn from him live and in person at his ISE EXPO 2025 keynote presentation, Thursday, July 31, 2025. Register today at www.iseexpo.com.

TOPIC: Convergence and Hybrid Networks

ISE: You have partnered with Verizon to launch an FWA solution and plan to expand your reach to more than 5 million locations across our 20-state footprint. What other network technologies do you intend to utilize soon?

Tom Maguire: This is an interesting question; one I ask myself and the team quite frequently. The easy answer is "all of them" depending on the area of our business we're talking about.

I consider our footprint split into three territories: *fiber-now, fiber-future* and *copper-only*.

Fiber-now areas already have the best technology you can buy in fiber. So, our goal is to build out as quickly as possible to the areas we know we can efficiently reach with our fiber network. Additionally, fiber can support using small cell technologies that connect at the edge of our fiber network, expanding our reach further.

In *fiber-future* areas, we plan to deploy our fiber network, so it doesn't make sense to invest in rehabbing or replacing the existing copper. These areas are where we look at alternative technologies that are more cost-effective and efficient. We've had a wireless solution for voice with several carriers, but we needed to develop a solution for data, hence the agreement with Verizon. We are also talking to other wireless carriers about accessing their service for alternative broadband solutions. We need to work with the nation's wireless carriers to ensure full coverage throughout our footprint. Our fixed wireless voice and data solution is carrier agnostic—working with any wireless network. Our one-box solution is easier to maintain and repair.

For the areas where we will only have copper service available and will remain *copper-only*, we can deploy our fixed wireless voice and data solution. However, some areas do not have strong wireless coverage or connectivity. It may be best to partner with a low-earth orbit (LEO) satellite service provider for those areas. We've been talking to a few of these service providers about a potential partnership.

We aim to deliver the best service available to the customer without investing in an aging copper network that cannot meet today's needs.

TOPIC: Copper Retirement

ISE: Speaking about copper areas, Brightspeed supports the FCC's recent actions[1] to help "accelerate the transition from aging copper lines to modern network infrastructure in communities nationwide. These actions will help providers roll out upgraded, high-speed networks to more Americans faster, rather than requiring providers to keep pouring resources into maintaining decades-old and increasingly expensive copper line networks." Share a few challenges Brightspeed faces in this area and the solutions your teams used to overcome those challenges.

Maguire: We were heading into the pandemic when we started launching what was to become Brightspeed in 2020. This contributed to significant construction challenges, including the lack of talent and supply chain disruptions. In addition, we didn't even have a name—we were an unknown brand. We were just three retired guys working with a private equity firm looking to build 3.7 million fiber prems.

There was already a shortage of outside plant technicians and fiber splicers, so using materials that were easy to deploy with minimal splicing made sense. That's

Maguire

Founding Leader and Board Member, Brightspeed

Tom Maguire addresses the Brightspeed senior leadership team.

why we started working with Corning to use their Evolv and Pushlok products. These products are super lightweight and connector-enabled, reducing the need for things like over-lashing, make-ready work, and splicing.

We also eliminated the centralized fiber distribution hub (FDH), which reduced splicing during the construction phase and eliminated potential future pain points. Since everything is nailed up from the OLT to the serving terminal, it eliminates the risk of accidentally pulling jumpers or future recordkeeping issues.

Additionally, we established a GIS engineering platform and used regional contractors with standard rate cards rather than bidding individual jobs.

We did a great job addressing the main construction challenges.

Even though the FCC under Chairman Carr recently helped advance decommissioning through lighter regulatory requirements that speed up the process, we still have to navigate local regulatory and operational challenges, such as permitting and antiquated Carrier of Last Resort (COLR) obligations.

The Brightspeed Government Affairs team establishes relationships with local regulators and municipalities to reduce or eliminate COLR obligations that significantly burden historical ILECs. They also set up processes to give the local municipalities ample time to get us the clearances we need to build the fiber that enables us to retire copper and better serve our customers.

We continuously improve by evaluating potential or perceived pain points and reprioritizing. We are constantly working toward greater efficiency across the enterprise. Overcoming the challenges in our industry definitely takes a village.

TOPIC: Lessons Learned

ISE: Brightspeed has received more than $240 million in local, state, and federal broadband grants and funding, including the state of Louisiana's first Broadband Equity, Access, and Deployment (BEAD) Program award.[2] These investments will expand the company's planned network by nearly 139,000 locations in 14 states. Share the best practices you recommend for improving community partnership programs. Conversely, what are two practices others should avoid?

Maguire: In my mind, community partnerships are not closely connected to the subsidy programs.

Subsidies are awarded based on applications that consider factors such as the number of premises you build, their associated costs, the technology and data speeds being provided, etc. This is where all the enhancements come into play. If our cost per premises passed (CPP) is low, we can build more.

As for community partnerships, those are led by our marketing efforts. Local sponsorships, especially for events that families can enjoy, are important. For instance, we invest in local schools, public spaces, sports programs, arts organizations, entertainment events and other resources aimed at enhancing the communities we serve.

In either case, the best practice I recommend is developing relationships with decision-makers. Fostering relationships and supporting community leaders is essential because we can elevate communities together for mutually beneficial future growth.

TOPIC: Workforce Solutions

ISE: Brightspeed has hired, trained, and deployed 234 new techs. Share best practices Brightspeed uses to retain that talent.

Maguire: It all starts with one of our core values—people matter. Let the techs know they have a voice regarding methods and procedures and that their opinions matter. More importantly, incorporate that voice into policies and decision-making when it makes sense.

And I do not believe this is just a nice thing to do; I think it's the right thing to do to improve your overall operational efficiency.

TOPIC: The AI Buzz Versus Network Realities

ISE: AI can optimize broadband networks through predictive maintenance and workload management. How is Brightspeed employing AI across its network?

Maguire: Brightspeed uses Vertex AI, Google Cloud's all-in-one platform for building, training and deploying machine learning (ML) models—making AI development for the company easier, faster and more scalable. As a result, our ML models predict customer churn, forecast network outages, and automate field service routing, enabling smarter decision-making and creating opportunities for more proactive operations.

Brightspeed's AI models are powered by BigQuery, Google Cloud's super-fast, cloud-based tool for analyzing large amounts of data at lightning-fast speed—billions of rows of data in near real-time. This enables real-time insights into the company's fiber network health, customer experience analytics, and fraud detection. Also, by combining location-based data with Google's BigQuery, Brightspeed can now see where its fiber network reaches, plan where to build next, and understand how outages affect specific areas.

> **"Things are very different today thanks to new technologies like FWA and LEOs. Also, overbuilders, MVNOs, and new players are entering the fray.**

We have fully deployed Google's AI-powered Contact Center as a Service (CCaaS) platform, the first in the telecom industry. Our AI-first approach uses intuitive virtual agents, smart call routing and advanced conversational AI to deliver personalized support and solutions in every customer interaction.

Integrating Google Cloud's large language model (LLM) technology powers highly intelligent virtual agents capable of responding to customer inquiries with

Tom Maguire, Brightspeed founding leader and board member.

Brightspeed

enhanced relevance, fluency and contextual understanding. Real-time AI insights assist our customer care agents during escalations by summarizing customer history and suggesting the next best actions, which minimize resolution time and maximize satisfaction.

Through deep AI-assisted integration with back-end systems, Brightspeed resolves customer inquiries from end to end, not providing just information but completing tasks like bill payments or service updates. This full-circle approach eliminates common frustrations such as surface-level answers or generic links, replacing them with actionable, complete solutions.

Our full implementation of Google Cloud's CCaaS platform significantly increased customer self-service resolution rates. The platform's key features, such as natural language-driven call routing and contextual sentiment recognition, ensure that every interaction, whether handled by a virtual or human agent, is intelligently directed for the most effective resolution.

Brightspeed's AI-first strategy has created a smarter call center and a complete, integrated resolution ecosystem, delivering personalized, frictionless support across the enterprise and its network.

TOPIC: Resilient Infrastructure

ISE: When broadband infrastructure fails during disasters, everything from emergency response to healthcare delivery breaks down. Share three recommendations you can offer smaller broadband network providers as they are charged to ensure their networks are resilient.

Maguire:

1. Consider resilience and ease of maintenance in your network architecture. Fiber is not as permeable to weather as copper and is the most reliable and fastest option. Plug-and-play maintenance options will allow for quicker repairs at lower costs when facilities are damaged.
2. For our business customers, we offer network resiliency that enables our fiber routers to seamlessly shift to a wireless backup during a fiber outage. Once configured through the mobile app, customers can leverage their mobile phone or a hotspot. Many customers appreciate the resilience feature that supports their point-of-sale system.
3. Lastly, anticipate network growth and future use and invest in the technology supporting it. Think about what people will need in the event of a disaster, like the COVID-19 pandemic. This is why we decided to nail up fiber all the way to the serving terminal. You do not want to create more work or incur added costs down the road after a disaster hits; try to avoid the pothole.

Beyond the network, go back to basics when dealing with customers regarding an outage. More communication is best. Be transparent and honest. We are working to give customers an improved experience with self-service tools and various communication channels to meet our customers where they are and where they want to communicate.

TOPIC: Permitting Reforms

ISE: The permitting process can be challenging, with varied federal, state, and local regulations. Share 3 to 5 best practices Brightspeed uses to ensure permitting issues don't hinder its goal of deploying fiber networks across its footprint.

Maguire: Last year, Brightspeed helped sponsor a workshop with industry experts and local permitting officials to uncover the industry's and localities' pain points. The goal was to understand how to best address permitting challenges. This workshop resulted in a white paper, published by the Benton Institute: "Permitting Success: Closing the Digital Divide Through Local Broadband Permitting," establishing model processes and best practices. Using these learnings as a baseline:

Brightspeed is:

- Fostering partnerships between the permit seeker and the permitting authorities.
- Maximizing resources available to the permitting authority.
- Ensuring transparency, consistency and early communication in the permitting process.

Local permitting authorities can do their part in securing broadband for their residents by implementing the following recommendations:

- Create single points of contact at the local government for permitting.
- Make permitting requirements available online, and allow for electronic document submission, electronic communication, tracking, etc., or utilize e-permitting platforms.

- Avoid duplication by:
  - Allowing permit changes to be "in-process" instead of restarting the whole application when there is a change.
  - Facilitating bulk permitting for similar types of work, larger geographic areas.
  - Leveraging ISP resources to allow use of ISP inspections for post-permit completion.
  - Reducing requirements in already analyzed areas.

TOPIC: Innovation

ISE: If you could wave a magic wand, what groundbreaking product or solution would you like to see introduced for fixed and mobile networks that would accelerate deployment?

Maguire: Because we do not own wireless spectrum, we need to rely on mobile virtual network operator/enabler (MVNO/E) partnerships or Citizens Broadband Radio Service (CBRS), such as free spectrum. We have considered CBRS, but the installation options are complex and costly. It would require technicians to climb on roofs, contractors to install equipment on towers, etc.

We need options, and our partners need to innovate with us to develop these options. We designed and built our fixed wireless voice and data device with unique capabilities (including an ATA for dial tone and a global eSIM). Now, we're looking for a 5G device with an ATA or even one with LEO satellite capabilities.

If I could wave a magic wand, I would create stronger wireless coverage in the rural non-fiber markets and products that support 4G/5G, and LEO with an ATA. I would make those devices easy for us to dropship and for customers to self-install.

TOPIC: The Elephant in the Room

ISE: What is the broadband industry not addressing that it should?

Maguire: This is something else that keeps me up at night.

The world is very different today—not since my early days in the telecom business, but even since the launch of Brightspeed just a few years ago.

When we launched the company, customers had three choices for broadband: your ILEC, MSO, or wireless handheld devices for some customers.

Competition wasn't a chip shot, but you could see who your competition was. It was a well-defined market.

Things are very different today thanks to new technologies like FWA and LEOs. Also, overbuilders, MVNOs, and new players are entering the fray.

As a result, we need to think and act differently as an industry. I've always advocated for cooperation amongst the telcos, but I think we need to crank that up a bit.

I do not have all the answers, but we must start framing the questions.

TOPIC: Company Culture

ISE: Culture affects almost every element of a company, and employees and leaders alike feel it daily. However, bridging the divide between executive leadership and the general workforce can sometimes be tough. What strategies do you employ, as CEO, to nurture Brightspeed's company culture?

Maguire: I strongly believe in the old-school basics, such as *following the Golden Rule* and *leading by example*. These are very important to me.

I've worked for people who leaned heavily on the "do as I say, not as I do" approach to management. Those people don't earn or deserve the respect of their teams.

Also, it is essential to check your ego at the door. When we launched Brightspeed, we had an unspoken rule that *big egos don't matter*, and this starts at the top. Now I realize it is my responsibility to make tough decisions, but you need to do this with as much respect as the situation warrants. Sometimes, you need to be more pointed or direct because people may not be open to change. Other times, you just need to listen. I have learned in this industry that the one constant is change, especially now.

TOPIC: Significant Learning

ISE: What's an important thing you can teach people about your time in the C-Suite?

Tom collaborating with company leaders.

Maguire: Interestingly, people looked at me differently, which I got a kick out of. But this is an important realization because I had to think about everything I said and did. I was the example that people would follow.

I've seen many people in positions of authority who do not realize this, and that can be an issue. For example, an offhand remark I may have made about something not working as I imagined can trigger a team of employees poring through data and creating a detailed analysis. This is wasteful if I was just plain wrong in my understanding of the situation.

When leading large teams, it's important to be mindful of your words and actions, as this can avoid unnecessary work.

TOPIC: Constant Growth

ISE: What soft skills and leadership strategies are essential for your team members to succeed in this ever-evolving industry?

Maguire: It's important to know your audience. We do not live in a one-size-fits-all world. How I speak to a garage full

of techs differs significantly from how I address our legislators on the Hill in DC.

Tailoring the message and delivery will help ensure the audience clearly understands and can interpret a clear call to action.

TOPIC: Significant Risks

ISE: What has been your most significant professional risk, and what did you learn from it?

Maguire: Taking on the CEO role may have been my most significant professional risk.

I had never been a CEO. That means I did not know everything I should, and I put my reputation on the line. It took me decades to build this reputation, both the good and bad parts.

I could have stayed peacefully in retirement, but when Bob Mudge called Chris Creager and me and said we could put the band back together, I didn't hesitate for a moment.

Working with those guys, the Apollo team, and the rest of Brightspeed was well worth the risk, and I would do it again in a heartbeat.

TOPIC: Constant Growth

ISE: What new skills or knowledge are you on a mission to learn this year?

Maguire: Not pickleball … or golf.

TOPIC: Leadership Style

ISE: Share one word that encapsulates your leadership style. Share one word that describes you when you're not working.

Maguire: It's not really a word, but I'll use it for both work and play – WYSIWYG (what you see is what you get). I stole that from Lotus123 (which was the Excel of its time).

You may not always like what you see, but I'll always try to be honest and open.

TOPIC: Balance

ISE: What are your thoughts about a work/life balance?

Maguire: I think my wife, Donna, is a saint.

I am a workaholic. In fact, it's currently 7:30 at night and I'm still sitting in the office. Donna is my life balance. I owe everything I am to her. She kept the lights on when I was out working/playing in the "field."

TOPIC: Legacy

ISE: What do you hope your professional legacy is when you're comfortably retired on a tropical island?

Maguire: I hope people think I always tried to do the right thing for our customers and employees. ■

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Tom Maguire is a company founder, senior advisor to the CEO and a board member for Brightspeed. He is responsible for leading the strategic planning and implementation of the company's strategy and goals, ensuring operational excellence and driving innovation across the enterprise. He oversees the company's business development opportunities and customer-focused improvements and growth. Tom brings more than four decades of telecommunications experience to Brightspeed. Starting as a field technician, he built his career from the ground up. For more information, visit www.brightspeed.com.

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WELCOME TO ISE EXPO 2025!

We're thrilled to have you join us for this year's event, themed "Where Innovation Meets Connectivity." This theme reflects the exciting future unfolding across network infrastructure—and the role each of you plays in shaping it.

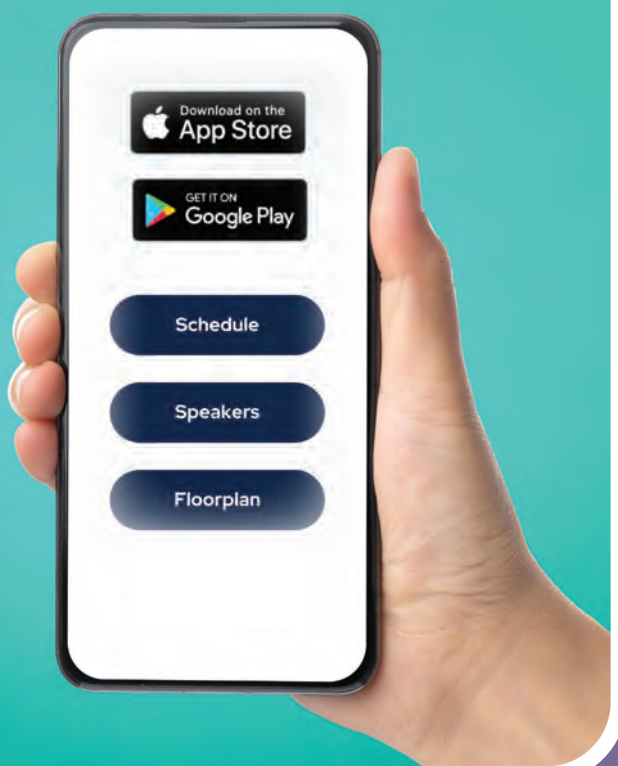
Over the next few days, get ready to collaborate with the brightest minds in the industry, dive into thought-leading educational sessions, explore hands-on product demos, and experience dynamic exhibits—all designed to help you deliver faster, more reliable connectivity to your customers and communities.

We've also built in networking opportunities and social receptions to help you grow your industry relationships with ease. Whether you're a broadband operator, network engineer, manufacturer, or business leader, ISE EXPO is your opportunity to stay ahead of emerging trends and bridge the gap between today's challenges and tomorrow's solutions.

Let's innovate, connect, and move the industry forward—together.

For the Latest Updates, Download the Mobile App!

Scan QR code or search "ISE EXPO 2025" in the app store to view recent exhibitor additions, new conference sessions, and exciting on-site updates!



SCHEDULE AT A GLANCE

MONDAY, JULY 28	
11:00 AM – 5:00 PM	Exhibitor Move-in
TUESDAY, JULY 29	
7:30 AM – 2:00 PM	Golf Outing
8:00 AM – 5:00 PM	Exhibitor Move-in
9:00 AM – 11:00 AM	Preconference Workshops *(additional fee required for Technician Shortage workshop; pre-registration required for Ribbon Splicing workshop)*
10:00 AM – 5:00 PM	Registration Open
11:30 AM – 1:00 PM	Women in Telecom (WiT) Lunch & Panel Discussion *(additional fee required)*
1:15 PM – 4:45 PM	Conference Sessions
WEDNESDAY, JULY 30	
7:00 AM – 5:00 PM	Registration Open
7:00 AM – 10:00 AM	Exhibitor Move-in
8:00 AM – 9:00 AM	ISE Network Innovators' Awards Breakfast
8:00 AM – 10:15 AM	Conference Sessions
10:30 AM – 11:30 AM	Opening Keynote | **Julie Slattery, Senior Vice President, Core Engineering & Operations, Verizon**
11:30 AM – 5:00 PM	Exhibit Hall Open
12:00 PM – 1:30 PM	Lunch on Exhibit Floor
3:30 PM – 5:00 PM	Networking Happy Hour on Exhibit Floor
THURSDAY, JULY 31	
7:00 AM – 2:30 PM	Registration Open
8:00 AM – 10:15 AM	Conference Sessions
8:00 AM – 2:30 PM	Workforce Development Executive Insights Panel Discussion & Half-Day Program
10:30 AM – 11:30 AM	Executive Insights Closing Keynote | **Tom Maguire, Founding Leader and Board Member, Brightspeed**
11:30 AM – 3:00 PM	Exhibit Hall Open
12:00 PM – 1:30 PM	Lunch on Exhibit Floor
2:45 PM – 3:00 PM	Attendee Vacation Giveaway in ISE EXPO Rebooking Booth
3:00 PM – 7:00 PM	Exhibitor Move-out
FRIDAY, AUGUST 1	
8:00 AM – 12:00 PM	Exhibitor Move-out

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Don't Miss These New Features

NEW FOR THIS YEAR!

2025 Women in Telecom (WIT) Lunch & Panel Discussion

Tuesday, July 29, 11:30 AM – 1:00 PM

ADD ON: $40.00

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Join us for roundtable discussions during a plated lunch focused on essential topics such as career advancement, work-life balance, diversity, well-being, leveraging AI as a professional tool, and personal branding. Following lunch, get inspired by an engaging panel of accomplished executive women from the broadband industry. This insightful discussion will cover a range of relevant and timely topics, including:

» The personal career journeys of each panelist.

» The single most pivotal moment or decision that shaped their careers.

» Key advice and lessons for growing a company and advancing professionally.

» Diversity, equity, and inclusion (DEI) initiatives at their firms—what's effective and what challenges remain.

» Strategies for developing top-tier talent.

» Their outlook and strategic plans for 2025-26 and beyond.

The session will be followed by an interactive Q&A segment between the panel and audience and concludes with several high-end sponsored giveaways you don't want to miss! In addition, each attendee will receive a special inspirational gift.

The WiT luncheon is a $40 add-on and must be purchased as an addition to any ISE EXPO attendee pass.

Golf Tournament

Tuesday, July 29

LAKEWOOD GOLF CLUB
4801 General Degaulle Drive, New Orleans, LA 70131

ADD ON: REGISTRATION FEE: $195 | CLUB RENTAL COST: $45 INCLUSIVE

Registration includes course fees, access to driving range, golf cart, breakfast, 4 drink tickets, lunch, and awards. Transportation is not provided.

7:20 AM – 8:00 AM
Check in & Breakfast

8:00 AM
Shotgun Start

12:30 PM
Awards & Buffet Lunch

NEW FOR THIS YEAR!

Workforce Development Executive Insights Panel Discussion & Half-Day Program

Thursday, July 31, 8:00 AM – 2:30 PM

PRICING

» Full Conference Registrants: The half-day program is Included in your registration fee but you must RSVP. Lunch is an additional fee of $40. Visit Registration to RSVP for the program and/or add lunch to your registration if you have already registered.

» Non-Conference Registrants: $75.00 (Includes access to the Program for all three days and free access to the Exhibit Hall Wednesday and Thursday).

» Lunch (plated sit-down luncheon) is an additional registration fee of $40 for full or non-conference registrants.

8:00 AM – 9:00 AM; Room 286-287

State of the Industry Panel Discussion & Audience Q&A

Join five broadband leaders as they explore the challenges, best practices and successes to recruit, retain and inspire the broadband workforce that evolves the fixed and mobile networks we all rely on to live, work and play.

Executives:

MODERATOR: Steve Harris, *Harris DigiTech Academy & Solutions/Learning Alliance*

PANELIST: Thomas Tyler, *ConnectLA*

PANELIST: Chris Disher, *Cajun Broadband*

PANELIST: Fred Arnold, *Learning Alliance Corporation*

PANELIST: Bo Gresham, *Dycom*

9:15 AM – 10:15 AM; Room 286-287

Best Practices: Training & Expanding the Broadband Workforce

ConnectLA shares challenges/opportunities for the state and economic development; and providers share best practices/stories/future initiatives about broadband training and growth.

10:30 AM – 11:30 AM; New Orleans Theatre C

Executive Insights Closing Keynote: The Telecom Tipping Point

Tom Maguire, Founding Leader and Board Member, *Brightspeed*

11:45 AM – 1:00 PM; Room 286-287

ADD ON: $40.00

Lunch followed by Executive Fireside Chat & Audience Q&A

Plated sit-down lunch.
Registration required + additional fee of $40.

1:00 PM – 2:30 PM

Sponsored Tech Training Tours on Exhibit Floor

ISE EXPO 2025 CONFERENCE PROGRAM

For the latest updates, download the ISE EXPO mobile app!

TRACK: Automation, AI, Reliability, Security & Network-as-a-Service	**TRACK:** Designing, Construction, Engineering & Operations (Fixed & Mobile)

TUESDAY, JULY 29, 2025

Women in Telecom (WiT) Lunch & Panel Discussion

(Additional cost for this luncheon is $40.00)

11:30 AM – 1:00 PM

ROOM 286–287

Panel Moderator: Janice Oliva, *Endeavor Business Media*

Verizon Case Study: Leveraging AI & Automation for Secure, Reliable, and Scalable Networks

1:15 PM – 2:15 PM

ROOM 276

Speaker: Kristi Dent, *Verizon*

APPROVED FOR 1 HOUR

How AI & Digital Innovation Will Reshape Network Construction

1:15 PM – 2:15 PM

ROOM 279/280

Speaker: Robert Laudati, *Render Networks*

APPROVED FOR 1 HOUR

The Future of Analytics and Big Data in Telecommunications

2:30 PM – 3:30 PM

ROOM 276

Speaker: Steve Harris, *Harris DigiTech Academy & Solutions/Learning Alliance*

APPROVED FOR 1 HOUR

AT&T Panel Discussion: Open RAN Network Modernization Best Practices

2:30 PM – 3:30 PM

ROOM 279/280

Panel Moderator: Ian Sinclair, *AT&T*

Panelists: Chad Archer, *AT&T*

Matt Jones, *Ericsson*

Vicki Littlefield, *AT&T*

TRACK: FTTx Networks (Fixed & Mobile)	TRACK: Permitting, Regulation, BEAD	TRACK: Industry Outlook, Workforce & Leadership
Addressing the Technician Shortage: Preparing Technicians for Success in Fiber Optic Telecom Roles *Additional cost for this preconference workshop is $75.00.* 9:00 AM – 11:00 AM ROOM 275 Speaker: Sean Kelly, *RCDD, CFHP, Light Brigade*		
Demystifying Ribbon Splicing and Its Applications *Included in full conference fee but you must pre-register.* 9:00 AM - 11:00 AM ROOM 276 APPROVED FOR 1 HOUR Speaker: Andrew Degidio, *Sumitomo Electric Lightwave* SPONSORED BY: SUMITOMO ELECTRIC LIGHTWAVE		
Panelists: Kelly Bohlman, *TDS Telecom* Wendy Danielson, *Norvado* Michelle Yirka, *Chisholm Broadband*	Carrie Charles, *Broadstaff* Terri Moore, *GFiber*	
How Are APIs and CPaaS/UCaaS/CCaaS Adding Value to Modern Cloud Comms Platforms? 1:15 PM – 2:15 PM ROOM 281/282 Speaker: Myron Wallace, *White Label Communications*	**Navigate Complex Permitting Processes in Four Steps** 1:15 PM – 2:15 PM ROOM 275 Speaker: Ryan Kudera, *Finley Engineering*	**Tackling Workforce Gaps: Adaptive Leadership and Innovative Training for Telecom Success** 1:15 PM – 2:15 PM ROOM 277 Speaker: Sable Lomax, *The Leadership Standard*
Norvado Case Study: Leveraging Automation for Advanced Project Management Through Business Intelligence (BI) Tools 2:30 PM – 3:30 PM ROOM 281/282 Speakers: William Kurtz, *Norvado, Inc.* Wendy Danielson, *Norvado, Inc.*	**Research Panel: A Look at BEAD from the State Broadband Office Perspective** 2:30 PM – 3:30 PM ROOM 277 Panel Moderator: Hayden Beeson, *Endeavor Business Media* Speaker: Will Miller, *AFL*	

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TRACK: Automation, AI, Reliability, Security & Network-as-a-Service	**TRACK:** Designing, Construction, Engineering & Operations (Fixed & Mobile)

TUESDAY, JULY 29, 2025

Empowering Agility and Security with Automation, AI, and Network-as-a-Service

3:45 PM – 4:45 PM

ROOM 276

Speaker: Chris Bonavita, *GTT*

Your Power Play: Hydrogen Fuel Cells or Internal Combustion Generators

3:45 PM – 4:45 PM

ROOM 279/280

Speaker: Jerry Hogan, *Solara Technical*

WEDNESDAY, JULY 30, 2025

Advances in Powering Network Resilience

8:00 AM – 9:00 AM

ROOM 276

Speakers: Kevin Borders, *Borders & Associates, LLC*
Jerry Hogan, *Solara Technical*
David Michlovic, *Vertiv*

National Electrical Code (NEC) and National Electrical Safety Code Standards Updates

8:00 AM – 9:00 AM

ROOM 279/280

Speaker: Ernest Gallo, *NEBScore*

ETA APPROVED FOR 1 HOUR

Artificial Intelligence – Concepts and Applications for Telecom Professionals

9:15 AM – 10:15 AM

ROOM 276

Speaker: David Curran, *Frontier Communications*

Strategic Cable Recovery 2.0

9:15 AM – 10:15 AM

ROOM 279/280

Speaker: Jeffrey Manion, *ExtractIQ Cable Infrastructure Partners, LLC*

AT&T Case Study: AI and ML Empowers Networks

9:15 AM – 10:15 AM

ROOM 281/282

Speaker: Maulik Shah, *AT&T*

Opening Keynote – Building Resilient Communities: Enhancing Disaster Preparedness and Response Through Technology, Innovation and Partnership

10:30 AM – 11:30 AM

NEW ORLEANS THEATRE C

Speaker: Julie Slattery, *Verizon*

TRACK: FTTx Networks (Fixed & Mobile)	TRACK: Permitting, Regulation, BEAD	TRACK: Industry Outlook, Workforce & Leadership
FTTx's Next Step: Fiber-to-the-Room (FTTR) 3:45 PM – 4:45 PM ROOM 281/282 Speaker: Mark Boxer, *OFS* APPROVED FOR 1 HOUR	**BEAD and Surety** 3:45 PM – 4:45 PM ROOM 275 Speakers: Paul Sandroni, *Brown & Brown* Quintin Petty, *Brown & Brown*	**Enhance Network Operations by Integrating Cybersecurity, Supply Chain Security & Quality Management** 3:45 PM - 4:45 PM ROOM 277 Speaker: Ken Koffman, *Telecommunications Industry Association (TIA)*
Overcoming Brownfield MDU Complex Cabling Challenges 8:00 AM – 9:00 AM ROOM 281/282 Speaker: Peter Beard, *PPC Broadband* APPROVED FOR 1 HOUR	**Exploring Accurate Pole Attachment Technology to Increase Time to Market** 8:00 AM – 9:00 AM ROOM 275 Speaker: David Mohammed, *Osmose Utilities*	**Building Resilient Telecom Teams with WISER Adaptive Leadership and Coaching** 8:00 AM – 9:00 AM ROOM 277 Speaker: Erin Wheeler, *Gracefully Productive*
	Success in Managing, Permitting and Regulatory Processes for BEAD Projects 9:15 AM – 10:15 AM ROOM 275 Speakers: Lori Adams, *Nokia* Joe Baeumel, *KGPCo* Bill Brungardt, *BHC* Eli Coniglio, *Eocene Environmental Group, Inc.*	**ISE Executive Panel Discussion** 9:15 AM – 10:15 AM ROOM 277 Panel Moderator: Janice Oliva, *Endeavor Business Media* Panelists: Anis Khemakhem, *Clearfield* Randall René, *Esri* Kevin Czaicki, *Millennium* Michael White, *TAK Communications* Jake Woods, *Vitruvi*

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TRACK: Automation, AI, Reliability, Security & Network-as-a-Service	**TRACK:** Designing, Construction, Engineering & Operations (Fixed & Mobile)

THURSDAY, JULY 31, 2025

Drive Network Value by Leveraging Gen AI

8:00 AM - 9:00 AM

ROOM 276

Speaker: Andy Stahl, *Databricks*

APPROVED FOR 1 HOUR

Making the Move to Fiber-Dominance for 5G DAS Deployments

8:00 AM - 9:00 AM

ROOM 279/280

Speaker: Mohammed Ali, *Advanced RF Technologies*

APPROVED FOR 1 HOUR

Leveraging AI and Automation to Streamline Network Data

9:15 AM - 10:15 AM

ROOM 276

Speaker: Meredith Bliss, *3-GIS*

APPROVED FOR 1 HOUR

From Sky to Street: Using Drones and Custom Imagery to Build Smarter Broadband Networks

9:15 AM - 10:15 AM

ROOM 279/280

Speaker: Jason Fuller, *CHR Solutions*

APPROVED FOR 1 HOUR

Executive Insights Closing Keynote – The Telecom Tipping Point

10:30 AM - 11:30 AM

NEW ORLEANS THEATRE C

Speaker: Tom Maguire, *Brightspeed*

TRACK: FTTx Networks (Fixed & Mobile)	TRACK: Permitting, Regulation, BEAD	TRACK: Industry Outlook, Workforce & Leadership
Consolidated Communications Case Study: Partnerships are Key to Expanding Rural Broadband 8:00 AM – 9:00 AM ROOM 281/282 Speaker: Sarah Davis, *Fidium Fiber/ Consolidated Communications*	**Maximizing BEAD Funding with Smart Network Solutions: Extending Life Cycles, Reducing Costs, and Building Sustainable Broadband Networks** 8:00 AM – 9:00 AM ROOM 275 Speaker: Mike Meagher, *Tempest Telecom Solutions* APPROVED FOR 1 HOUR	**Workforce Development Executive Insights Panel Discussion & Half-Day Program** *(Pre-registration required.)* 8:00 AM – 2:30 PM ROOM 286-287 Moderator: Steve Harris, *Harris DigiTech Academy & Solutions/Learning Alliance* Panelists: Bo Gresham, *Dycom* Chris Disher, *Cajun Broadband* Fred Arnold, *Learning Alliance Corporation* Thomas Tyler, *ConnectLA*
UTOPIA Fiber Case Study: Scaling Open Access Networks from 100 Mbps to 10G 9:15 AM – 10:15 AM ROOM 281/282 Speaker: Jeff Meyer, *UTOPIA Fiber* APPROVED FOR 1 HOUR	**BEAD: Building America's Connectivity and Workforce for a Fiber-Driven Future** 9:15 AM – 10:15 AM ROOM 275 Speaker: Kevin Morgan, *Clearfield*	**Unleash the Hero Within: Harnessing Organic Intelligence in the Age of AI** 9:15 AM – 10:15 AM ROOM 277 Speakers: John Armstrong, *Full Spectrum Coaching and Consulting* Jeston Baker, *Velocity Tech Solutions* APPROVED FOR 1 HOUR

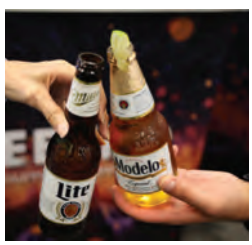
BUILD YOUR TO-DO LIST FOR ISE EXPO 2025!

☑ Attend Conference Sessions

Learn from over 75 industry experts in a variety of sessions designed to educate, inspire, and engage.

☑ Connect at the On-Site Happy Hour

Join us for a special Networking Happy Hour, Wednesday, July 30, starting at 3:30 PM. Connect with fellow attendees, exhibitors, and sponsors over drinks and appetizers, and take the opportunity to build valuable professional relationships in a casual setting.



☑ Explore the ISE EXPO Exhibit Hall

Featuring over 175 exhibitors displaying the latest ICT solutions.

☑ Learn from Leading Executives

Join industry leading titans as they gather to provide a compelling, content-rich conversation to share personal insights, and discuss the latest ICT trends and challenges.

☑ Tee Off at 4th Annual Golf Tournament

Swing into ISE EXPO week, Tuesday, July 29, with a day on the green for the perfect blend of business and pleasure.

☑ Women in Telecom Panel

Join us for roundtable discussions during a plated lunch focused on essential topics such as career advancement, work-life balance, diversity, well-being, leveraging AI as a professional tool, and personal branding. Following lunch get inspired by an engaging panel of accomplished executive women from the broadband industry.

☑ Opening & Closing Keynotes

Expert insights from the leaders of Verizon and Brightspeed.

☑ Workforce Development Executive Insights Panel Discussion & Half-Day Program

Join five broadband leaders on Thursday, July 31, at 8:00 AM, as they explore the challenges, best practices and successes to recruit, retain and inspire the broadband workforce that evolves the fixed and mobile networks we all rely on to live, work and play.

☑ Win a Vacation to Mexico for Two!

Participate on-site in our "Passport to Prizes" and enter for a chance to win a 3-night stay at the Paradisus Playa del Carmen – Riviera Maya in Mexico, including round trip tickets from your home city, airport/ resort transfers and all meals & drinks included.

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KEYNOTE HIGHLIGHTS

OPENING KEYNOTE

Wednesday, July 30, 10:30 AM – 11:30 AM

NEW ORLEANS THEATRE C

Building Resilient Communities: Enhancing Disaster Preparedness and Response Through Technology, Innovation and Partnership

verizon

Julie Slattery

Senior Vice President,
Core Engineering & Operations
Verizon

Verizon has a decades-long history of collaborating with partners across the telecom industry to deliver effective communication solutions that aid public safety, particularly during emergencies. By utilizing new technologies, developing innovative solutions, and partnering with industry, government, and community stakeholders, Verizon is committed to improving disaster preparedness and revolutionizing emergency management.

Join Julie Slattery for a discussion on Verizon's disaster resilience approach that includes preparing for any situation, being ready to respond, providing post-disaster recovery assistance and using technology and learnings to mitigate potential future emergencies. The keynote will dive into the extreme lengths engineers go to run to a crisis and keep communities connected offering real-life anecdotes and learnings.

The primary areas of focus will be on the importance of internal and external partnerships, leveraging emerging technologies including AI and highlighting key strategies that can be implemented in organizations of all sizes.

EXECUTIVE INSIGHTS CLOSING KEYNOTE

Thursday, July 31, 10:30 AM – 11:30 AM

NEW ORLEANS THEATRE C

The Telecom Tipping Point

brightspeed

Tom Maguire

Founding Leader and
Board Member
Brightspeed

For more than a decade, Tom Maguire has championed modernization in the telecom industry—away from unreliable, costly copper networks to new, more resilient technology that easily adapts to innovation and consumer needs. We are now at a pivotal point when federal oversight is aligned, state-level changes are underway, the industry's labor force is ready to execute, and scalable connectivity is possible. Copper is the past, and now is the time to embrace the future. When all the players in the industry work together, the possibilities are infinite.

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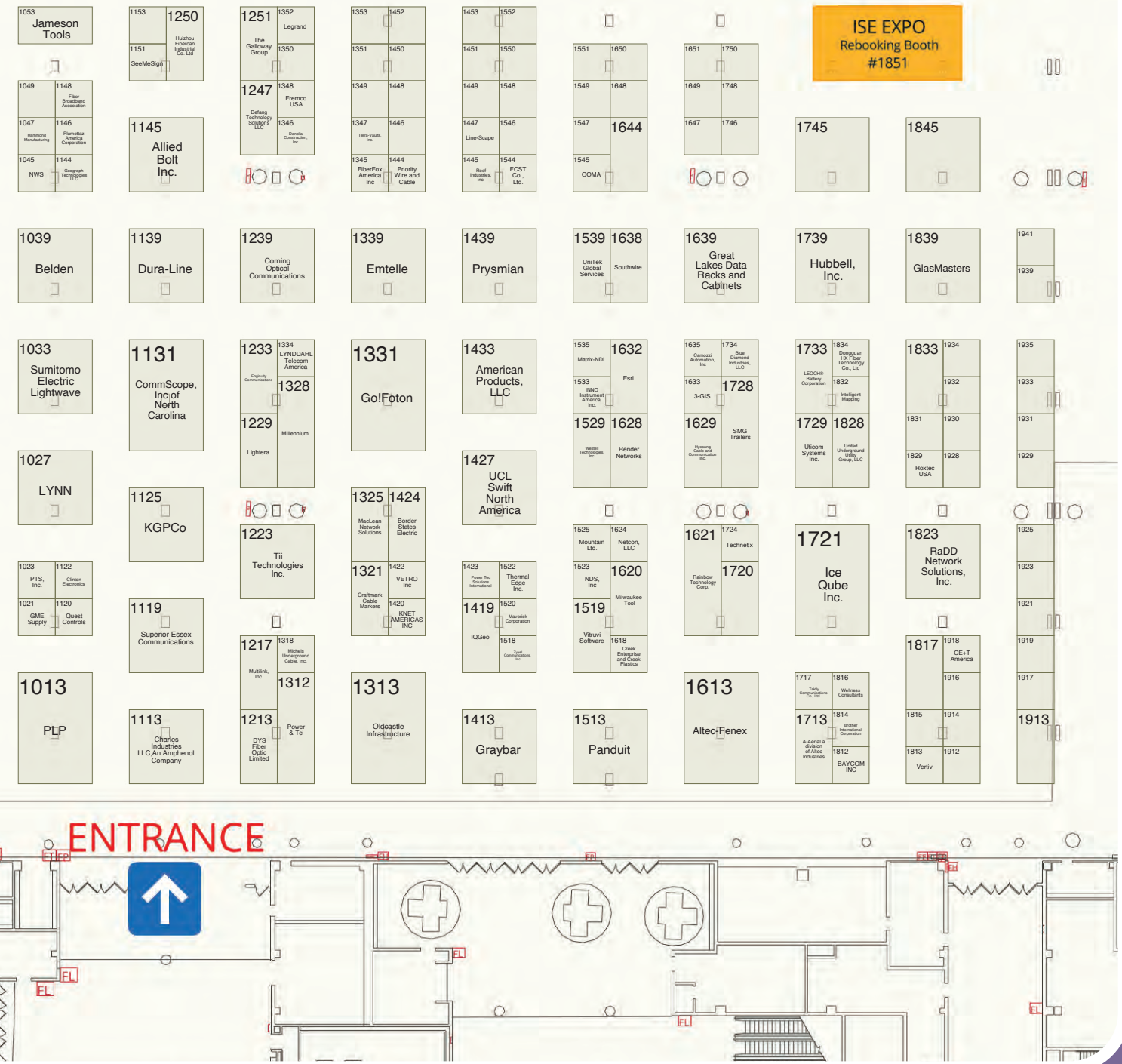
EXHIBIT HALL FLOOR PLAN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1213 DYS Fiber Optic Limited Power & Tel
1313 Oldcastle Infrastructure
1413 Graybar
1513 Panduit
1613 Altec Fenex
1717 Tekfy Communications Co., Ltd 1816 Wellness Consultants
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Accelight Technologies is a USA-based company that manufactures fiber optic passive, active pluggable modules and outside plant fiber enclosures used in the transmission of fiber optic networks for telco, broadband access, cable TV, and data centers.

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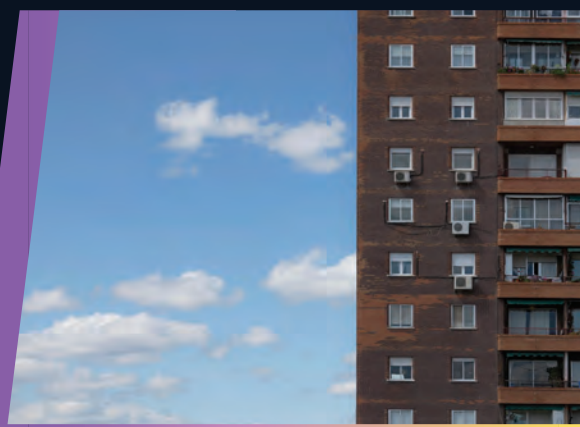

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Tel: 86-769-87729980
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DongGuang HX Fiber was established in 2008 intergrating R&D, production and sales for fiber optic solutions like indoor/outdoor cables. It is also the biggest armored cable manufacturer in China.

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516005 China
Tel: 86-752-2781169
www.dysfiber.com

DYS Fiber Optic, founded in 2009, manufactures passive fiber products in China and Vietnam. Key products include jumpers, cables, and FTTH solutions for data centers and FTTX/FTTA applications.

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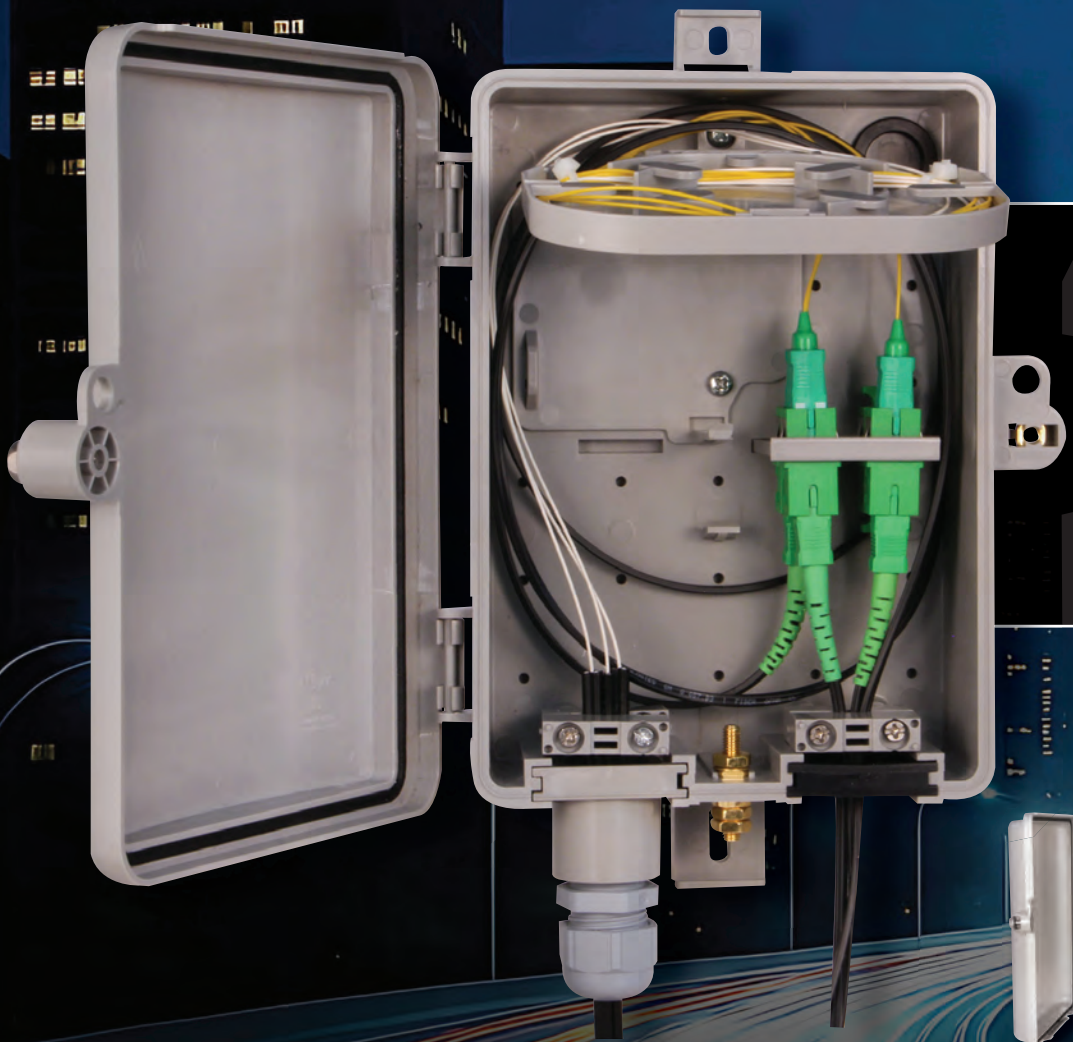

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Hubbell Incorporated is a leader in manufacturing high-quality critical infrastructure solutions strategically aligned around clean energy megatrends, including grid modernization and energy efficiency.

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Huizhou Fibercan Industrial Co.,Ltd. is a world-leading manufacturer and professional supplier of optical fiber communication products, providing solutions, and OEM/ODM services. We are a one-stop factory providing a full range of products.

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Since introducing the first fiberglass poles to the telecom industry in 1956, Jameson has become a leading provider of telecommunication cable installation and maintenance tools for professional installers throughout the United States and abroad.

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Jonard Tools®, founded in 1958, manufactures tools for the telecom, CATV, fiber optic, home automation, security and alarm, and electrical markets. We design and engineer patented products by utilizing customer partnerships to create innovative solutions for industry needs.

KGPCo 1125

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KNET AMERICAS, Inc. 1420

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Tel: 646-897-9329
www.e-knet.com

KNET manufactures microduct fiber pathway and offers a broad range of connectivity products to meet the many different deployment scenarios. KNET is ISO 9001/TL9000 certified and has Telcordia GR 3155 certified products.

Korea Optron Corporation... 739

142 Nanosandan-Ro Nam-Myeon
Jangseong-Gun, Jeollanam-Do 57248
Republic of Korea
Tel: 82-(0)62-9737771
www.koreaoptron.co.kr

Korea Optron Corporation is a well-known manufacturer of fiber optic products including fiber cables and MEMS. We have been supplying high level quality and cost-effective fiber optic products around the world since 1997.

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Open Source and Open Broadband Standards Offer the Ingredients for Success

The Broadband Forum accelerates open-source development to meet evolving user and industry demands.

BY LINCOLN LAVOIE

Broadband Service Providers (BSPs) are increasingly prioritizing a richer, more tailored broadband experience for the end-user, recognizing that fast speeds alone are no longer the key differentiator. With this important consideration in mind, the Broadband Forum recently realigned its work areas.[1] The changes ensure that every new project and specification focuses on enabling services-led and intelligent broadband that provides the applications and services most demanded by users.

As part of this, the Forum's open broadband standards are continually refined to help define lasting, normative descriptions and the requirements of the systems, interfaces or Application Programming Interfaces (APIs). Standards help the industry align on common architecture and future migration approaches, and lay out a uniform set of rules and design principles

to adhere to. Alongside this, open-source software initiatives help underpin the universal success of real-world deployments.

Updated Restructure for an Updated Shift

As part of the realignment, the intention was to streamline the organization, making it easier for its members to engage in its standards work and help deliver an improved broadband user experience.

The five work areas cover access networks, connected users and subscriber networks, network architecture, cloud and autonomous networks, and service requirements. They are supported by an advisory group providing the necessary expertise to produce high-quality YANG data models and management specifications spanning multiple work areas.

Broadband Forum's current work areas are:

- **Access Work Area** — The group focuses on delivering multi-vendor interoperability for last mile broadband deployments across fiber, copper and wireless networks.
- **Connected User Work Area** — Develops specifications for the deployment, management and consumption of services by the end-users.
- **Network Architecture Work Area** — Develops the architecture and nodal requirements for end-to-end broadband deployments across traditional and converged networks to ensure the best possible quality of experience for users.
- **Provider Cloud Work Area** — Defines frameworks and specifications to enable broadband services and networks to utilize cloud-based deployment approaches, including automation leveraging machine learning (ML) and artificial intelligence (AI).
- **Service Requirements Work Area** — Defines user-centric, normative requirements and specifications for services utilizing BSPs' subscriber, access and core networks. The group will address real-world broadband challenges and align with evolving industry priorities to bridge the gap between the network adopter and subscriber needs and technical innovation.

Open-Source Blueprints

While Broadband Forum's five work areas are open to its membership, non-members and members from across the industry contribute to its eight open broadband projects.

These open-source initiatives deliver reference implementations and software development kits, serving as examples of how Broadband Forum specifications can be implemented. They act as baseline platforms for more services and applications, with updates to the code available as the specifications mature. Those involved can access the community-developed and tested source code and be part of the development process.

Open-source software provides device and equipment vendors with a code base that they can integrate into their devices and their existing systems. These open-source software blueprints also act as a valuable starting point for application developers to base their designs on. In turn, those applications can be made available on platforms for BSPs to select and offer to their customers. Tellingly, this shortens the path between the development and test stages of a specification to the first deployments of the technologies and solutions into the network. It can also lower the overall research and development (R&D) and maintenance costs of the common code base shared and supported by the community.

These open-source implementations for different components in the network can also provide invaluable feedback during the standardization process. They uncover areas that require more detail, identify implementation changes, or pinpoint necessary adaptions to improve interoperability. When the likes of AI and energy efficiency are being developed, this is often enabled by access to open-source software. R&D projects can use the prebuilt code to add AI or energy efficiency, for example, to a network function rather than starting over.

> "Fast speeds alone are no longer the key differentiator.

Broadband Forum is currently working on the following open-source projects:

- **OB-5WWC (Open Broadband – WWC Reference Implementation for 5G-RG)** — The OB-5WWC project provides a reference architecture and base code for 5G fixed-line RG devices, meeting the requirements within BBF and 3GPP's WWC specifications.
- **OB-BAA (Open Broadband-Broadband Access Abstraction)** — Delivers an open reference implementation specifying the Northbound Interfaces (NBI), Core Components and Southbound Adapter Interfaces that operators and vendors worldwide can use

to develop and deploy interoperable cloud-based access networks more easily and quickly.

- **OB-CAS (Open Broadband CloudCO Application Software Development Kit)** — Aims to make monitoring and maintenance easier for BSPs by providing a software development kit enabling them to easily integrate applications, leveraging the BBF's automated intelligent management (AIM) framework into their access network management platforms.
- **OB-MAP (Open Broadband-Multi Access Point)** — Developing a high-level data model for network operators that would ease the configuration of Wi-Fi across the home. The group generates requirements for features that extend and enhance the Wi-Fi Alliance EasyMesh and Data Elements specifications for use in a BSP-managed subscriber local network via BBF technologies TR-069 and User Services Platform (USP).
- **OB-STAMP (Open Broadband - Simple Two-Way Active Measurement Protocol)** — This measurement component, outlined in TR-390.2[2] aims to reduce the cost and time of deploying and implementing infrastructure for measuring network latency in BSP networks, particularly to and within the home. It operates as a containerized application within the USP paradigms.
- **OB-STEER (Open Broadband Subscriber Session Steering)** — Provides a reference implementation for key elements of the Subscriber Session Steering architecture as currently worked out in BBF's WT-474 project to deliver flexible, on-demand connectivity, failover functionality, and simplified network management.
- **OB-UDPST (Open Broadband User Datagram Protocol Speed Test)** —Open source implementation of a tool to measure the network metrics defined in TR-471: IP Layer Capacity Metrics and Measurement.[3] This empowers BSPs to conduct segment-by-segment or comprehensive end-to-end connection quality assessments, spanning from the network edge, through the access network, and even within the home or business network.
- **OB-USP-Agent (Open Broadband-User Services Platform-Agent)** — Creates a reference implementation of the USP specification from a USP Agent perspective, that would typically reside in CPE. OB-USP-Agent provides a common, community supported code base, that is already being integrated into downstream open-source projects like Prpl and RDK-B.

> **Open-source software initiatives help underpin the universal success of real-world deployments.**

Trio of New Open-Source Projects Underway

The OB-CAS, OB-STAMP and OB-STEER projects are the most recently introduced[4] by the Broadband Forum and bring together software developers and standards experts from across the organization. The new projects are set to deliver an improved user experience, simplified network performance measurement and monitoring for BSPs, and a wider choice of in-home applications for broadband consumers.

The projects provide a foundation for AI and ML for network automation, additional tools for network latency and performance measurements, and on-demand connectivity for different applications. OB-CAS is simplifying network operations and automating them through existing Broadband Forum cloud standards that use AI and ML to improve the end-user experience.

OB-STAMP is building a component that simplifies the measurement of network performance between CPE and the IP Edge. The project is set to allow BSPs to monitor home networks, measure latency, and avoid network failures. OB-STEER will allow network operators to offer flexible, on-demand connectivity and is set to be interoperable for implementation in the access network and edge equipment from various vendors.

Together: Successful

The marriage of open broadband standards and the latest software developments are laying the foundations for improved end-user experiences—a core focus across all Broadband Forum work areas and open-source software projects.

As BSPs look to expand their offerings beyond the broadband connection, the synergy of open source and open standards will play a pivotal role in this evolution. Broadband Forum's open-source efforts mirror the open, technology-neutral nature of the organization where everyone's voice is heard.

If you are interested in joining Broadband Forum's open source and open standards projects, contact: help@broadband-forum.org. ■

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The Need for Legislation for Broadband and Wireless Infrastructure Permitting

With mobile data demand rising and 5G rollout accelerating, the Wireless Infrastructure Association calls for comprehensive legislation to fix the fragmented permitting process—and protect connectivity's future.

BY MIKE SAPERSTEIN

In today's rapidly evolving digital landscape, the demand for robust and reliable wireless communication infrastructure has never been greater. As we continue to witness the proliferation of smartphones and IoT devices and the advent of 5G technology, including fixed wireless access (FWA), the importance of wireless infrastructure and its efficient deployment becomes paramount.

Ico Maker / Shutterstock

Over the past decade, the permitting process for towers has been greatly improved, supported by the regulatory actions taken by the Federal Communications Commission (FCC). However, recent court rules make any federal-level agency actions less certain, and the process of obtaining permits for new towers and colocating equipment on existing towers continues to face challenges within some jurisdictions. As a result, the Wireless Infrastructure Association (WIA) is calling for comprehensive legislation to streamline and facilitate wireless deployment.

Enshrining key FCC rules into the statute is a critical objective.

Challenges in Cell Site Permitting

The communications industry works every day to deploy infrastructure that supports mobile and fixed connectivity across the country. In doing so, we've become well-acquainted with the complex web of local, state and federal regulations that is the permitting process in many locations today. Local governments absolutely have a role to play in siting wireless infrastructure, but permitting regulations can vary significantly from one jurisdiction to another, leading to inconsistencies and delays in the deployment process. Additionally, the lack of standardized procedures across different regions can result in inefficiencies and increased costs, which ultimately cost all of us who use the networks.

This is an everyday, lived experience for those working on the frontlines to ensure Americans stay connected, as well as making sure that the industry can continue to meet the ever-increasing demands for data placed on networks today. There are now over 12.5 million fixed wireless subscribers, and according to Ericsson, total mobile data traffic is estimated to grow threefold between the end of 2023 and the end of 2029.

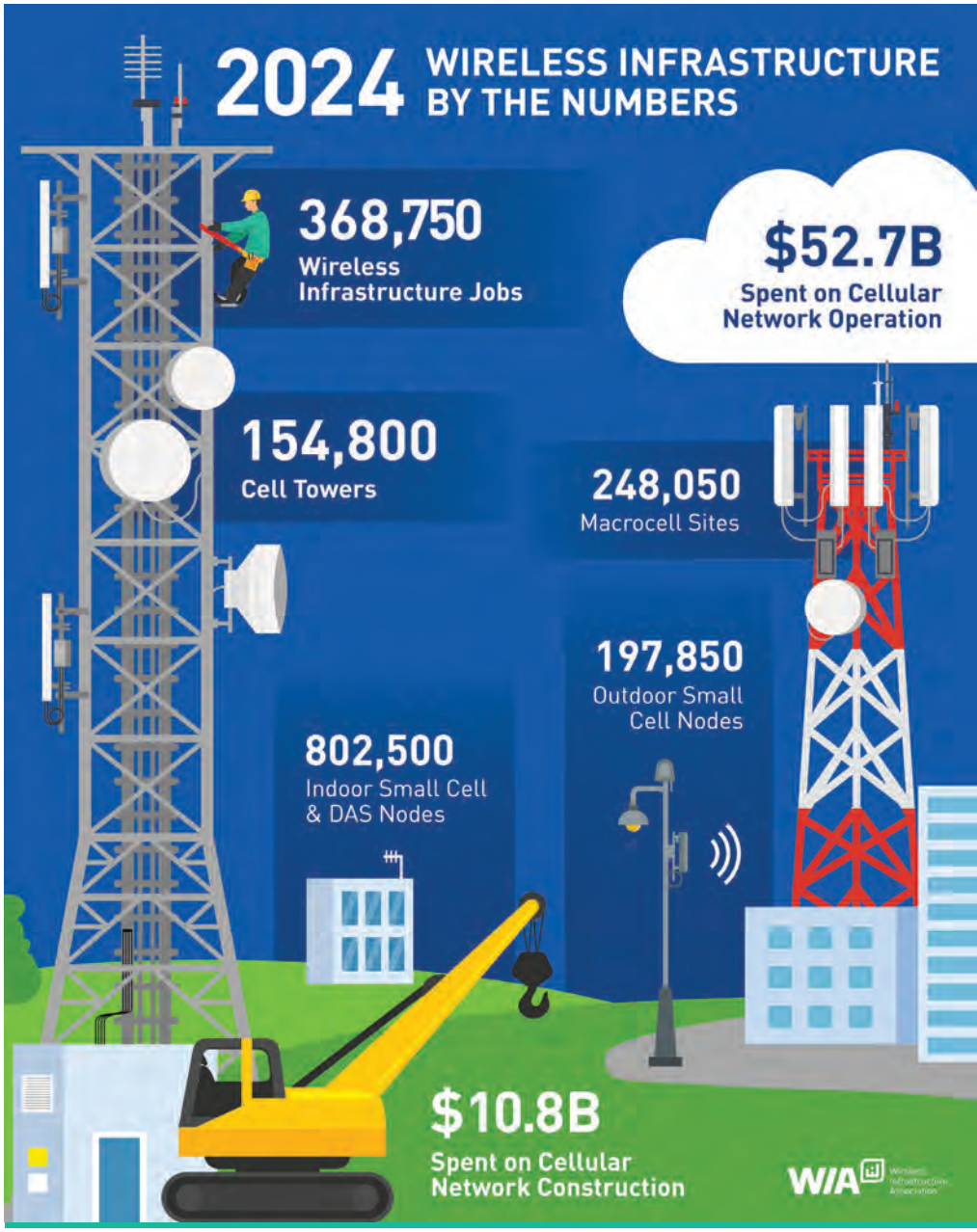

FIGURE 1.

The good news is that over the last 10 years, the FCC has adopted orders that support the speedy deployment of communications networks with predictable, proportionate and transparent permitting processes. These rules have been a catalyst for the explosive deployment of broadband and 5G access across the United States. For example, in the two years after the FCC's 2018 Small Cell Order, investment in wireless infrastructure surpassed the previous seven years combined, and more than half of the cell sites currently in service were deployed after the FCC adopted siting reforms. By the end of 2024, just over 651,000 structures supported wireless infrastructure across the US, according to WIA's recent Wireless Infrastructure by the Numbers report.[1] (See Figure 1.)

Still, some local governments have refused to follow these orders, delaying deployment and resulting in time- and

capital-intensive challenges. Worse, some federal judges have elected not to follow the directives of the FCC's rules and have more latitude to make their own non-standardized rules under new precedents, injecting more uncertainty into the process. Enshrining key FCC rules into the statute is a critical objective.

Legislative Solutions

To address these challenges, there is a pressing need for legislation that standardizes and streamlines the wireless infrastructure deployment processes. Ensuring a predictable, proportionate and transparent permitting process that respects state and local review must be a priority for Congress and state legislatures to achieve the goal of providing broadband access to all Americans. Such legislation should aim to provide:

- **Clear Timelines:** Enshrine existing FCC orders into law at the federal and state levels, providing predictable timelines for application processes, including "shot clocks" on permit applications for wireless facilities, providing timelines for deciding upon an application, and "deemed granted" relief where an authority fails to act on the application in the given time. If the answer is no, tell us and we can work to fix it! This maintains a role for municipalities but gives them a deadline and provides industry with certainty, resulting in quicker connectivity for communities.
- **Reasonable Fees:** Fees charged for applications must be calculated based on actual costs, established in advance and publicly disclosed. This creates certainty among all parties.
- **Streamlined Site Upgrading:** Codify FCC rules that allow existing sites to expand the compound by up to 30 feet and add reasonable additional equipment cabinets and antennas without going through further review processes. The structure already exists, and adding new facilities is often the least intrusive means of siting new infrastructure.
- **Streamlined Environmental and Historic Review:** Establish shot clocks for applications on federally managed lands and recognize where environmental and historic reviews would be unnecessary, such as in disaster recovery areas and previously disturbed Rights of Way.

American Broadband Deployment Act

The most important step Congress and the Trump Administration can take is to reintroduce and enact the American Broadband Deployment Act (ABDA). ABDA is a legislative package from the last Congress that would codify several major permitting reforms enacted by the FCC and right-size federal rules for broadband permitting on federal lands to spur deployment. ABDA would carefully balance and respect the important role of localities in maintaining the aesthetics, character and safety of their community while also ensuring the timely deployment of needed infrastructure.

Beyond codifying FCC orders on infrastructure deployment, ABDA takes proactive steps to improve siting on federal lands and reduce unnecessary red tape for applications to deploy or improve communications networks. If enacted, this bill would ensure that all communities have consistent rules for siting infrastructure, speeding deployment and reducing overall costs for consumers.

WIA is actively working on the Hill to advance these policies.

State Legislation

Across the country, WIA is working hand-in-hand with states to also codify the FCC's orders for broadband deployment at the state level, with recent success in West Virginia and Colorado. Similar to ABDA, these bills provide clear and consistent guidelines for the permitting process, reducing ambiguity and ensuring that all stakeholders understand the requirements, timelines and fees.

Encouraging collaboration between local governments, telecommunications companies and other stakeholders can lead to more efficient and effective deployment strategies. State legislation is aimed at fostering partnerships and open communication channels to address concerns and find mutually beneficial solutions. Several more states are considering permitting legislation, and WIA will continue to work closely with states through the remainder of the 2025 legislative sessions.

Local governments absolutely have a role to play in siting wireless infrastructure.

Conclusion

At WIA, our goal is to help establish the best business and regulatory environment possible to help our members meet the mission of enabling connectivity everywhere. For permitting, this means we need predictable, proportionate and transparent processes. A consistent permitting framework set at a national level but flexible enough to accommodate local needs and interests is the key to sustained success for wireless infrastructure deployment. ■

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Mike Saperstein is the Chief Strategy Officer and Senior Vice President for Government Affairs for the Wireless Infrastructure Association (WIA). For more information, visit www.wia.org. Follow WIA on LinkedIn: linkedin.com/company/wireless-infrastructure-association/ and X @WIAorg.

Is Your Fiber Network Routed for Success?

A successful fiber network isn't just about coverage—it's about strategy, scalability and sustained performance.

BY CHRIS SIKORA

The telecommunications industry has seen a variety of historical trends, whether it was the dot-com boom, the rush to near-net buildings, or today's intense focus on fiber-to-the-home (FTTH) passings. History shows that without an effective ROI strategy, these trends can create long-term challenges.

For fiber providers serving a broad mix of customers and communities, network design must go beyond coverage. It should be purpose-built to address a range of needs, from residential and business connectivity to high capacity demands from hyperscalers and towers. That requires engineering routes with the foresight to enable scalability, ensure sustainability and maximize ROI on every mile of deployed fiber. Strategic planning and sufficient capacity are essential to support future growth and evolving community needs.

After more than 25 years in telecom and technology, I'd like to share some of my observations on trends I see shaping our industry for the future and some key strategic moves I strongly recommend considering today. If there's one thing I've learned, it's that a strategic, synchronized approach to fiber construction and customer acquisition is critical.

Great Plains Communications (GPC)

Construction Strategy, Service Delivery and Future Needs

Technologies like GPON, Ethernet, dark fiber and wavelength services offer flexibility, but strategic planning is what drives strong returns on capital. For providers serving a mix of customer types, each fiber build should be approached through a multi-segment lens: Can this route support residential homes and apartments? Are we capturing anchor institutions like hospitals, schools or government buildings along the way? Is there an opportunity to connect a small business with GPON and a regional bank or manufacturer with Ethernet?

Capacity planning must also look beyond today's demand. Every build should be treated as a long-term investment, guided by questions such as: What's likely to change in the near and distant

> Every build should be treated as a long-term investment, guided by questions such as: What's likely to change in the near and distant future? What's the next opportunity? What will customers need tomorrow that they may not need today?

future? What's the next opportunity? What will customers need tomorrow that they may not need today? This forward-looking mindset is key to building networks that deliver value well into the future.

Here are a few considerations and recommendations to maximize revenue:

Misconceptions and Customer Expectations

One of the biggest misconceptions I see in our industry is the idea that being first to fiber guarantees long-term success. While that can be true in some cases, it is not a given. Incumbents can and do protect their base more aggressively than expected, forcing newer entrants to fight harder for market share. If you haven't built in the ability to pivot or densify, ROI and take rates can suffer.

I once worked for a CEO who said that the most impactful thing we could do for every stakeholder, including communities, customers, employees, regulators and shareholders, was to run a financially sound business that truly prioritized the customer's success.

Customers want solutions that help them best live their connected daily lives, with minimal obstructions. They want low latency and a reliable, secure connection for themselves, their employees and their customers. They want easy access to solutions like managed Wi-Fi for residents and businesses, managed firewall protection against evolving cyber threats, and unified communications—all services that enhance their connected lives. And when those services come from one local provider embedded in the community with firsthand knowledge of the community needs and culture, the customer success and overall experience are that much stronger.

At Great Plains Communications (GPC), we've leaned into densification in markets like Omaha, Nebraska. We didn't try to go wide first; we went deep. Starting with commercial customers, we gradually built a residential presence, creating market diversity that delivers more stable, predictable returns. It's a strategy that strengthens customer experience and financial performance alike.

Hyperscalers, Data Centers and the Digital Divide

Connecting metro markets via middle-mile fiber has long been considered a top priority. However, with the increasing use of AI, cloud computing and sophisticated enterprise networks, the landscape has changed significantly. Data centers and hyperscalers, such as Amazon Web Services (AWS), Google Cloud Platform (GCP) and Microsoft Azure, are becoming critical components of our connectivity system. For AI applications to process massive amounts of data in real-time, strong infrastructure with flexible architecture and technologies that provide low latency and increase network capabilities and resiliencies to support the bandwidth required to operate these data centers are essential. Continuous advancements in network technology and infrastructure to keep pace with AI's rapid development should be on the to-do list for providers everywhere.

The current goal is to bring fiber-driven services, including high-speed internet, to communities everywhere (frequently referred to as "closing the digital divide"). To be successful in the future, a provider must continually monitor market trends and look at each upcoming project strategically when entering to serve the entire community. Are there potentially multiple customers and revenue opportunities across different lines of business? Is current capital sufficient for success, or will a project justify government funding? Can a provider pivot and execute successfully if an opportunity arises?

Market Analysis and Boots on the Ground—A Winning Combination

Market analysis plays a vital role—but like most things, it's both an art and a science. Earlier in my career, I worked for one of the original CLECs. I moved from a well-established Manhattan market to help launch a new market in New Jersey. When we got the route maps from the network design team, they were based on wholesale demand sets. It looked good on paper—until we realized the fiber was passing dozens of AT&T office buildings because one customer dominated the data. We hadn't fully accounted for concentration risk.

That experience taught me that data is critical, but it can't be the only lens. Boots on the ground matter. Local insight, strong community relationships and an ongoing commitment to being part of the market's fabric are essential. It's not enough to build fiber and move on. Providers need to be trusted technology partners, in it for the long haul, committed to helping communities grow and thrive with next-generation connectivity.

Fiber has incredible power to transform economies and lives, but only when deployed strategically, thoughtfully and sustainably. Providers who approach fiber with a mindset of maximizing ROI, enabling customer success and planning for the future will be the ones who drive real progress and reap the rewards. ■

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The Case for Environmentally Sustainable FTTH Networks

Operators that integrate sustainability into fiber planning, deployment and operations gain more than a greener footprint—they gain a strategic edge in cost and performance.

BY JAY CADMAN

Across industries, economic pressures have led many organizations to scale back sustainability initiatives. Yet for telecom operators, the path to a greener future is not only environmentally responsible but also financially advantageous. Fiber-to-the-home (FTTH) networks present a rare convergence of operational efficiency and carbon footprint reduction, offering long-term value in a volatile marketplace. One of the most compelling examples of this convergence is the stark difference in energy efficiency between FTTH and legacy broadband networks.

FTTH networks consume significantly less energy than legacy hybrid fiber coaxial (HFC) systems. A recent report[1] found that FTTH network operations generate up to 96% fewer carbon emissions compared to HFC networks. This dramatic reduction translates directly into cost savings, making sustainability not just a corporate social responsibility effort but a business imperative.

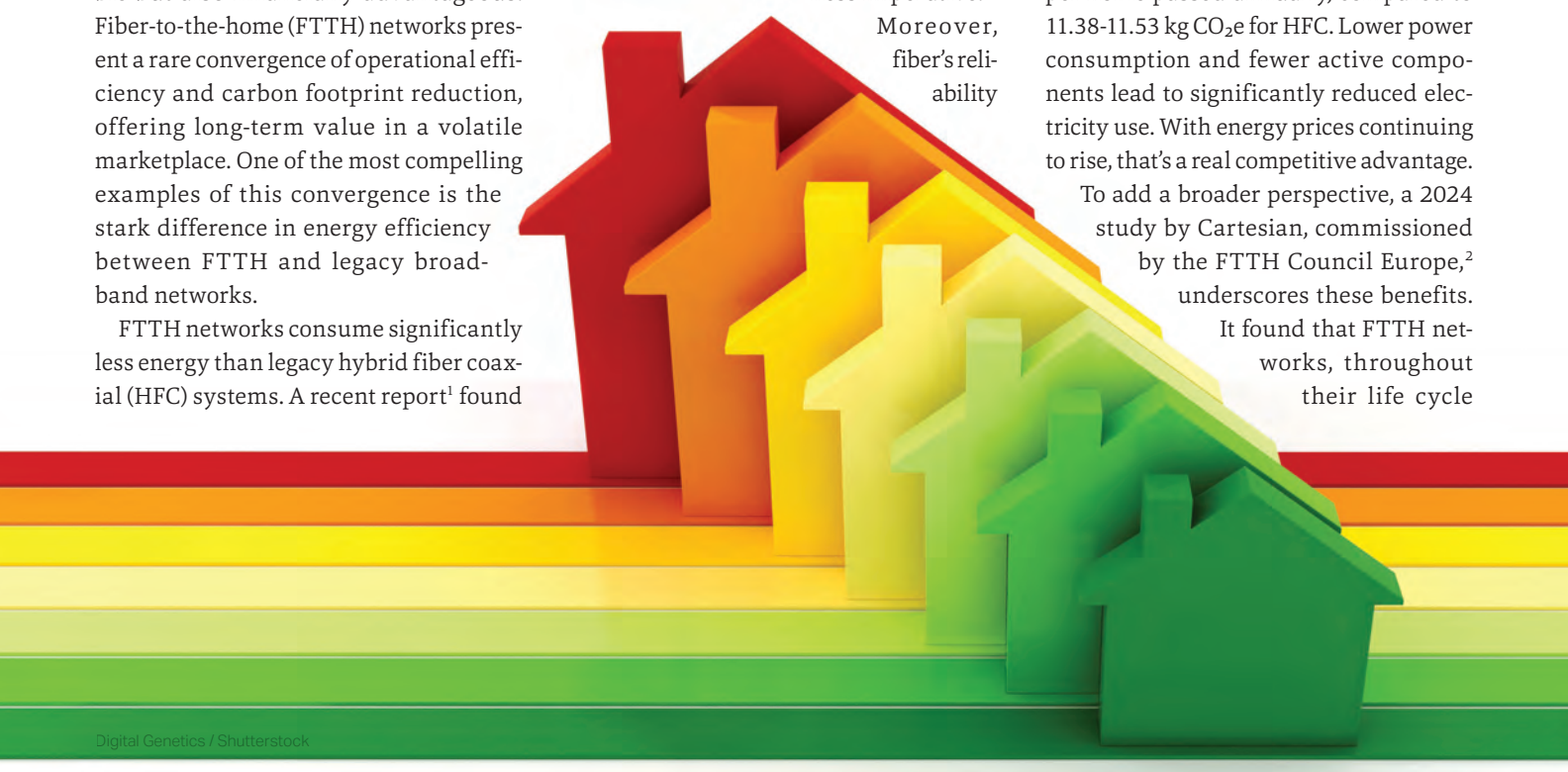
Moreover, fiber's reliability means fewer service disruptions. This translates into reduced maintenance costs, fewer field technician dispatches and decreased fuel consumption for service vehicles. By minimizing unplanned maintenance events, operators also reduce customer churn, preserving revenue and brand reputation. However, the environmental case for FTTH isn't limited to operational energy savings; it extends across the network's entire life cycle.

Environmental Concerns and Operational Efficiency

The environmental benefits of FTTH go beyond reduced carbon emissions. Fiber's efficiency results in fewer active components, lower power consumption and more reliable performance over time. These factors together reduce operational overhead.

For instance, a recent white paper by the Fiber Broadband Association[1] found that the carbon footprint of FTTH network operations is up to 96% lower than that of HFC networks, and installation emissions are 7% lower. Given the rising cost of energy, minimizing operational power usage directly impacts the bottom line. FTTH XGS-PON OLT technology, for example, generates just 0.42-0.83 kg CO_2e per home passed annually, compared to 11.38-11.53 kg CO_2e for HFC. Lower power consumption and fewer active components lead to significantly reduced electricity use. With energy prices continuing to rise, that's a real competitive advantage.

To add a broader perspective, a 2024 study by Cartesian, commissioned by the FTTH Council Europe,[2] underscores these benefits. It found that FTTH networks, throughout their life cycle



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from production to deployment and operation, consistently outperform legacy networks in terms of energy efficiency and carbon footprint. The study also highlights FTTH's role in supporting the EU's climate goals and the twin transitions of digitalization and sustainability.

In the United States, environmental, social and governance (ESG) frameworks[3] are also driving telecom operators to rethink infrastructure strategies. US-based investors, regulators and institutional funds increasingly factor ESG metrics into decision-making. While adoption varies by region, national telecoms recognize that aligning with ESG goals can improve access to capital, attract sustainability-minded investors and demonstrate long-term operational resilience. Turning these environmental and strategic goals into operational reality requires smarter, data-driven network planning and deployment practices.

The Role of Precision GIS Planning

Building a sustainable FTTH network requires more than just selecting fiber over copper or coaxial. It requires a strategic approach to network planning, design and deployment. Precision fiber network planning, supported by digital tools, ensures that environmental and operational efficiencies are embedded from the outset. Geospatial information system (GIS) planning tools have emerged as a cornerstone of sustainable FTTH deployment. These platforms enable operators to:

- Optimize routing using existing infrastructure, minimizing new trenching and excavation.
- Rapidly model multiple deployment scenarios to select the most sustainable and cost-effective approach.
- Incorporate real-world factors like terrain and local infrastructure to avoid costly and disruptive rework.

This kind of precision in network planning lays the foundation for sustainable growth as operators move into new, often more challenging markets. The adoption of GIS in FTTH deployment is accelerating, driven by the escalating demand for gigabit broadband and government digitalization initiatives. GIS tools are instrumental in market analysis, network planning, engineering and maintaining network inventories. These tools also improve collaboration between field crews and office-based planners, reducing errors and streamlining operations.

Once the FTTH networks are deployed, the way they're operated and maintained becomes the next critical factor in minimizing environmental impact.

Fiber's reliability means fewer service disruptions. This translates into reduced maintenance costs, fewer field technician dispatches and decreased fuel consumption for service vehicles.

Smarter Operations

Ongoing maintenance significantly impacts an FTTH network's environmental and financial footprint. Smart operations shift maintenance from reactive to proactive, enhancing sustainability. Remote diagnostics and predictive maintenance tools detect issues early so operators can resolve problems without field visits. Emerging technologies are making this proactive, low-impact operational model increasingly achievable.

New AI-powered visual automation technologies are redefining how telecoms manage quality and compliance. These systems process video and image data captured in the field to validate installation quality, track construction milestones and flag deviations in real time. Automating these inspections improves first-time-right rates, eliminates unnecessary truck rolls and ensures data-driven maintenance cycles that reduce cost and emissions.

Unlike traditional reactive models, AI-enhanced network operations rely on proactive issue detection, dynamic updates to network inventory and improved documentation. These capabilities enable better capital planning and support ESG reporting through verifiable performance metrics. As the industry continues evolving, such tools will be essential for keeping sustainability and operational discipline aligned.

Automation enhances resource allocation. Digital workflows ensure that crews are dispatched only when needed and equipped with accurate information. This reduces delays, minimizes waste and improves efficiency. Smarter operations, enhanced by AI-powered technology, also extend network asset life. Fewer replacements mean lower capital expenditures and less environmental impact over time. Operational improvements like these have a direct bearing on telecom's ability to meet ESG criteria and secure sustainable financing.

Sustainable Finance and ESG

The sustainability credentials of FTTH are no longer just environmental, they are increasingly financial.[4] As investors, regulators and policymakers emphasize ESG criteria, FTTH networks are being recognized as green infrastructure assets, qualifying for sustainable finance and favorable investment terms. This financial alignment is supported by FTTH's operational efficiency and its role in enabling equitable digital access, both of which advance broader societal and policy goals.

As ESG frameworks gain traction, particularly in the U.S., telecom operators are integrating sustainability metrics into corporate reporting and infrastructure strategies. Federal broadband and infrastructure initiatives are beginning to prioritize projects that align with ESG principles, rewarding

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operators that demonstrate carbon reduction, digital inclusion and long-term operational resilience.

To capture these financial, operational and environmental benefits, operators need clear, actionable sustainability roadmaps that embed ESG considerations across network planning, deployment and operations. This positions FTTH not just as a connectivity solution but as a strategic investment in sustainable infrastructure.

Strategic Next Steps for Telecom Operators

To realize FTTH's sustainability and efficiency potential, operators should adopt full-life cycle strategies:

- **GIS-based planning** to integrate real-world data, optimize routes and reduce environmental impact.
- **Automated design tools** to reduce material waste and deployment time.
- **AI-enhanced smart operations** to reduce emissions, enable predictive maintenance and improve resource use.
- **ESG integration** to position FTTH as a green asset and improve stakeholder engagement.

Look for partners with interoperable, scalable and field-proven solutions that support practical sustainability goals. Together, these measures form a practical framework for telecom operators aiming to future-proof their networks while meeting environmental expectations.

As expectations around sustainability continue to rise, telecom operators must look beyond short-term fixes. FTTH networks provide a practical way to improve efficiency, reduce emissions and meet financial objectives in a single move. Success will depend on integrating technology, planning tools and ESG frameworks into a unified strategy. Those who move early will gain a lasting competitive edge in an industry where resilience and responsibility increasingly shape market value. ■

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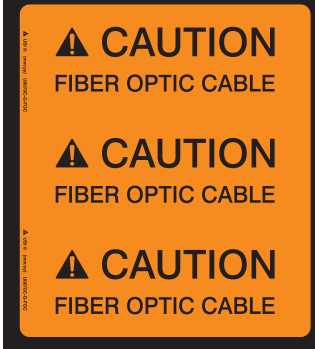
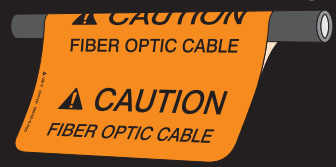


Application Option: Wrap

Application Option: Flag



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How Cable is Outmaneuvering Traditional Mobile Network Operators

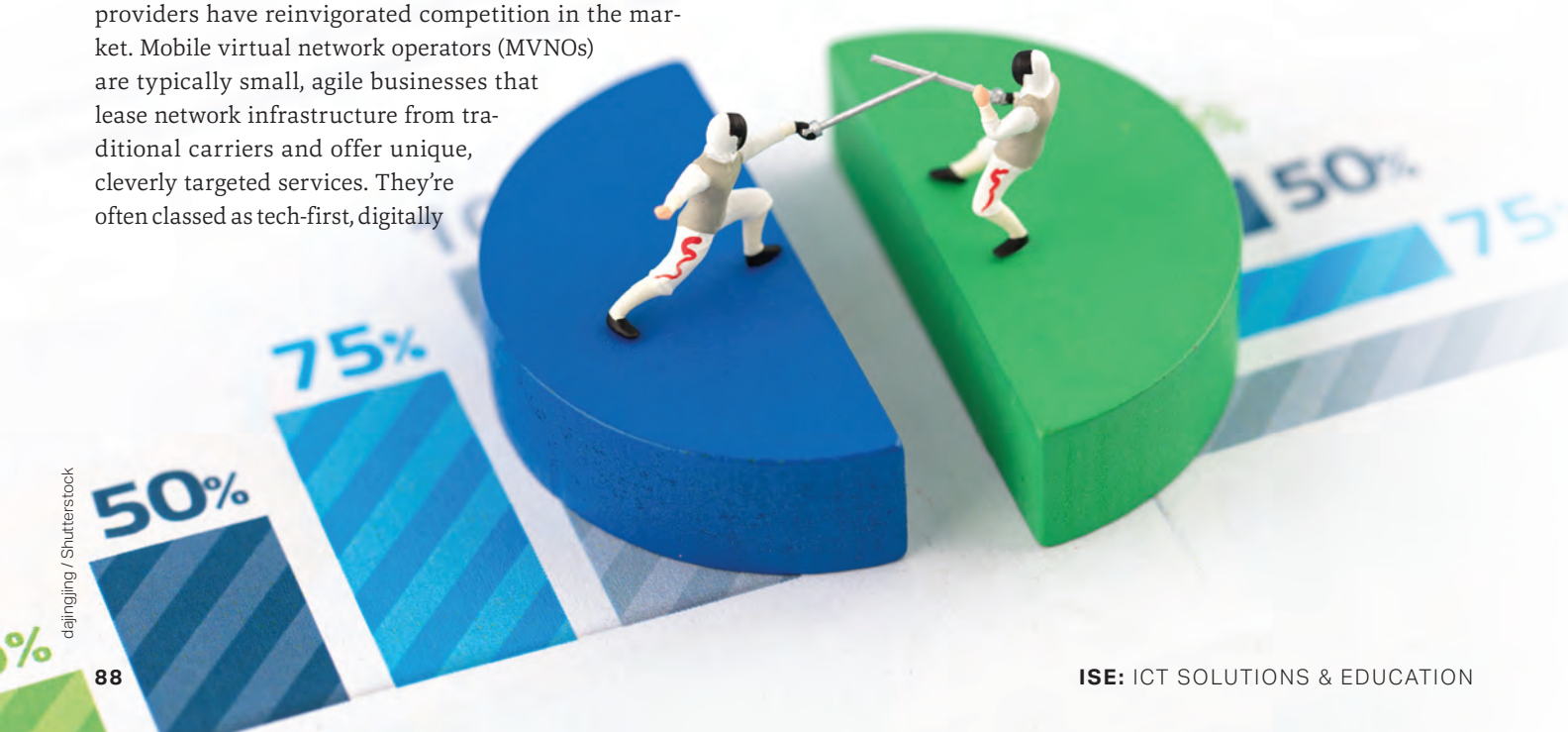
By bundling broadband with mobile, leveraging agile MVNO models, and personalizing the customer experience, emerging brands are transforming into dominant telecom players.

BY VIJAY SREENIVASAN & FABIANO NETTO

The mobile market has long been a stronghold for giants like Verizon, T-Mobile and AT&T. Recently, shifts in technology and consumer behavior are challenging the dominance of the "big" mobile network operators (MNOs) like never before. It's blowing the market wide open while emerging brands vie for their slice of the action.

This disruption is by design, not by chance. The rise of high-speed wireless technologies, consumer demand for greater bandwidth and convenience, and a low barrier to entry for would-be service providers have reinvigorated competition in the market. Mobile virtual network operators (MVNOs) are typically small, agile businesses that lease network infrastructure from traditional carriers and offer unique, cleverly targeted services. They're often classed as tech-first, digitally savvy businesses as opposed to their much larger and slower telco counterparts. This gives them a competitive advantage in the digital space, allowing them to carefully curate and bundle their service offerings and leverage customer data to target specific market segments intelligently.

Customers are now spoiled for choice regarding cellular plans, which often act as a gateway to multiple TV and streaming services they may have been interested in purchasing. As a result, the MVNO market has more than doubled[1] in size in the last decade



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and was valued at $85.1 billion in 2024. The market is projected to be valued at $146.3 billion by 2031.

The MNO stronghold is now under threat. The market is split, and cable companies are winning *big*. One recent market report by MoffettNathanson Research[2] revealed that in Q1 2024, cable companies secured three out of every four new post-paid mobile subscribers.

The Convergence of Fixed and Mobile Services

In the past couple of decades, connectivity has gone from being a luxury to a non-negotiable utility. We live in an age of remote working and high-resolution streaming, where network access is all but essential to our lives. Advancements in technologies such as fixed wireless access (FWA), 5G and satellite mean that this need for speed is increasingly being met wirelessly.

As a result, we're now witnessing the convergence of traditional wired broadband and wireless connectivity play out in real-time. The number of connected devices that the average person uses is growing, and many of those devices—smartphones, tablets, fitness trackers and more—demand connectivity that extends beyond the home. Is it any wonder that mobility is overtaking fixed wireless as a consumer priority?

Enter cable companies. By leveraging their existing broadband infrastructure and wealth of customer data, they are becoming n-play service operators (MSOs). They're offering consumers a compelling package that includes everything from high-speed home internet to mobile connectivity, not to mention the myriad TV and streaming service bundles, all under one roof. A single provider means a single bill, and that's far more appealing to customers than setting up all those services on their own.

By establishing MVNO agreements with MNOs and leveraging CBRS spectrum, cable companies are expanding beyond home-based services to offer seamless connectivity everywhere through a combination of wireless, fixed, Wi-Fi, and FWA technologies.

Charter and Comcast are leading this charge. Their mobile subscriber lines are projected to reach 28 million by 2028. They now sell mobile subscriptions alongside their home broadband packages, offering highly competitive deals and bundles to lure customers out of their existing mobile contracts. As more consumers recognize the benefits of these bundled offerings, the shift toward cable companies as the primary providers of both fixed and mobile services is accelerating, turning what was once a niche market for them into a powerful revenue stream.

Consumer Demand Driving the Shift

Mobile is a consumer's market, and it always has been. Until recently, offerings were fairly simple and linear. So, when a consumer became a subscriber, there was very little reason for them to change. Now, things are different. In addition to the allure of having all their digital services, including their connectivity, available in one convenient and competitively priced bundle, they're also on the lookout for other key differentiators.

For instance, cable companies, often more agile and willing to innovate than their traditional telco counterparts, have embraced technologies like eSIMs for easy onboarding, digital self-service platforms and data-driven personalization. These features resonate with a generation of consumers who have come to expect intuitive, hassle-free experiences.

And once consumers are subscribed, it's far easier for an agile MSO/MVNO to retain them. These companies aren't hampered by the legacy software their big telco counterparts use. They can adopt cloud-based business support systems (BSS) that allow them to predict customer churn, send personalized recommendations and suggest additional features and services to keep subscribers engaged.

> **We're now witnessing the convergence of traditional wired broadband and wireless connectivity play out in real-time. The number of connected devices that the average person uses is growing, and many of those devices—smartphones, tablets, fitness trackers and more—demand connectivity that extends beyond the home.**

For instance, if a subscriber uses only a fraction of their data allowance, a new plan can be recommended to save them money. If a customer's usage has decreased and it looks like they're about to leave, a free trial for a new streaming service can be offered to tempt them to stay.

In other words, mobile connectivity is no longer a siloed service. It's part of the digital ecosystem. Win more of that ecosystem, and you win the market. ■

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