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EXECUTIVE INSIGHTS WITH

Darren Farnan

GENERAL MANAGER, UNITED FIBER

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SCAN ME

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WINTER 2025

"We always prioritize fiber because it's the most durable, scalable technology available. But in some extremely rural or hard-to-reach areas, we will look at fixed wireless as a bridge until fiber becomes viable."

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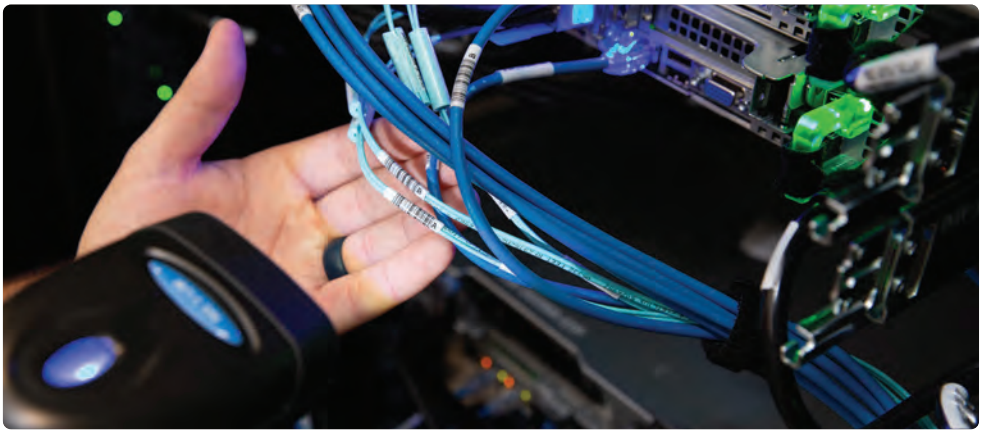

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ISE ICT SOLUTIONS & EDUCATION

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A Time to Build

AS WE COME to the end of 2025, constant hype appears to be giving way to steady execution, where success is measured not by how new or exciting something is, but by how well it fits and lasts.

Conversations are shifting from what new technology might do to what it actually delivers, and there is a renewed focus on the fundamentals: the planning, processes, and people that create lasting infrastructure.

It's clear that long-term value is built on thoughtful, deliberately executed steps, not a single transformative leap.

This issue of ISE Magazine reflects that perspective, exploring how operational excellence can foster the resolve needed to endure shifting markets and successfully manage new waves of technology.

We can also see that technology is not a replacement for strategy. The most effective innovations are those that enhance human capabilities, and the best results still come from people.

Nowhere is this spirit more evident than at industry gatherings. Our photo recap from this year's ISE EXPO captures the energy of an industry focused on shared challenges and solutions. Likewise, the comprehensive product guide included in this issue showcases the tools that empower the workforce to build, maintain, and improve our networks every day.

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Opportunity Cost

The High Price of Waiting

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AS AN UNDERGRADUATE at Vanderbilt University, I studied to be a scientist. My major was physics and astronomy, but I was required to take a certain number of electives in non-science areas. I chose philosophy and economics, which turned out to be very good choices.

Philosophy—studying Kant's "Critique of Pure Reason," for example—taught me a lot about critical thinking. Economics, which the professor defined as "the study of the allocation of scarce resources," proved invaluable when I abandoned academia for business and became an entrepreneur.

One thing I took away from economics class was an understanding of "opportunity cost." When you make a business decision, there is always an opportunity cost. You make one choice but may lose other opportunities.

A clear example of opportunity cost is the United States Government programs offering support for broadband. According to the Government Accountability Office (GAO), in the five years between 2015 and 2020, the U.S. Government had 133 programs under 15 federal agencies covering broadband construction, affordability, and digital skills training, totaling $44 billion. And that's before the pandemic and the $65 billion Broadband Equity Access and Deployment (BEAD) program.

"The U.S. broadband efforts are not guided by a national strategy with clear roles, goals, objectives, and performance measures," states the GAO's Broadband: National Strategy Needed to Guide Federal Efforts to Reduce Digital Divide (GAO-22-104611) report. "Without such a strategy, federal broadband efforts will not be fully coordinated, and thereby continue to risk overlap and duplication of effort."

As with many federal funding programs, many of those 133 programs targeted special interests or had unique conditions that must be met to qualify for funds. And much of that $44 billion went unspent or was awarded, then cancelled or clawed back.

To its credit, BEAD tried to create a strategy that would help unserved and underserved areas get broadband connectivity. But, like most, or likely all, of those 133 earlier programs, BEAD had fatal flaws.

It was four years ago, in November 2021, that the Infrastructure Investment and Jobs Act (IIJA) established BEAD, but to date, not a single user has been connected. In fact, no project has even been started. In my opinion, the biggest flaw with BEAD was creating a program to connect people who needed broadband right now that had so many time-consuming steps to follow that it could not connect anyone for years, if ever.

Then BEAD favored a technology (fiber) that requires long planning and construction times instead of technologies that could get people connected with adequate service almost immediately (and at a much lower cost). The preference for fiber caused average connection costs to be incredibly expensive. The original awards had costs per connection as high as $75,000, connecting users on the tundra whose only neighbors were wolves and polar bears. And in those places, most people who needed internet were already using satellite service.

What's the opportunity cost? Someone else will get the business, or potential subscribers have signed up for satellite or wireless services and find it works for them.

Most service providers had no interest in connecting the unserved or underserved areas targeted by BEAD because of the economics. These areas will always be expensive to build and not produce sufficient revenue for an acceptable ROI, unless they are subsidized by urban users or government programs like BEAD.

But doing nothing for the long waiting period for BEAD subsidies has encouraged hundreds of local broadband programs to do it themselves. Then, when (or if) BEAD funding materializes, the areas will no longer be interested or even eligible. In fact, analyses of the original BEAD eligible areas show that many are no longer available for this reason.

Another opportunity cost for those waiting for BEAD funding is the higher cost of building networks when (or if) BEAD money ever becomes available. During the waiting time, inflation has been very high, raising costs, and interest rates are very much higher, making project financing much more expensive.

And finally, with the change in administration and the focus on cutting government expenditures, along with changes in the focus of what constitutes broadband, how much BEAD funding will ever become available?

Perhaps the real question here should be: Why didn't this get done a decade earlier? That's opportunity cost. ■

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

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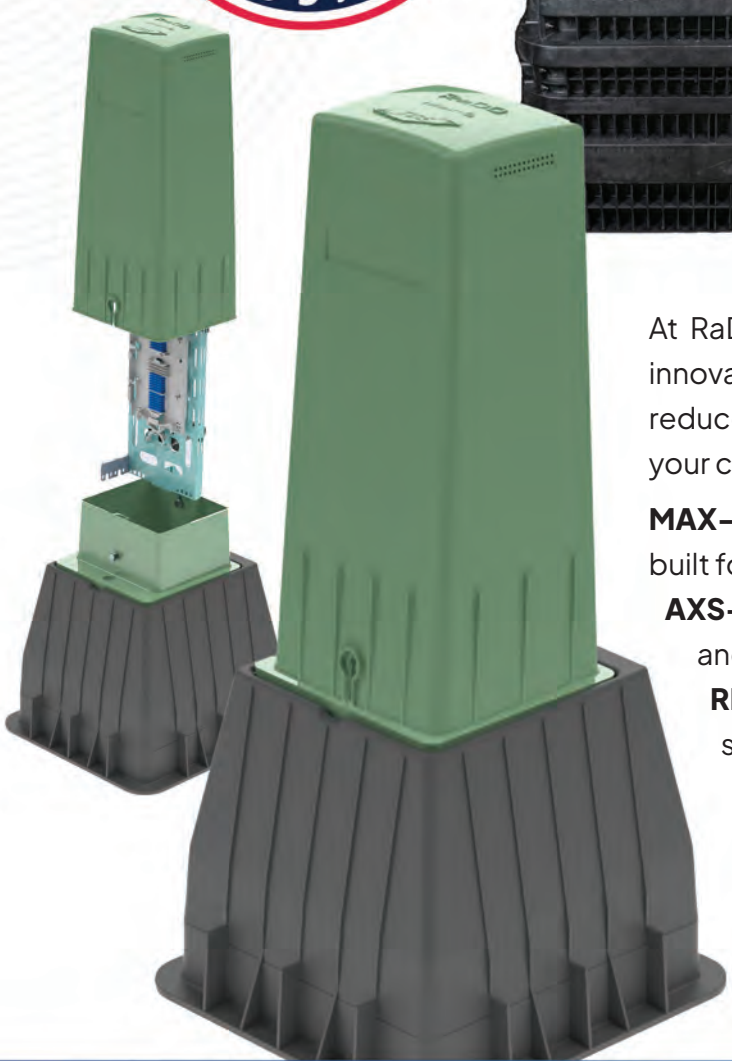

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A New Approach to C*********ity

New Thinking to Enable a Stronger Organization

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LET'S FACE IT, droning on about impending doom to the organization: "if we don't deploy resources (money and staff) to reduce our security risks now, then I can't be held responsible …" goes down like a lead balloon. Whatever you say next is not listened to. Instead, the executive minds return to dealing with other issues or how to execute the next big plan. You will notice that even the title of this article couldn't bring itself to use the word cybersecurity!

It's time to change that with an approach that will open closed minds. After authoring the article on Resilience in the fall edition, I had one of those "why didn't I think of this before?" moments, realizing that it was all in the language and the impact on the listener. It's switching from the part of the brain that reacts to an amygdala attack to fostering being inspired by new possibilities.

This article is not about brain science; it's about:

- Putting all actions in the context of strengthening the organization by changing the mindset to enable new possibilities.
- Creating a structure for low-cost execution with a holistic strategy and incremental actions.
- Executing actions related to avoidance, prevention, detection, and removal of disruptions to the goals.
- Measuring and reporting improvement over time. Then, adapting to the evolving organization and changes that impact the goals for the next iteration.

Developing the Executive Language

This begins by using words like "strengthening the organization" and avoiding negative words such as "risk" and "threat avoidance." I just read a guidance document that used the word "risk" 160 times, along with "vulnerabilities," insider terms like "security posture," and acronyms that interrupt the listener's understanding. Look to see how well-documented resilience and security procedures support sales to differentiate from competitors, remove supply chain fears, etc. Just like privacy policies that no one reads, the security policy should be posted to

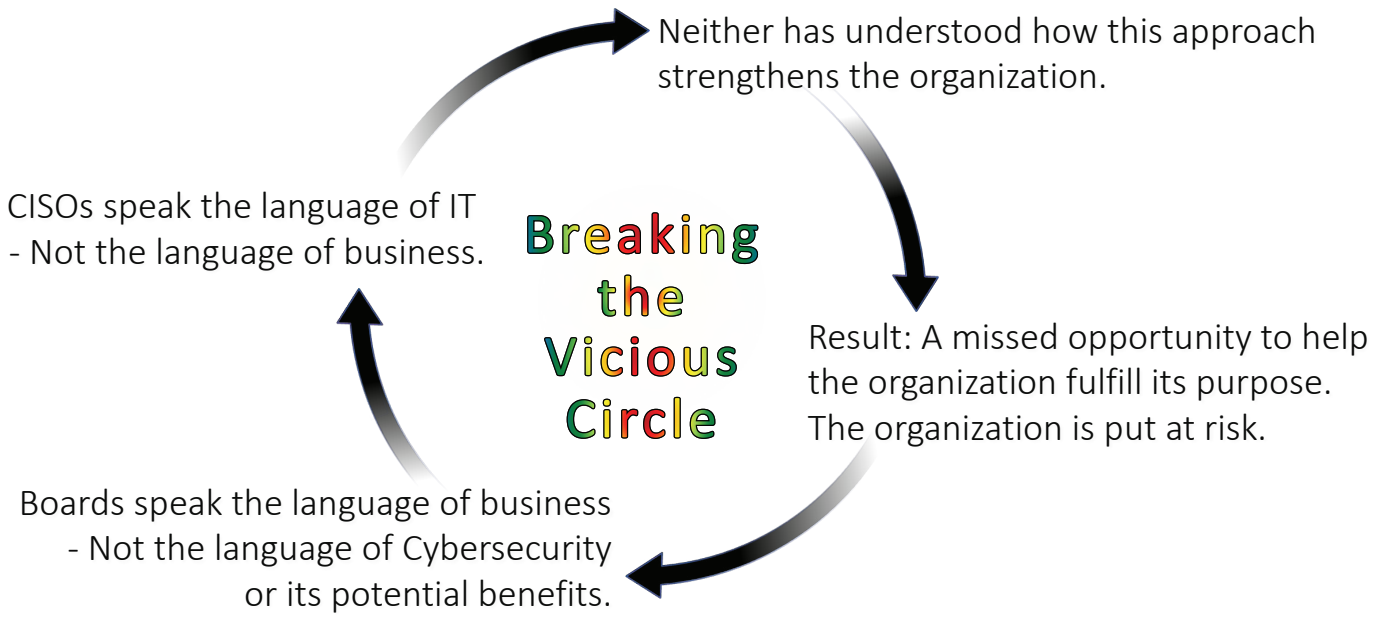


FIGURE 1.

identify the organization as a modern, powerful company. The same applies to obtaining insurance at lower rates, meeting legal and SEC requirements, and defending its reputation if supply chain vendors cause problems.

Lastly, specifically for ISE Magazine readership, although the focus here is on end-users, there are two difference-making services that could be unique client offerings for service providers. Offering the security services covered in my Assume Breach article (ISE spring edition and cybyr.com/assumebreach) means end-users can both potentially eliminate ransomware and save money by delegating responsibility and costs to service providers. This is exactly the kind of thinking that changes executive mindsets. (See Figure 1.)

Due to limited space, we can only provide the highlights of the approach here. It's expanded on my website (cybyr.com/strengthening). The idea is to use the work to develop your own powerful, resilient organization (external cost = 0).

Creating a Holistic Strategy and Incremental Plan

To deliver on the promise, two documents are required:

1. A Holistic Resilience and Security Policy covering the scope of actions and the goals measuring the impact on the organization. Holistic here means every department and line of business, collaboration with all supply chains, including outsourcing, evolving over time.
2. The Plan of Action. This lists short-term actions to be undertaken by each department under your guidance. The execution of the plan will be either action completion or achieving measurable milestones. Its scope includes sales and marketing actions, legal, conformance and compliance, HR, etc., that strengthens the organization. The point is, of course, not to get overwhelmed by too many tasks at once and to observe measurable progress.

Much of this work will consist of interrogation of the organization's departments to discover vulnerabilities and make agreed recommendations. This is one of the reasons that I wrote Cybyr-AI, my Expert Proactive AI Software to personalize and automate the process, make recommendations, and measure results. However, you may choose to do this yourself (external cost = 0) or with help from a consultant (like me!).

Executing the Actions in the Plan

This section breaks down the main tasks related to avoidance, prevention, detection, and removal of disruptions to the goals.

AVOIDANCE AND PREVENTION

Here are some basic actions to take and not to take.

Phishing is easily the #1 source of attacks. There are at least 10 types. However, don't waste resources on anti-phishing training courses. Recent studies from MIT, etc., show that training is 95% ineffective/useless. Here's my cut-out and avoidance "device" to stick on your monitor or screen (cost = 0).

You likely know all these, but maybe you don't: Zero access to corporate networks from unapproved devices. Approved devices must be automatically updated, containing approved software. User authentication (low cost) must only permit access at approved times for approved transactions from approved locations. Executives—that means you too.

Always use passkeys or multi-factor log ins to approved applications. Never reuse an ID/ password or allow people to log in with Google or Facebook identities. If you do, and one site is compromised (as thousands have been), then every one of your sites is compromised (cost = 0).

In terms of protection of assets to avoid ransomware, I covered this in the spring issue ("Assume Breach"). The "Resilience" article (fall edition) covered asset protection and the automation of asset updates in detail.

DETECTION AND REMOVAL

The good news is that there are several low-cost options available. For users of Microsoft Office, the email phishing detection is constantly being updated. Anti-malware software from Microsoft Defender, McAfee, MalwareBytes, etc., is likely already in place. (Cost/user relatively small.)

SOFTWARE TSUNAMI WARNING

I cover around one hundred types of security software and packaged solutions on my cybyr.com/cyberpedia page. The actual number of security products is in the 6,000-10,000 range! However, the only type of software I think is beneficial for the end-user is Endpoint Detection and Removal software. More on this on my website.

ONGOING MEASUREMENT, REPORTING, AND ADAPTATION

In terms of measuring progress, this is where I have spent much time on software that both measures your status, prioritizes recommendations on next actions, and tracks improvements.

Finally, as each cycle of execution completes, it's time to adapt to developments in the organization and prevailing circumstances, ready for the next cycle.

Summary

I hope this structured approach gives you some inspiration for a more engaged organization at limited external expense. Yes, cybersecurity is critical but the overarching context is the strength of the organization. I hope that you will visit my website and see that many of the steps have been automated to accelerate the adoption of this approach: cybyr.com/strengthening. ■

Mark Fishburn is President of Cybyr.com, a provider of strategic network, cybersecurity, software, and marketing services.

EXECUTIVE INSIGHTS WITH

Darren Farnan

General Manager, United Fiber

BY SHARON VOLLMAN

TOPIC: Network Evolution Roadmap

ISE: What technologies or upgrades have been most critical in boosting connectivity speeds across your footprint, and what innovations are you exploring to improve the overall customer experience further?

Darren Farnan: When we started United Fiber in 2011, we launched as a greenfield GPON network, and that decision gave us a strong foundation. Today, we're rolling out XGS-PON upgrades across our markets so our customers can experience multi-gig speeds. We've always believed physical connectivity is only part of the equation; the Wi-Fi experience inside the home or business is just as necessary.

Managed Wi-Fi, Outdoor Wi-Fi, SmartBiz, and SmartTown solutions from Calix enable us to meet our customers where they live, work, and play, while ensuring their connection remains seamless in their home, business, or out in the community.

TOPIC: Next-Gen Fiber Infrastructure

ISE: How are you approaching the transition from GPON to XGS-PON or other next-gen technologies to deliver multi-gigabit speeds? In your view, what defines a "future-ready" fiber network?

Farnan: We're in the middle of our XGS-PON deployment, and that technology is powering the launch of multi-gig services across our markets. In many of the communities we serve, we're the only fiber provider, so we have a responsibility to make sure our customers aren't just keeping pace but staying ahead. To me, a "future-ready" network is scalable, flexible, and built with standards that evolve right alongside consumer demand.

TOPIC: Hybrid Network Strategies

ISE: In rural areas where fiber is too costly to deploy, how do you evaluate when to invest in fiber builds versus fixed wireless or other alternatives?

Farnan: We always prioritize fiber because it's the most durable, scalable technology available. But in some extremely rural or hard-to-reach areas, we will look at fixed wireless as a bridge until fiber becomes viable. Our litmus test is simple: can the technology support the digital demands of today—remote work, healthcare, and education—without

All images courtesy United Fiber

compromise? If the answer is no, it's not an option for our customers.

TOPIC: Expansion Versus Consistent Quality

ISE: How do you manage the tension between rapid expansion and the need for consistent service quality?

Farnan: Expansion without quality is meaningless. Our roots as a rural electric cooperative provide a member-focused approach, which has shaped the service quality expectations we have for our telecommunications services. We've grown quickly, but we do it in a way that matches our financial resources and our workforce capacity. Our team excels at having multiple projects ready, so if one gets hung up on permitting, rock, or other factors, we can move seamlessly to another. We release a targeted number of passings each month, which keeps our construction and installation teams running at peak efficiency. It's a repeatable process that keeps our employees, contractors, and customers on the same page.

TOPIC: Small Business = Anything but Small

ISE: United Fiber has focused its growth efforts on serving its small business customers. Share how you moved the needle there and how Wi-Fi played a role in your small business successes in 2025.

Farnan: Small businesses are the heartbeat of the communities we serve and critical to rural vitality. Therefore, it's crucial to deliver enterprise-grade Wi-Fi and managed connectivity to small business owners who can't afford enterprise IT staff. We've seen firsthand how better Wi-Fi means better customer experiences—and that helps small businesses grow, which in turn strengthens the community. It's a game-changer for our local restaurants, shops, and businesses.

TOPIC: Vendor Partners

ISE: Looking back, what were the top lessons you learned about network transformation and upskilling your field teams?

Farnan: The biggest lesson was that

technology and people must evolve together. Partnering with the right vendor partners gives us great tools and excellent training. Our field teams gain confidence working with new service offers, but just as importantly, the right vendor partners help our team learn how to better engage with customers. Upskilling in both areas has been crucial, and that's how we drove a 10% ARPU increase with small business customers. We invest heavily in network upgrades, education, and training because this industry is one of constant change.

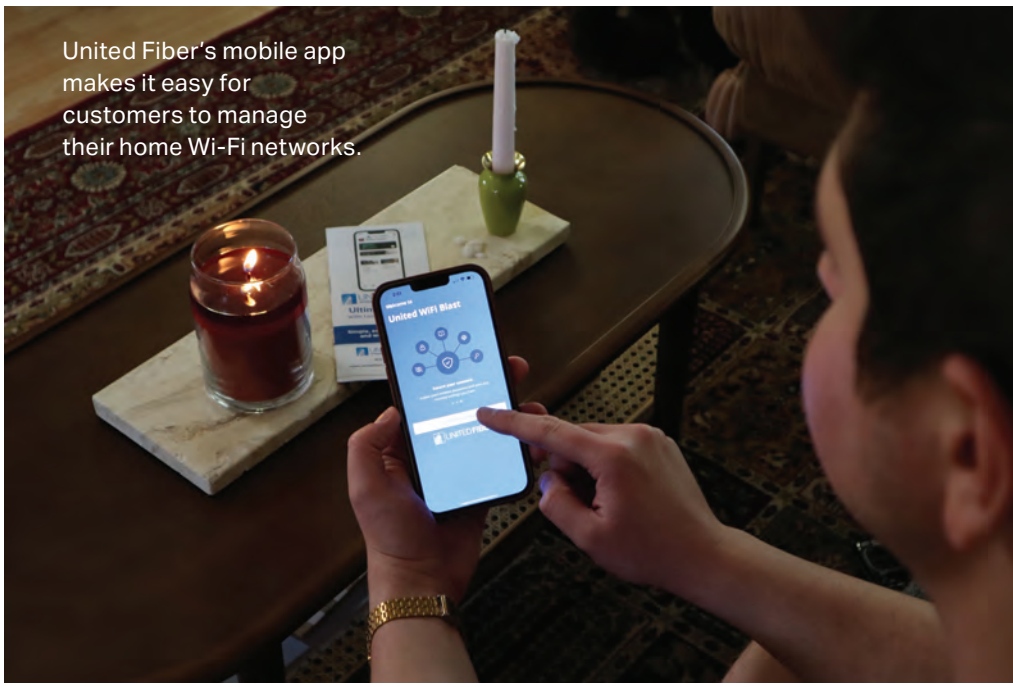
TOPIC: LEOs and Broadband Definition

ISE: Share whether United Fiber plans to tap LEOs in its broadband plans and what led your team to its current decision.

Farnan: LEOs have made progress, but they still can't deliver the symmetrical

United Fiber's dedicated team works every day to deliver secure, reliable online experiences for their customers.

speeds and low latency that fiber can. And with programs like BEAD requiring networks to meet the 100/20 Mbps broadband definition, we've doubled down on fiber-first. Could LEOs play a role in mobile, emergency, or edge cases? Sure. But for the communities we serve, fiber is the only way to truly future-proof broadband access.



United Fiber's mobile app makes it easy for customers to manage their home Wi-Fi networks.

> "We always prioritize fiber because it's the most durable, scalable technology available. But in some extremely rural or hard-to-reach areas, we will look at fixed wireless as a bridge until fiber becomes viable."

TOPIC: Permitting and Regulatory Challenges

ISE: Permitting delays and regulatory variability remain significant hurdles for our industry. What solutions or process improvements have you found effective?

Farnan: Permitting delays can derail projects if you're not prepared. We've learned to engage communities and regulators early, map out requirements in advance, and dedicate teams just to ensure we handle these potential roadblocks well ahead of construction. Like most things, it is about communication and preparation. It's not glamorous work, but it pays dividends in smoother builds and better relationships with local officials.

TOPIC: Skilled Workforce Development

ISE: The scale and pace of today's network providers require a highly skilled workforce. What new skill sets or certifications are becoming increasingly important for network engineers, techs and construction teams?

Farnan: We need people who understand optical networking, cybersecurity, and cloud orchestration. On the field side, key skills include splicing, advanced Wi-Fi diagnostics, and strong customer communication. Certifications in cybersecurity and fiber optics are rising, and we are implementing more formal training programs across these departments.

TOPIC: Powering the Future

ISE: Technological innovations in power and energy storage solutions allow operators to improve network resilience. Describe the nuts and bolts behind United Fiber's network strategy that address the reality of a fallible power grid.

Farnan: As an electric cooperative, we have a strong background in grid resilience and start by placing many of our hub locations next to our substations. In

the event of an electrical outage, these are the primary locations to get back on first. We've also invested in battery backups, redundant systems, and on-site generators. That way, even if the grid goes down, our customers can stay connected until we restore service. Connectivity is essential, and we build resilience into our design.

TOPIC: Industry Leadership

ISE: What role do you believe providers like United Fiber should play in shaping the future of broadband in the U.S.?

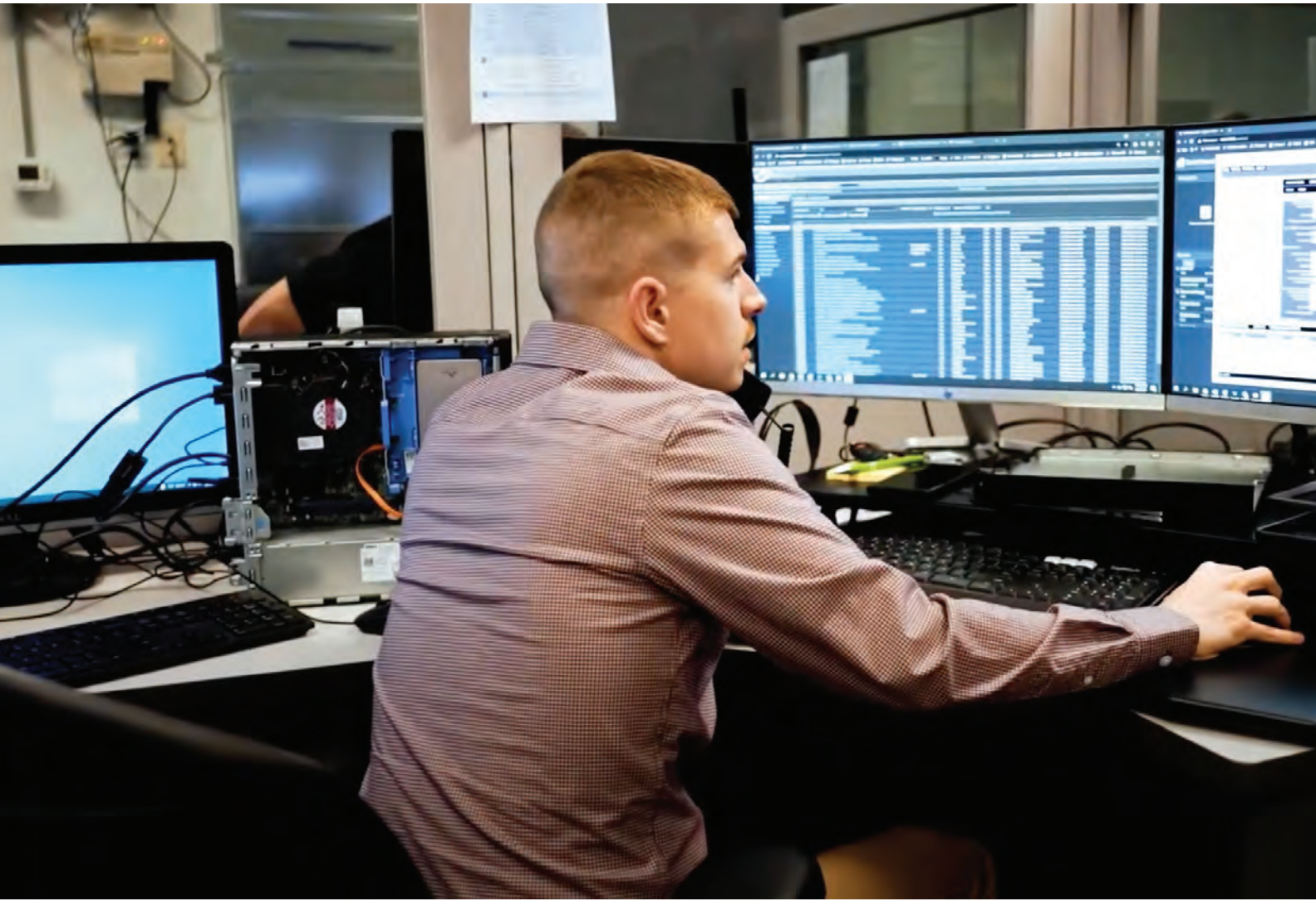
Farnan: Providers like United Fiber have a responsibility beyond just delivering service—we play a critical role in bridging the digital divide. For rural America, especially, connectivity can't be taken for granted, and there are still too many people who are not connected. Our rural communities deserve the same access to education, healthcare, and jobs—it is critical to our economic survival. Our role is to push for policies and investments that make broadband accessible and affordable while setting a standard for innovation, reliability, and customer experience.

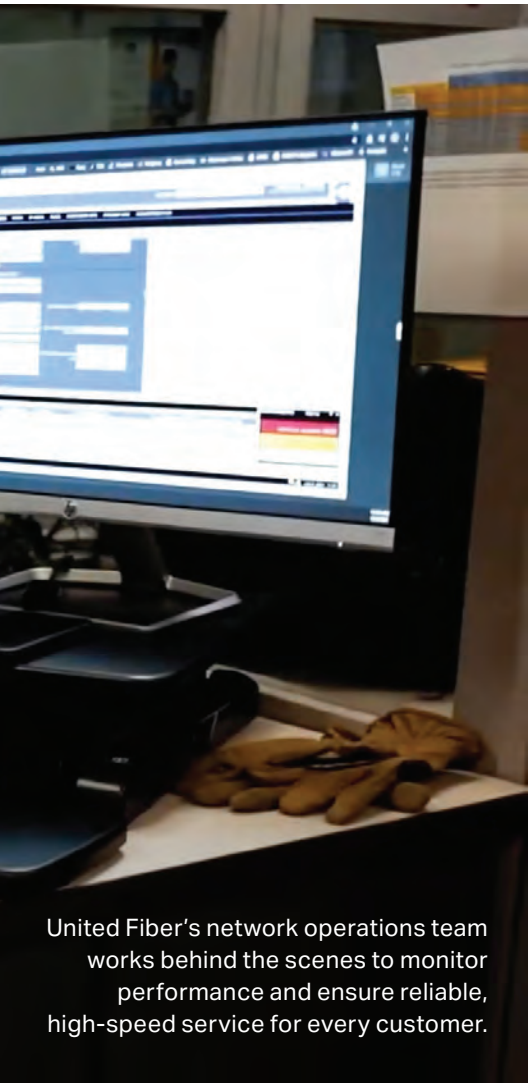
TOPIC: Company Culture

ISE: Share two strategies you use to nurture your team's culture.

Farnan: First, we believe in transparency – sharing our goals, challenges, and wins openly, and our teams know they are part of something special. Second, we focus on empowerment. We trust our employees to make decisions and strive to provide them with the training and resources to succeed. That combination builds a culture

A United Fiber field technician installing high-speed fiber-optic network services.





United Fiber's network operations team works behind the scenes to monitor performance and ensure reliable, high-speed service for every customer.

where people feel both connected and valued. One of our favorite things as a group is sharing customer compliments as they come in across the whole company. It is fantastic to see the support our employees provide for each other and the positive energy these moments create. It may seem like a small thing, but it really hits at the core of the value we are providing every day.

TOPIC: Thumbs Up / Thumbs Down

ISE: What's a favorite thing about your job, and what's your least favorite?

Farnan: My favorite part is seeing the impact we have on families and businesses when we bring fiber into their communities. Hearing stories from our customers about how United Fiber has improved their lives is number one for me and our employees. My least favorite part is delays, whether they come from drawn-out funding programs, regulatory issues, or construction problems—things that slow down our ability to serve people who need broadband now, not months or years from now.

TOPIC: Being Uncomfortable

ISE: What makes you uncomfortable as a leader and why?

Farnan: I'm uncomfortable when I feel disconnected from the day-to-day experiences of our employees. As organizations grow, it's easy for leaders to get insulated. I push myself to stay connected because when leaders lose touch, culture and performance suffer.

TOPIC: What's Next?

ISE: What haven't you done professionally that you'd like to do in the next five years?

Farnan: At this point in my career, I want to spend more time mentoring and developing future leaders. My focus now is on ensuring we position United Fiber to thrive well beyond my tenure. That means helping our next generation of leaders who will take the company even further. We are blessed with an amazing group of caring and talented employees, so I know United Fiber is in great hands.

TOPIC: Legacy

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

Farnan: I hope my legacy is that I was part of a group that closed the digital divide in Northwest Missouri and built a high-quality organization that will continue serving communities long after I've stepped away. I strive to be a leader that cares about people and creates opportunities for employees to grow, thrive and carry the mission forward. Growing up in this area and seeing the value United Fiber has created for our region, our electric membership, and employees, is more fulfilling than I could have ever imagined. ■

Darren Farnan has worked for United Electric Cooperative since 1994 and serves as the General Manager of United Fiber. He led the development and operations of the United Fiber network, which has grown to 4,800 miles of fiber, 81 employees, and over $50 million in annual revenue since turning up their first fiber customer in 2013. Currently, United Fiber serves 42,000 combined residential and commercial fiber customers. For more information, visit unitedfiber.com.

THE BIG PICTURE:

Telecom Leaders on 2025's Network Shift

An ISE EXPO executive Q&A tackles AI-driven buildouts, BEAD's real-world effects, and hybrid access.

ISE Executive Panel Discussion moderated by Janice Oliva, VP, Event Business Development, Endeavor Business Media. Panelists (left to right): Anis Khemakhem, Chief Marketing Officer, Clearfield; Kevin Czaicki, VP of Broadband Solutions, Millennium; Randall René*, Director, Industry Solutions - Telecom, Esri; Michael White, VP of Business Development, TAK Broadband, Charles Harlow, Vice President, Vitruvi Software.

BY JANICE OLIVA

At ISE EXPO 2025, an executive panel examined the forces likely to shape networks in the year ahead. In this Q&A, leaders from Clearfield, Esri, Millennium, TAK Broadband, and Vitruvi Software discuss how AI-driven data center buildouts, BEAD implementation, and hybrid access models are informing planning, investing, and day-to-day operations.

Their responses largely center on three areas: near-term growth drivers, the middle-mile and backbone implications of rising fiber demands, and the role of partnerships in combining fiber-to-the-home (FTTH), fixed wireless access (FWA), and satellite.

Topic: The Big Picture

ISE: From your perspective, what are 1-2 key growth drivers that will significantly impact the fixed and mobile networks in 2025?

Anis Khemakhem, Clearfield: It's almost trite to say it, but AI. Just one example—at the same time ISE EXPO 2025 was happening, Amazon announced it is building 30 huge data centers on 1,200 acres in Indiana. The amount of information moving within and between those buildings is unimaginable. The amount of data entering and leaving the compound is unimaginable. Setting the power requirements aside, interconnecting campuses like that will require much more fiber on premises, between campuses, and to the rest of the world.

Second, BEAD. Despite any of the recent changes to the program, it will clearly impact our industry. Initially, many thought BEAD would be a huge boon to the FTTH segment. It is still likely to cause a big upsurge in FTTH deployment in the next few years. But now we know BEAD is likely to include a significant fixed wireless component. What does that mean for existing wireless and wireline networks? No doubt, middle-mile and backhaul networks will need to be expanded no matter how it all goes down.

Randall René, Esri*: In 2025, two big things are driving growth in both fixed and mobile networks: understanding customers more clearly and making faster, smarter decisions using location data. Telecom companies are under pressure to serve more people, deliver better service, and keep costs down. They need tools that help them work efficiently across planning, building, and operating their networks.

That's where Esri plays a key role. We help providers see everything on a map—from infrastructure and assets to demographics and demand. This makes it easier to target the right communities, manage complex projects, and make better business decisions.

It all ties back to four big themes:

- **People:** Making sure services reach the communities that need them most.
- **Productivity:** Helping teams work smarter and faster.
- **Profitability:** Supporting better decisions that reduce costs and grow revenue.
- **Planet:** Helping build networks with less environmental impact.

Esri is not just another tool. We are the spatial foundation that supports telecom growth with clarity and confidence.

"Much of what was promised with 5G, particularly in speed, latency, and network slicing, will now be carried forward and more fully realized with 6G."

Kevin Czaicki, Millennium

Kevin Czaicki, Millennium: As we move through 2025, two notable developments are influencing the future of fixed and mobile networks:

- **Foundational Moves Toward 6G:** While full-scale 6G implementation is still years away, strategic planning and testing are underway. Much of what was promised with 5G, particularly in speed, latency, and network slicing, will now be carried forward and more fully realized with 6G. These early moves are setting the stage for how future wireless infrastructure will evolve. This is similar to the improvements in 4G leading into the 5G deployment.
- **Satellite-to-Device Connectivity:** Simultaneously, we are seeing momentum in direct-to-device satellite connectivity. Companies like Starlink and Amazon's Kuiper are driving innovation in this space, promising to extend network reach beyond traditional coverage areas.

Although the year is already half over, we do not anticipate major transformative impacts on networks by year-end. The current landscape is reminiscent of the early 2000s, when mobile towers rapidly shifted from copper T-1s to fiber. Today's middle-mile fiber projects—many nearing completion—are expected to provide more stable and widespread connectivity, especially in rural regions, ultimately benefiting both fixed and mobile access.

Michael White, TAK Broadband: First is the convergence of fixed and mobile networks. We're already seeing it with products like Verizon's 5G Home and T-Mobile's fixed wireless pushing into traditional broadband territory. This shift is blurring the lines between access types and forcing providers to rethink how they compete and bundle services.

Second is the rise of AI-driven use cases. Applications that rely on real-time data processing—like edge computing, automation, and advanced analytics are driving the need for both high capacity and ultra-low latency. That means more fiber, more densification, and more strategic builds.

These trends are accelerating demand for faster, more flexible infrastructure that can support both consumer expectations and enterprise workloads.

Charles Harlow, Vitruvi Software: In 2025, the landscape of network growth will be overwhelmingly shaped by drivers that underscore the essential role of robust, scalable fiber infrastructure:

- **The Unstoppable Demand for Pure Speed and Latency Driven by AI and Immersive Experiences:** The true catalyst for growth is the exponential increase in data consumption fueled by emerging AI applications, immersive virtual and augmented reality, and the ever-growing appetite for high-resolution content. These experiences demand not just high bandwidth, but ultra-low latency and symmetrical speeds that only fiber can reliably deliver. While 5G expands mobile capabilities, its true potential for enterprise and advanced consumer applications is inherently tethered to a high-capacity fiber backbone. FTTH is the ultimate enabler, providing the foundational infrastructure to meet this burgeoning demand, ensuring a seamless and future-proof experience as AI integrates further into our daily lives and businesses.
- **The Societal Imperative of Bridging the Digital Divide with Sustainable Connectivity:** Beyond commercial drivers, there's a profound societal mandate to deliver equitable high-speed internet to every community. This fundamental need drives significant investment into network expansion, with FTTH leading the charge as the most resilient, high-performance, and long-term solution for broadband access. The focus isn't just on connecting, but on providing meaningful connectivity that supports education, healthcare, economic development, and remote work. While wireless solutions like FWA and satellite offer valuable immediate access in particularly difficult terrain or areas lacking initial economic viability for fiber, they are best viewed as strategic accelerators and value-adds, providing essential stopgap or niche solutions that complement and can eventually be augmented by the superior capabilities of fiber. Our commitment to FTTH is paramount for achieving truly equitable and future-proof digital inclusion.

Topic: Fiber Capacity Challenges

ISE: As large-scale data centers expand into urban, suburban, and rural areas, the demand for high-capacity fiber infrastructure grows. Meeting this need requires scaling middle-mile and backbone capacity to connect data centers and broaden networks. How will this impact your customers' 2025 strategy and your company's roadmap?

> "From the standpoint of our customers and prospects, middle-mile and backbone capacity will be a huge fiber cable and connectivity driver in the coming years."
>
> **Anis Khemakhem, Clearfield**

Anis Khemakhem, Clearfield: From the standpoint of our customers and prospects, middle-mile and backbone capacity will be a huge fiber cable and connectivity driver in the coming years. We are expanding our focus to understanding just what this means to our customers—from the small ILEC in Iowa to the big Tier 1 national accounts. How does it change the product set we offer?

One thing for sure is an expected shortage of the actual glass fiber and, therefore, the optical cable used everywhere in the network. Throughout the history of commercial fiber optics, we've seen periods of fiber constraints. We're likely coming into one of those times, and even the actual connectors to mate the fibers may become scarce.

We work to make sure these macroeconomic factors do not impact fiber builds in the field. We work with our supply chain, vendor alliances, and in-house manufacturing teams to forecast demand weeks and months into the future. That way, we can mitigate—as much as possible—these challenges for our customers.

Randall René, Esri*: As data centers continue to expand into more regions—including rural and suburban areas—the demand for high-capacity fiber is rising fast. Telecom providers need to quickly plan and build middle-mile and backbone fiber routes to support this growth.

This adds pressure, especially when it comes to speed, accuracy, and funding. Esri helps our customers map existing assets, analyze demand, and find the most efficient paths for new construction.

We also make it easier to track permits, environmental risks, and project timelines in one place.

Here's how it aligns with the four Ps:

- **People:** Making sure fiber expansion connects more communities.
- **Productivity:** Reducing delays through better coordination and faster decision-making.
- **Profitability:** Avoiding costly mistakes and speeding up return on investment.
- **Planet:** Identifying lower-impact routes and avoiding sensitive areas.

Esri is continuing to expand its telecom tools and partnerships to meet this challenge. We are building tighter connections with design systems, AI models, and permitting platforms so customers can move faster with fewer surprises.

Kevin Czaicki, Millennium: As data center development expands into urban, suburban, and rural areas, the pressure on middle-mile and backbone fiber networks is intensifying. For Millennium's customers, this means the following:

- **Short-Term Strain on Fiber Availability:** Limited fiber counts in certain corridors will challenge project timelines and budget forecasts. Millennium is proactively working with customers to get ahead of this demand, offering engineering support, securing critical materials, and supplying the necessary construction equipment.
- **Strategic Alignment with Middle-Mile and Edge Builds:** As middle-mile networks and regional data centers come online, we anticipate long-term benefits in the form of improved latency, more competitive pricing, and better access for previously underserved areas.

The expansion of smaller and regional markets is no longer speculative; it is happening now. Our approach is to ensure customers are not only reacting to market shifts but are positioned to lead them.

Michael White, TAK Broadband: As large-scale data centers expand into urban, suburban, and rural areas, the demand for high-capacity fiber infrastructure grows. Meeting this need requires scaling middle-mile and backbone capacity to connect data centers and broaden networks.

For our customers, it means rethinking their 2025 strategy. They'll need stronger regional connectivity, more redundancy,

"The winners won't be the ones who build the most fiber; they'll be the ones who build the best network for the use case."

Michael White, TAK Broadband

and partners who can move fast and think beyond local access. We're putting more energy into middle-mile builds, shared infrastructure models, and speeding up coordination with utilities and municipalities to keep pace. In 2025, success will come from thinking beyond the last mile. The future is about powering the full digital backbone.

Charles Harlow, Vitruvi Software: The unprecedented expansion of large-scale data centers, particularly those powered by the insatiable demands of AI, unequivocally validates and intensifies our focus on pervasive fiber infrastructure. This directly impacts our customers' strategies and our company's roadmap for 2025:

- **Fiber is the Only Answer for Data Center Connectivity:** Our customers, especially hyperscale and enterprise clients leveraging these expanding data centers, recognize that fiber is the singular technology capable of handling the sheer volume and velocity of data required. They are not merely asking for connectivity; they are demanding ultra-high capacity, ultra-low latency, and absolute reliability from their middle-mile and backbone networks. This means prioritizing investments in new fiber builds and capacity upgrades that support dense, future-proof optical networks, often requiring advanced, high-count fiber deployments and innovative cabling solutions within data center ecosystems.
- **Accelerated Investment in Middle-Mile Fiber as the Ultimate Enabler:** For our company's roadmap, this translates into an accelerated and aggressive investment in middle-mile fiber. As data centers strategically locate in new urban, suburban, and even rural hubs, the critical link to these facilities, and then onward to our FTTH deployments, is paramount. We are prioritizing the deployment of high-capacity, resilient middle-mile fiber that can act as the crucial conduit between these data powerhouses and the local loop, ensuring our FTTH customers receive the full benefit of multi-gigabit speeds and low-latency services. This includes optimizing deployment techniques through advanced trenching, boring, and modular fiber solutions to meet aggressive timelines. Every new data center expansion reinforces our belief that robust fiber infrastructure is not just an advantage; it's a fundamental necessity for meeting both current and future bandwidth demands.

Topic: Hybrid Networks

ISE: How will hybrid networks—combining satellite, FTTH, and FWA—optimize performance and cost in 2025? What role can partnerships and collaboration play in driving success in this area?

Anis Khemakhem, Clearfield: I'm not sure anyone has figured out the perfect combination to satisfy the requirements of the 21st-century do-it-all communications network. And, of course, it's changing. The way we implement hybrid networks—and even the way we think about them—is advancing every day. But

no doubt, from both the providers' and suppliers' point of view, co-opetition and first-of-its-kind partnerships will be necessary to make it all happen.

Randall René, Esri*: Hybrid networks are becoming the standard because no single technology can reach everyone at the right price or performance level. Providers are blending satellite, fiber, and fixed wireless to close gaps, especially in tough-to-reach areas.

But managing all these technologies together is complex. Esri makes it easier by giving telecoms a full picture of their network infrastructure in one map. This helps them decide which technology works best where, how to connect it all, and how to keep it running smoothly.

This approach supports:

- **People:** Ensuring coverage and reliability, no matter the location.
- **Productivity:** Simplifying operations across multiple technologies.
- **Profitability:** Choosing the right technology for each area to control costs.
- **Planet:** Reusing existing infrastructure and minimizing environmental impact.

> "Hybrid networks are becoming the standard because no single technology can reach everyone at the right price or performance level."
>
> Randall René, Esri*

Collaboration is key. That's why Esri works closely with partners across the telecom ecosystem—from OSS vendors to network designers—to create a shared view of every network element. When everyone can see the same information in the same context, they can work together more effectively.

Kevin Czaicki, Millennium: Hybrid networks are quickly becoming essential in delivering connectivity across varied geographies, particularly in remote areas. During a visit to rural Alaska last year, I saw firsthand how multiple satellite links were being used to create a viable internet experience in the absence of fiber or robust FWA options. Nationwide, similar transformations are underway:

- **Fiber Expansion into Remote Areas:** Numerous projects across the broader U.S. are bringing fiber closer to some of the most remote communities.
- **Satellite Systems Filling Gaps:** Starlink is now reporting 100+ uplink/gateway U.S. sites with an additional site, around 21 in 2026. This infrastructure need directly contributes to fiber network growth.
- **Upcoming Launches Like Kuiper:** Amazon's Kuiper is expected to begin deployment later this year, adding further dimension to the satellite mix and increasing the demand for local terrestrial interconnects.

The convergence of satellite, FTTH, and FWA technologies creates a balanced solution for performance and cost. Partnerships between satellite providers, ISPs, fiber infrastructure companies, and government agencies will be crucial in ensuring seamless integration and sustainable long-term models.

Michael White, TAK Broadband: Blending satellite, FTTH, and FWA is going to be critical in 2025, especially in markets where pure fiber isn't practical. The one-size-fits-all model is gone. What matters now is getting people online reliably, not just perfectly.

BEAD is pushing that reality forward. States are starting to realize that reaching every location means mixing technologies. Fiber where it makes sense. FWA and LEO where it doesn't. That's how we will optimize performance and cost.

Everyone needs to stop guarding turf and start planning together. The winners won't be the ones who build the most fiber; they'll be the ones who build the best network for the use case. For me, this is about functional coverage and speed to impact.

Charles Harlow, Vitruvi Software: In 2025, hybrid networks will strategically optimize performance and cost by leveraging wireless as a powerful complement to our beloved FTTH, ensuring comprehensive connectivity for every scenario:

FTTH as the Performance and Cost Optimization Champion: At the core, FTTH remains our gold standard for delivering unparalleled performance—symmetric multi-gigabit speeds, ultra-low latency, and rock-solid reliability. This makes FTTH the most cost-effective solution in the long run due to its virtually unlimited capacity, lower operational costs compared to legacy copper, and superior resilience. Where possible and economically viable, FTTH is always the preferred foundation for optimizing network performance and providing the best user experience.

Wireless as a Strategic and Valued Complement: This is where hybrid networks shine. While we champion FTTH, we recognize that certain geographic and economic realities can make immediate fiber deployment challenging or unfeasible.

FWA, particularly when powered by a robust 5G core fed by fiber, serves as an invaluable rapid deployment tool. It can quickly provide competitive broadband speeds (e.g., 100-300 Mbps) to suburban or semi-rural areas where fiber is still in the planning or construction phase, or where a full FTTH build doesn't make immediate financial sense. FWA offers a faster time-to-market and can bridge connectivity gaps efficiently, providing essential service until, or as a complement to, fiber expansion.

Satellite broadband, especially advancements in LEO constellations, becomes a critical value-add for the most remote and challenging locations. For the deepest rural areas or places with extreme terrain where laying fiber is prohibitively expensive or

physically impossible, satellite offers a vital baseline connectivity option. It ensures that everyone, everywhere, can have access to essential broadband, extending the reach of the digital economy far beyond traditional wireline limits.

"The true catalyst for growth is the exponential increase in data consumption fueled by emerging AI applications, immersive virtual and augmented reality, and the ever-growing appetite for high-resolution content."

Charles Harlow, Vitruvi Software

The Indispensable Role of Partnerships and Collaboration: Driving success in this hybrid landscape absolutely requires strategic collaboration:

- **Public-Private Partnerships (PPPs):** These are vital for extending high-speed connectivity to underserved and unserved areas. Governments bring crucial funding (like BEAD programs) and regulatory support, while the private sector brings the innovation, technical expertise, and efficient deployment capabilities. These partnerships ensure that even challenging FTTH builds are financially viable, and where they aren't, the strategic use of FWA and satellite can still bring connectivity.
- **Infrastructure and Technology Sharing:** Collaborating on open-access fiber networks allows multiple service providers to leverage the same physical infrastructure, optimizing investments and accelerating time-to-market. Additionally, partnerships with technology vendors (e.g., in wireless technology, network automation, and software-defined networking) enable seamless integration and optimization across the different network layers. This collaborative ecosystem ensures that whether it's an FTTH deployment, an FWA extension, or a satellite fill-in, the entire network operates cohesively and efficiently to deliver the best possible outcome for customers.

For more on these executives, visit isemag.com/55319473. ■

*At the time of this writing, Randall René was employed with Esri. He is now with Waypoint 33 LLC.

ISE EXPO 2025 was kicked off by the 4th annual golf tournament.

The exhibit floor showcased 185+ vendors and their products, engaging the attendees during their two days on the floor.

The 2025 Women in Telecom (WiT) luncheon and panel discussion was well attended as Janice Oliva, Kelly Bohlman, Carrie Charles, Wendy Danielson, Terri Moore, and Michelle Yirka focused on topics such as career advancement, work/life balance, diversity, leveraging AI as a professional tool, and more.

Julie Slattery's (SVP, Core Engineering & Operations, Verizon) opening keynote focused on enhancing disaster preparedness and response through technology, innovation, and partnership.

"This was our first time attending ISE EXPO, and we couldn't have enjoyed it more! From insightful sessions on ICT industry trends and challenges to exploring the exhibit floor and engaging in peer-to-peer networking, every day was packed with excitement!"

- ISE EXPO Attendee

Celebrating the 17 award-winning products/ companies in this year's ISE Network Innovators' Awards program.

Tom Maguire (Founding Leader and Board Member, Brightspeed) shared how modern networks are replacing legacy infrastructure to meet the demands of the future, in his executive insights closing keynote.

Attendees participated in 40+ conference sessions and workshops covering automation, AI, reliability, security, construction, engineering and operations, FTTx networks, BEAD, and more.

Why Cable Identification is Critical Infrastructure for ISPs

The Hidden Backbone of ISP Operations

BY ERICK CARMONA, CHRIS MCCONNELL, & MIKE NOVAK

As fiber networks grow at a record pace, internet service providers (ISPs) are dealing with more complexity than ever before. The pressure to deploy fast, stay reliable, and minimize downtime is constant. But there's one aspect of network infrastructure that doesn't always get the attention it deserves: cable identification.

It may not be the flashiest part of a broadband build, but labeling is one of the most essential. Cable labeling refers to the practice of marking cables and connections with durable, standardized tags for easy recognition and troubleshooting.

When done right, it helps avoid downtime, speeds up troubleshooting, and saves valuable time for both technicians and the business. When done poorly (or not at all), the results can be chaotic.

When Things Go Wrong, Labels Matter

Cable misidentification is more common than people realize, especially in networks

that have been expanded over time or inherited through a merger. Without a clear, consistent labeling system, even simple tasks like replacing a patch cord can turn into hours of detective work. In some cases, a mislabeled or unplugged cable has brought down entire networks, with teams spending days trying to figure out what and where things went wrong.

This isn't just about avoiding major outages. It's about making daily operations smoother. Whether it's a move, an upgrade, or a maintenance task, clear labeling reduces guesswork and helps field teams work more efficiently.

Labeling is Part of the Infrastructure, Not an Afterthought

In today's networks, labeling isn't optional. It's a foundational part of how ISPs maintain reliability and scale with control. A well-documented cabling system supports faster installations, better inventory tracking, and faster problem resolution. It keeps operations from stalling out when the unexpected happens.

Good labeling also makes future changes easier. As networks evolve, having a system in place helps new equipment and cables integrate seamlessly, without the confusion of legacy guesswork.

Standards and Consistency Go a Long Way

One of the best ways to avoid labeling pitfalls is to start with a plan. Industry standards like ANSI/TIA-606 by the Telecommunications Industry Association provide a solid framework for identifying ports, panels, cabinets, and rooms. These standards are flexible enough to be adapted for different types of networks but detailed enough to support large-scale infrastructure.

But even the best standards fall short if not followed consistently and across teams. Misalignment between departments is one of the most common issues in cable ID. One group may label everything carefully, while another plugs in new gear without updating the records. That's where things start to break down.

Creating a shared labeling convention and making sure it's documented and accessible to everyone is a simple but effective step. And while spreadsheets might work for small projects, they're easy to lose or forget. A centralized system is a much smarter long-term solution.

Labels Need to Be Built to Last

It's easy to underestimate how much of a beating cable labels take in the real world. Outdoor environments can hit both extremes—scorching summers and freezing winters. Inside data centers, hot aisles expose labels to high temperatures, while in outdoor environments, labels can face high humidity and UV exposure. As a result, labels can wear down fast if they're not designed for these conditions.

That's why material selection matters. For rugged environments, stainless steel embossed tags offer excellent durability, especially for outdoor or underground cables. In data centers or cabinets, adhesive-backed wraparound or flag labels are often the better choice, as long as they're made with materials built to withstand heat, humidity, and wear. Choosing the right label for the environment helps avoid having to redo everything later.

Taking the Guesswork Out of Documentation

As networks grow and teams get pulled in more directions, automating parts of the labeling process can make a big difference. That's where Panduit's RapidID Network Mapping System comes in.

RapidID uses pre-labeled cables with unique barcodes, applied during manufacturing. During installation, field teams simply scan each cable using a handheld reader, and the software takes care of the documentation. There's no need to handwrite anything or manually enter serial numbers. The system handles mapping, records, and even makes it easy to trace cables later.

For large projects or fast-paced rollouts, this can mean scanning an entire rack in minutes instead of spending hours labeling by hand. It's a time-saver, but it also reduces errors, which is just as important.

Cable Labeling FAQ

What is cable identification?

Cable identification is the process of labeling cables and connections to simplify network management, reduce downtime, and support troubleshooting.

Why is cable labeling important for ISPs?

Clear, consistent labeling helps internet service providers (ISPs) avoid outages, streamline maintenance, and ensure faster deployments.

What are common problems caused by poor cable labeling?

Mislabeled or missing labels can lead to service interruptions, time-consuming troubleshooting, and even full network outages.

What standards apply to cable labeling?

ANSI/TIA-606 is a commonly used industry standard that provides a framework for consistent labeling across network infrastructures.

How does Panduit's RapidID system help with cable identification?

RapidID automates the labeling process using pre-labeled cables with barcodes, enabling faster installation, error reduction, and easier documentation.

Cleaning Up Legacy Networks One Step at a Time

Many ISPs are managing networks that have grown in fits and starts over the years. Some have inherited infrastructure through acquisitions or worked with contractors who didn't follow consistent labeling practices. Cleaning that up doesn't have to mean starting from scratch.

The most practical place to begin? Patch panels, where most of the day-to-day changes happen. From there, teams can move to patch cords and edge devices. Even small improvements done methodically over time can make a big difference in how manageable a network feels.

It's also a great opportunity to build or refresh a company-wide labeling standard. That way, any future builds or changes can follow a system that's already in place.

Final Thought

Cable identification might not be the most exciting part of building or maintaining a network, but it's one of the most important. Whether you're activating a new fiber route or tracking down an outage, having clear, durable, and consistent labels saves time, prevents mistakes, and keeps your infrastructure running smoothly.

If you're looking for ways to improve operations, reduce service interruptions, or just make life easier for your field teams, cable ID is a smart place to start. Systems like RapidID can take a lot of the pain out of the process—and put you back in control of your network. ■

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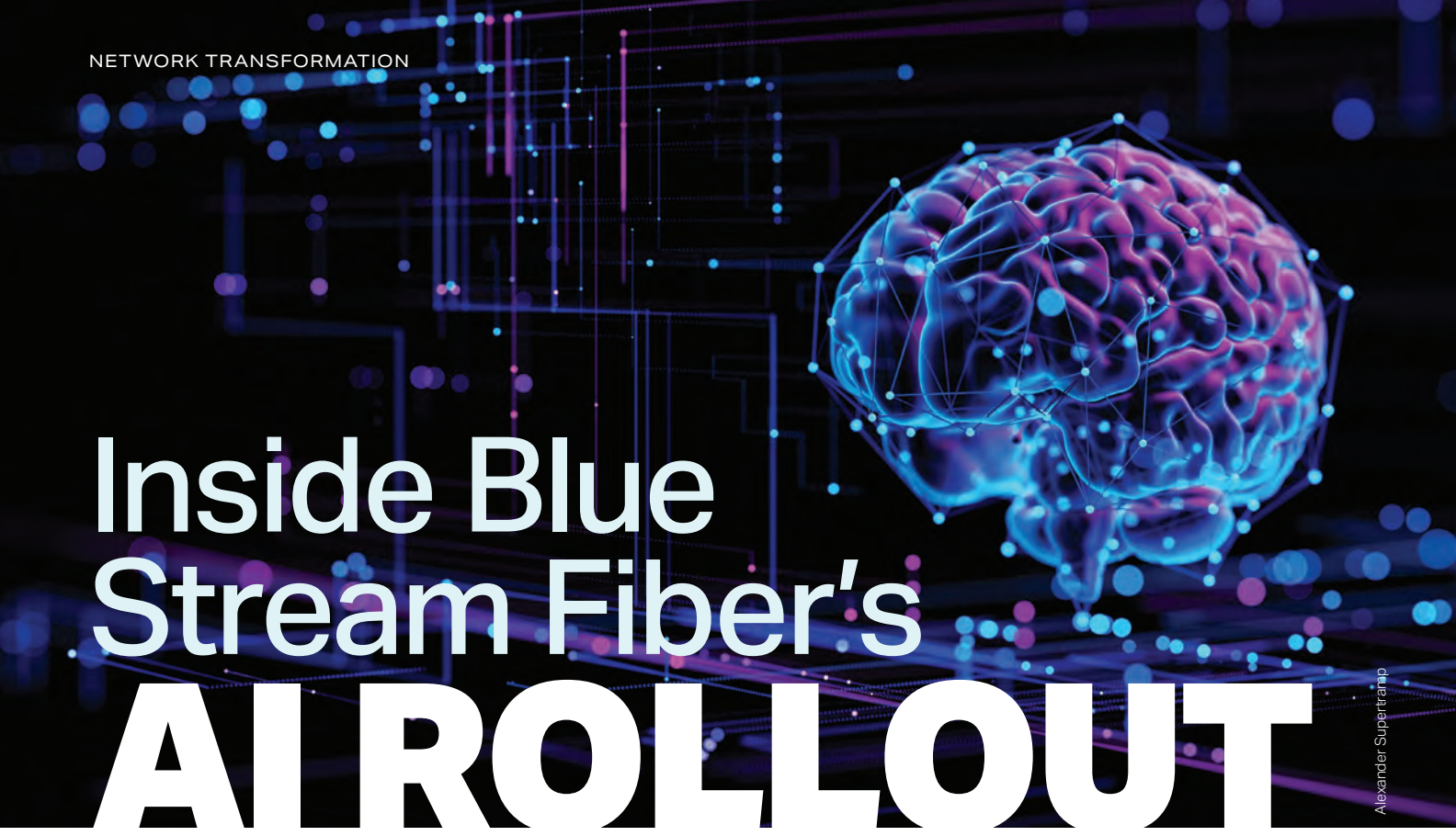

Inside Blue Stream Fiber's AI ROLLOUT

Alexander Supertramp

How the company launched tools in 90 days and achieved a 6000% ROI through dispatch optimization and task automation.

BY JOSH TURIANO

When Blue Stream Fiber set out to modernize its telecom dispatch triage operations, it wasn't trying to fix something broken; it was preparing for growth. The company recognized that its current operational model, while functional at a monthly cost, wouldn't scale efficiently to meet expanding service demands. What Blue Stream achieved in the following 90 days would redefine what's possible in telecom operations: reducing operational costs to just $3.32 in OpenAI tokens while simultaneously improving service quality and preparing for unlimited scale. This transformation delivered a remarkable 6000% return on investment (ROI) and created a blueprint for the future of telecom service delivery.

> "Data quality emerged as both a challenge and an opportunity.

Understanding the Pre-AI Landscape

Before diving into the transformation, it's essential to understand what Blue Stream Fiber's dispatch operations looked like before its artificial intelligence (AI) platform, METIS, entered the picture. The dispatch function in telecom is a complex orchestration of multiple moving parts. Technicians need to be routed to service calls efficiently, equipment availability must be tracked, customer appointments need scheduling and rescheduling, and urgent network issues require immediate prioritization. Each of these tasks involves countless micro-decisions that, when performed manually, consume enormous amounts of time and mental energy.

One particularly resource-intensive component was the work order triage process. Blue Stream Fiber maintained a dedicated team whose sole function was to manually review every work order for accuracy, completeness, and compliance. This team would spend hours each day combing through work orders, checking that technician notes were complete, verifying that parts usage was properly documented, and ensuring that customer issues were fully resolved. While quality control was essential, it represented a significant direct cost center that grew linearly with service volume—every new customer meant more work orders to audit, requiring either more auditors or longer processing times.

The traditional dispatch workflow involved teams of coordinators managing spreadsheets, making phone calls, sending emails, and constantly juggling priorities as new service requests came in. A single dispatcher might spend 30 minutes optimizing regional routes for the day, only to

have them completely reshuffled when an urgent outage occurred.

The Philosophy: Tasks, Not Jobs

The breakthrough came when the company's leadership recognized a fundamental principle: the path to scalability lay in automating specific tasks rather than entire job functions. This distinction is crucial and often misunderstood in AI implementations. Rather than viewing AI as a replacement for dispatch coordinators or auditors, Blue Stream Fiber recognized it as a tool to eliminate the repetitive, algorithmic portions of their work, freeing them to handle complex situations that require human judgment, empathy, and creative problem-solving.

This philosophy shaped every decision in the rollout. Instead of pursuing a massive, all-encompassing AI system that would attempt to handle every aspect of dispatch operations, the team identified specific, well-defined tasks within the dispatch workflow that were prime candidates for automation. These included route optimization calculations, availability checking, preliminary troubleshooting steps, and critically, the systematic auditing of work orders for completeness and accuracy.

The work order auditing function became an early focus because it represented a clear opportunity: the audit criteria were well-defined, the process was highly repetitive, and the cost scaling issue was acute. Every work order needed to be checked against the same set of rules and standards, making it an ideal candidate for AI automation.

The 90-Day Sprint: From Concept to Implementation

The rapid timeline of implementation stands in stark contrast to the multi-year digital transformation projects that often plague large organizations. The key to their speed lay in starting small and iterating quickly. Rather than waiting for a perfect solution, Blue Stream Fiber launched a minimum viable product within the first 30 days that handled just one task:

> **The 90-day implementation timeline proves that AI transformation doesn't require years of planning and millions in investment.**

determining if a call is a trouble call and if it should go to the field.

The first month focused on data preparation and establishing the AI pipeline, while the team worked to clean and structure their historical dispatch data, identifying patterns in service call types, duration, and geographic distribution. They built simple application programming interface (API) connections between their existing Service Management system and OpenAI's models, creating a foundation that could be expanded upon incrementally. Simultaneously, they began documenting the work order audit criteria, converting years of tribal knowledge into structured action that an LM Agentic AI could execute consistently.

By day 30, the first AI-powered Triage optimization was live. The system analyzed every work order scheduled, calculated the customer's health and the validity of the work order, and presented recommendations to dispatchers. Even this basic implementation immediately showed promise, reducing active amount of time spent to triage by 50%.

The second month saw rapid expansion of capabilities, with particular focus on the work order auditing function. The AI system was trained to review pending work orders in real-time, checking for missing information, flagging potential quality issues, and ensuring compliance with service standards. What previously took a team of auditors' hours to complete each day now happened instantly as work orders were created. The system could identify patterns that human auditors might miss, such as mismatched work order reasons, flagging for recurring issues at particular locations that suggested underlying infrastructure problems.

The final month of the sprint focused on integration and refinement. The various AI components were woven together into a cohesive flow that could handle the life cycle of a service request, from initial customer contact through successful resolution and audit.

Machine learning models were trained on specific historical work order patterns, improving accuracy and relevance.

The Technical Architecture: Simplicity at Scale

One of the most remarkable aspects of the company's implementation was its technical simplicity. Rather than building complex custom models or investing in expensive proprietary AI platforms, Blue Stream Fiber leveraged OpenAI's existing capabilities through well-designed code and smart system integration. The entire system operates on a handful of core components that work together seamlessly.

At the heart of the system is a Service Management framework that translates dispatch tasks into API calls that large language models can understand and process effectively. For the recently deployed route optimization, the system feeds current appointment data, technician locations, and skill matrices into carefully crafted Agentic AI that returns optimized schedules. For work order auditing, the system converts audit criteria into API calls that can evaluate completeness, accuracy, and compliance in seconds. These prompts evolved through iteration, with the team constantly refining them based on output quality and token efficiency.

The integration layer connects OpenAI's API with Blue Stream Fiber's existing systems through a lightweight middleware application. This middleware handles authentication, data formatting, error handling, and result validation. It ensures that AI recommendations are sanity-checked and stored before being presented to human operators, maintaining safety and reliability in critical operations. For the auditing function, it creates a seamless pipeline where completed work orders are

automatically reviewed, with only exceptions requiring human attention.

Perhaps most importantly, the system maintains a feedback loop where dispatcher decisions, audit outcomes, and operational results are fed back into a closed-loop feedback process. When a dispatcher overrides an AI recommendation or when a human auditor disagrees with an AI assessment, we log the decision and outcome, allowing the team to continuously improve prompt design and system logic.

Measuring Success: Beyond the Numbers

While the 6000% ROI figure captures attention, the true measure of success extends far beyond cost savings. The transformation of the work order auditing function alone demonstrates the compound benefits of AI implementation. What was once a direct cost center consuming significant resources became an automated quality assurance system that operates in real-time, catching issues immediately rather than days later.

First-call resolution rates improved by 4% or more because the AI system ensured technicians had the right equipment and information before arriving on site. The real-time auditing caught incorrect work orders immediately, allowing for same-day corrections rather than expensive return visits. Employee satisfaction showed remarkable engagement as dispatchers and former auditors reported no longer spending their days on routine tasks but instead focusing on complex problem-solving.

Lessons Learned and Best Practices

Blue Stream Fiber's journey offers valuable lessons for other organizations considering similar AI implementations. First and foremost is the importance of identifying specific, high-impact tasks for automation. The work order auditing function was an ideal starting point because it was well-defined, repetitive, and represented a clear cost center that scaled poorly with growth. Automating this function early demonstrated immediate value while building confidence for broader implementation.

The iterative approach proved crucial to success. Rather than attempting to solve every problem at once, the team built momentum through quick wins that demonstrated value and built confidence. Each successful implementation made the next one easier, creating a virtuous cycle of improvement and adoption. The transformation of the audit team into strategic quality advisors showed employees that AI implementation could enhance rather than threaten their careers.

Data quality emerged as both a challenge and an opportunity. While initial data cleaning required significant effort, the process of preparing data for AI consumption led to broader improvements in data management practices across the organization. It was also discovered that AI implementation can be a catalyst for better data governance and operational discipline. The structured documentation of audit criteria, previously held as tribal knowledge, created lasting value beyond the AI implementation itself.

The Path Forward: Scaling Intelligence

With the initial implementation proving successful beyond expectations, Blue Stream Fiber is now exploring expanded applications of its AI framework. The scalability built into the system means that as service volume grows, operational costs remain essentially flat—a complete reversal of the traditional linear cost scaling that plagues service organizations. Predictive maintenance algorithms are being developed to anticipate network equipment failures before they impact customers. Natural language interfaces have been rolled out to allow technicians to query technical documentation and receive instant, contextual answers in the field.

Conclusion: A New Paradigm for Operational Excellence

Blue Stream Fiber's transformation from an expensive monthly triage operation to a $3.32 AI-powered system represents more than just cost reduction—it's a fundamental reimagining of how telecom companies can achieve scalable excellence. By automating specific tasks like work-order auditing rather than entire jobs, Blue Stream Fiber has created a model where human expertise is amplified, operational costs are decoupled from service volume, and quality improves continuously through intelligent automation.

The 90-day implementation timeline proves that AI transformation doesn't require years of planning and millions in investment. With clear philosophy, iterative implementation, and focus on specific tasks, organizations can achieve remarkable results quickly. The 6000% ROI isn't just a number—it's proof that the future of scalable telecom operations has arrived, powered by intelligent automation that enhances rather than replaces human capability.

As the telecom industry faces increasing pressure to scale service quality while controlling costs, Blue Stream Fiber's approach offers a roadmap for sustainable transformation. The elimination of linear cost scaling through intelligent task automation, exemplified by the transformation of work order auditing from a manual cost center to an automated quality system, shows what's possible when AI is applied thoughtfully. The question for other organizations isn't whether to implement AI in their operations, but how quickly they can begin their own journey toward scalable excellence. The tools are available, the approach is proven, and the results speak for themselves. The future of intelligent dispatch operations is here, running on $3.32 worth of tokens and the irreplaceable value of human-in-the-loop insight. ■

Josh Turiano is Senior Vice President, AI Strategy and Deployment, for Blue Stream Fiber. For more information, visit bluestreamfiber.com. Follow them on LinkedIn: linkedin.com/company/bluestreamfiber and Facebook: facebook.com/BlueStreamFiber.

ISE EXPO 2025 Product Spotlight – Innovation in Action!

Welcome to *ISE Magazine*'s 2025 product guide spotlighting an array of offerings from exhibitors at ISE EXPO. Whether your project terrain is dense metro, remote rural or a hybrid network topology, our guide brings together the hardware, connectivity systems and deployment services to turn telecom and data-based solutions into build-ready reality.

In this special section, you will find an array of OSP-specific innovations such as rugged fiber cable engineered for long-haul rural runs, modular hardened connectivity platforms designed for rapid field installation, outdoor enclosures and splice closures built for harsh environments, and end-to-end service offerings that support planning, grant-funding, construction management and network operations.

Our goal in putting together this year's guide is to highlight systems and service bundles that enable contractors to move from design to trench to turn-up. Vaults, ducts, splice closures, overhead and underground hardware; modular rack-mounted platforms that support both active and passive gear; and software tools that integrate planning, field mobilization and operations management.

We hope this guide serves as a reference as you select the right mix of components and capabilities to keep your outside plant build efficient, repeatable, and future-ready. For your convenience, each spotlighted product or service has a link to provide more information.

PLUMETT LUBRICATOR

The Plumett Lubricator allows for significantly extending the jetting distance while reducing stress on the fiber and equipment when faced with challenging trajectories. It provides an extra layer of lubrication on the fiber as it is placed into a lubricated duct. Available for applications for duct sizes 3mm-50mm and fiber O.D.s 1mm-24mm.

Plumettaz America Corp.
plumettazamerica.com

For more information, visit ISEmag.com/55325894

UNDERGROUND SOLUTIONS BUILT WITH TRUST

Michels Underground Cable, Inc. combines experience and equipment to build underground power transmission, power distribution, renewable, and communication cable networks. Depending on system needs, their crews directly bury or install protective casing, including duct banks, for solid and stranded conductors and copper, fiber optic, and coaxial cable. Michels Underground Cable is a member of the Michels Family of Companies.

Michels Underground Cable, Inc.
www.michels.us

For more information, visit ISEmag.com/55325885

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The InvisiLight™ Home Fiber Kit, is a revolutionary consumer-installable solution designed to deliver ultra-fast, wired internet connectivity to any device in the home with a nearly invisible installation. Featuring a 600-micron, ultra-bend-insensitive EZ-Bend® optical fiber, the kit allows for discreet installation along walls, baseboards, trim, or moldings, blending seamlessly into any home's decor. Use it to connect a modem to a home office, gaming console, TV or any other device where a wired connection is needed.

Lightera | lightera.com/invisilight-home-fiber-kit

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BUILD THE FUTURE OF CONNECTIVITY WITH MICRO-PATH™

Micro-Path™ Microduct Piping Systems help build the future of connectivity without additional digging. Ideal for microtrenching, The piping system streamlines network expansions and updates. Atkore offers Micro-Path™ in multiple sizes and configurations for use in fiber installation projects. It is manufactured in the USA and is Build America, Buy America compliant.

For more information, visit ISEmag.com/55325493

Atkore – United Poly Systems
unitedpolysystems.com/micro-path-microduct-piping

THENID™ FAMILY LINE – ENGINEERED FOR ADAPTABILITY AND EFFICIENCY

LYNN's fiber optic network interface devices offer multiple size options and a complete, interchangeable accessory line to fit any site need. Designed with field feedback in mind, TheNID™ saves time during installation with innovative features like their patent-pending cable entry clamp and enhanced protective grommet. One system, endless installation possibilities.

LYNN | thinklynn.com

For more information, visit ISEmag.com/55325819

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Powered by GIS intelligence, 3-GIS | Web unites the full life cycle of telecom networks, supporting both engineering precision and operational control. From design and permitting to field deployment and ongoing management, the platform connects physical assets to the services they deliver. Teams can collaborate in real time, analyze signal routes, and maintain accurate records at scale, reducing risk, speeding activation, and transforming network data into decisions that drive stronger performance and outcomes.

3-GIS | www.3-gis.com

For more information, visit ISEmag.com/55325449

DURALITE: BUILT FOR THE FIELD. ENGINEERED FOR EFFICIENCY.

The Duralite® enclosure from Oldcastle Infrastructure sets the standard for installation speed and field flexibility. Convenient divider and cable rack slots, along with new conduit knockouts and mouse-holes, simplify setup and save time. Larger flat working areas make on-site modifications easier, while improved stackability enables deeper configurations when needed in the field. With readily available accessories—cable racks, pulling eyes, and EMS markers—Duralite delivers a complete, adaptable solution engineered for efficiency, reliability, and real-world performance.

Oldcastle Infrastructure | oldcastleinfrastructure.com/brands/duralite/handled

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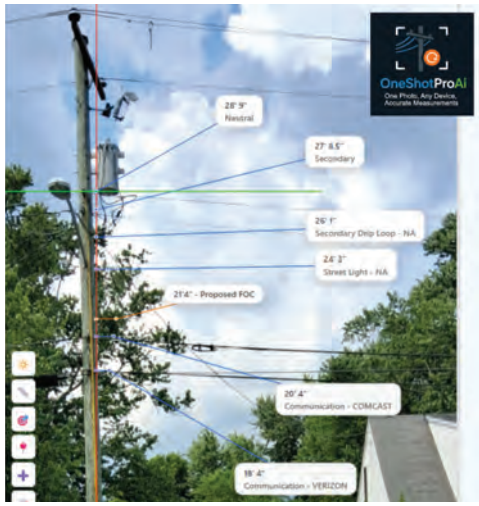

A single operator on any phone or tablet can capture all the data necessary for the back office in less than three minutes. No expensive equipment, no expensive software—almost no training…a software system designed by fielders for fielders. The program is cloud based and fully transparent. Office personnel can monitor field work in real time and process poles for make ready and permitting while data is still being gathered. Schedule a demo today.

For more information, visit ISEmag.com/55325714

OneShotPro.ai
app.oneshotpro.ai

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Dura-Line | www.duraline.com

For more information, visit ISEmag.com/55325672

COMPREHENSIVE ENCLOSURE SOLUTIONS

Charles Industries Walk-in Cabinet (WIC) is a protective enclosure for electronic components, serving fiber and copper interfaces in an integrated, customizable solution. The WIC series offers a lighter-weight, energy-efficient, and cost-effective alternative to traditional concrete shelters and huts, providing a lower cost of ownership and fast installation. Now available in five sizes, including the new 10'x10'x7' and 10'x6'x6' models.

Charles Industries, an Amphenol Company |
www.charlesindustries.com

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Say hello to the future of FTTx deployments with the AFL RTD™ Drop Connectors and Terminals – Powered by Prodigy®. Engineered for seamless integration, this compact, rugged solution delivers unmatched performance and flexibility in the field. Designed with BABA and BEAD compliance in mind—and backward compatible with legacy connectors—it provides a scalable, unified path forward for your network. Discover how AFL is helping service providers build smarter, stronger and more future-ready networks!

For more information, visit ISEmag.com/55325453

AFL
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With customers in more than 30 countries across four continents, LYNDDAHL Telecom America combines global experience with local commitment. Their U.S. operations are based in Belmont, North Carolina, where they manufacture and deliver complete, high-quality BABA and BEAD compliant microduct solutions tailored to American infrastructure needs. As part of LYNDDAHL Telecom and the ACOME Group, they bring decades of fiber ducting and cable expertise to the U.S. market—providing flexible supply, and reliable quality.

LYNDDAHL Telecom America | lynddahltelecomamerica.com

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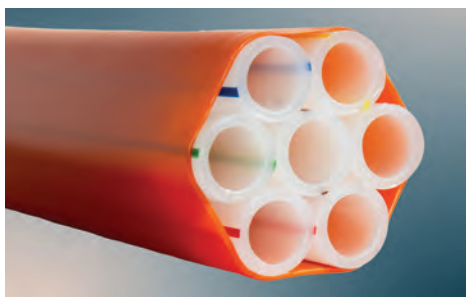

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Teel Plastics | www.teel.com

For more information, visit ISEmag.com/55325907

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Fibercan's MPO connector with lock function ensures secure, high-performance fiber optic connections for data centers, telecommunications, and FTTx applications. Featuring a reliable locking mechanism for stable mating, it supports both single-mode and multimode fibers (OM1-OM4). With low insertion loss (≤0.35 dB elite), excellent durability, and wide operating temperatures, it meets rigorous IEC and Telcordia standards. Ideal for high-density cabling, it simplifies installation while guaranteeing unwavering signal integrity in demanding environments.

Huizhou Fibercan Industrial Co., Ltd. | www.fibercan.com.cn

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Velox | veloxuc.com

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Border States |
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For more information, visit ISEmag.com/55325501

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American Products | amprod.us/products/ap-c-liberty

For more information, visit ISEmag.com/55325480

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UCL Swift | uclswiftna.com

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NET Suite is a field-proven platform for planning, building, and operating fiber networks faster, smarter, and more efficiently. Automate workflows, manage data from any device, and keep your entire project life cycle connected. With GIS-ready exports, real-time construction tracking, and fault detection, NET ensures funding success and operational excellence. Built for scale, optimized for speed.

TKI | www.tki-net.com

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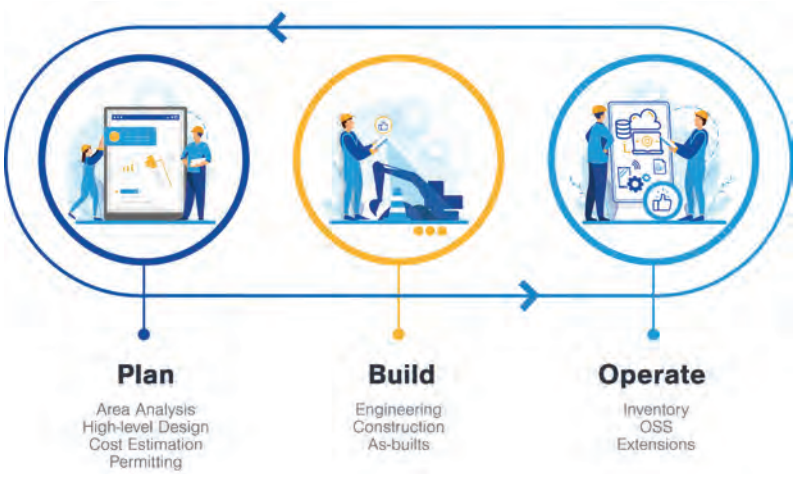

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Trident Solutions | www.tridentproducts.com

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Established in 2000, Takfly Communications Co., Ltd. is a high-tech enterprise incorporating R&D production and sales of MPO, MTP, and fiber optic passive components, which include fiber optic patch cord/pigtail, connector, adaptor, PLC splitter, attenuator, terminal box, ODF, etc. Their advantage products include indoor cable and drop cable, patch cord and pigtail, fiber optic adapter, PLC splitter, MPO/MTP, WDM (CWDM/DWDM), terminal box + FTTH wall outlet, media converter, and POE switch.

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Cyber Power Systems (USA), Inc. | www.cyberpowersystems.com

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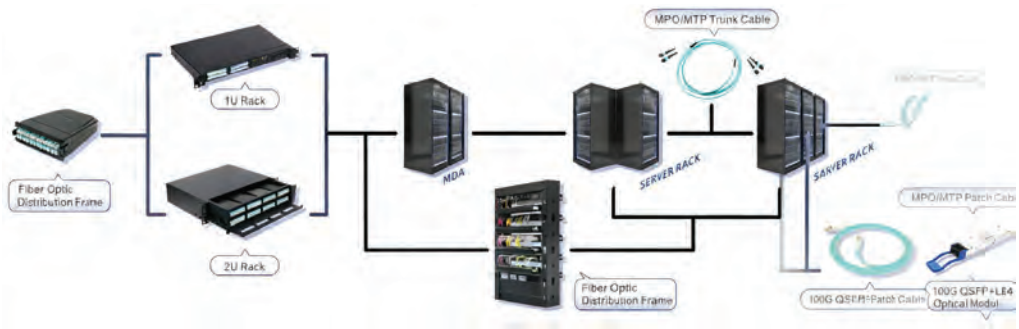

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NEXT GENERATION FIBER OPTIC CABLE BLOWER

The Gulfstream (GS) 350+ from Condux features an optimized power band providing better performance at the most desired install speeds. The GS350+ has an average improvement in push force of 50% between 0-170 ft./min. An improved motor design features stainless steel gears and an upgraded drive system. It installs fiber from 0.16- to 0.65-inches (4 to 16.5 millimeters) into duct from 0.50- to 1.25-inches (8 to 42 millimeters) at speeds up to 300 ft./min.

Condux | condux.com

For more information, visit ISEmag.com/55325626

NWS EVERYTHING: A FULL-SPECTRUM FRAMEWORK FOR DIGITAL INFRASTRUCTURE

NWS has launched NWS Everything, a full-spectrum framework supporting broadband growth across North America. Combining trusted products in broadband, fiber, FWA, test and measurement and more with end-to-end solution services and their Integrated Distribution™, NWS simplifies deployment and accelerates outcomes. Designed to reduce risk, improve ROI, and align with business realities, NWS Everything helps providers expand connectivity with confidence.

NWS | nwsnext.com/nws-everything

For more information, visit ISEmag.com/55325890

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Corning | www.corning.com/optical-communications/worldwide/en/home/products/evolv-hardened-connectivity-solutions.html

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MULTIFLOW RAPID: HIGH-PERFORMANCE FIBER CABLE BLOWING MACHINE

The MultiFlow RAPID by Fremco is a versatile machine for relining multiple microducts or single cables, supporting fiber/cable OD of 5.5-32 mm and duct sizes of 10-63 mm. It offers tool-free installation, quick setup (8-10 min), and can blow cables up to 5,000 m with air or 10,000 m with water. Highly flexible, it adapts to various duct and cable combinations, enhancing efficiency for fiber optic installations.

Millennium | www.mymillennium.us/product/fremco-multiflow-rapid-fiber-blower

For more information, visit ISEmag.com/55325887

LASHING WIRE

If you're struggling with wire jams, it's time to make a change. HS Springsteen's wire is evenly precision-wound by PLC system, ensuring each wire and each layer is in order, which reduces wire jams by 99.9%. Also, the upgraded version (HS-302038-L) is 40% longer, allowing for fewer coil replacements and less coil end waste. It is available for all kinds of lasher.

HS Springsteen Enterprise | www.hsspringsteen.com

For more information, visit ISEmag.com/55325950

THE UNIVERSAL HARDENED CONNECTIVITY SOLUTION FOR SMARTER FIBER DEPLOYMENTS

The CommScope Prodigy® solution enables service providers to deploy and expand fiber access faster and more reliably—especially in space-constrained environments. Engineered to overcome deployment challenges like long install times, complex training and backwards compatibility, the Prodigy platform combines a compact form factor with intuitive, universal connectivity, reducing your terminal footprint by up to 67%. From FTTH to fiber backhaul and cellular sites, the Prodigy solution delivers a smarter, scalable way to build tomorrow's networks.

CommScope | www.commscope.com/prodigy

For more information, visit ISEmag.com/55325623

FIBER OPTIC CABLE MARKER

New, long lasting fiber optic cable markers have a 15-year durability. The markers can be wrapped or flagged around fiber optic cables. Manufactured with high molecular strength, black ink on an orange retroreflective background ensures easy identification in day or night. Permanent acrylic adhesive ensures long term adhesion markers are self-cleaning, chemical, water, abrasion and sunlight proof. Custom sizes and print available.

Uticom Systems, Inc. | uticom.net

For more information, visit ISEmag.com/55325913

MADE IN AMERICA!

Proudly made in America and BABA compliant, the Max-5 Pedestal, AXS-500R670-S, and RFW 24x36x30 Vaults exemplify American quality, innovation, and reliability. Each product is precision-engineered and manufactured in the U.S. using high-grade materials to deliver unmatched strength and performance. Supporting American jobs and infrastructure, these solutions meet the highest standards of excellence—ensuring dependable, long-lasting results for projects nationwide that demand superior craftsmanship and full domestic compliance.

RaDD Network Solutions | raddnetwork.com

For more information, visit ISEmag.com/55325899

☆☆ FEATURED PRODUCT ☆☆

DESKPOD TRI7

Delivering Wi-Fi 7 power with unmatched coverage, speed, and efficiency, the AirSonics DeskPod Tri7 turns next-gen connectivity into everyday performance. Plume's Adaptive Channeling™ ensures stronger links and lower latency for seamless streaming, gaming, and real-time apps. Available on OpenSync-certified products, AirSonics was the first to introduce CapExPress, Plume's Managed Wi-Fi with no subscriptions, no commitments, and 100% CapEx.

For more information, visit ISEmag.com/55325455

AirSonics
airsonics.com

ADVANCED OPTICAL FIBER PROTECTION

Engineered to safeguard optical fibers with superior environmental protection. Its inert gel prevents water ingress and insect damage, while allowing field re-entry without compromising seals. Compact and modular, it supports high-density splices in a rugged IP68 housing—ideal for FTTH, ODN, and outdoor deployments. Showcase reliability, ease of installation, and long-term network performance.

Yuyao Hejor Communication Equipment Co., Ltd.
www.cnhejor.com

For more information, visit ISEmag.com/55325919

PIONEERING HARDENED CONNECTIVITY FOR BLOWABLE FIBER IN NORTH AMERICA

Emtelle and CommScope have teamed up to deliver North America's first hardened connectivity solution for pushable and blowable fiber optic drop cables. Combining Emtelle's REVOLink3™ pre-connectorized 3-in-One cable with CommScope's Prodigy® hardened technology, this innovation supports legacy systems while enabling fast, cost-effective FTTH installations. The result is lowest total cost and fast installation speeds while also delivering a high-performance, scalable solution that simplifies deployment and meets service providers' expectations for durability and reliability.

Emtelle USA | www.emtelle.com

For more information, visit ISEmag.com/55325687

DISCOVER INDUSTRIAL LABELING POWER TOOLS BUILT FOR TRUE PROS

P-touch EDGE handheld industrial label printers help you save time, manage projects, and print accurate labels that last. It streamlines labeling with features like quick keys and support for laminated labels and heat-shrink tubes up to 24mm. Create barcodes, QR codes, and serialized labels directly on the device. Includes Bluetooth and USB-C options, an auto-cutter, half-cuts, a secure hand strap, and a long-lasting battery. Experience on-demand labeling for industrial applications.

Brother International Corporation
brothermobilesolutions.com/products/printers/p-touch/edge

For more information, visit ISEmag.com/55325503

FLAT DROP REPAIR CASE – FDRC02

The FDRC02 is a compact, IP68-rated fiber repair closure for flat drop cables, offering fast, durable repairs in harsh environments. It supports both connectorized and direct splice repairs with included accessories, features a pre-applied gel for sealing, a removable splice tray, internal toning wire connection, and installs using standard tools. Its rugged thermoplastic housing is compatible with various flat drop cables, including ROC™ drop.

Hubbell Power Systems | www.hubbell.com/hubbellpowersystems/en/products/data-communications/fiber-splice-closures/cl/2862257

For more information, visit ISEmag.com/55325774

INSTALL FTTH FASTER

The Fiber Driver with Air Boost pushes flat drop fiber thousands of feet in seconds—no hand feeding, no bulky gear. Compact, drill-powered, and built for fiber-to-the-home (FTTH), it's a one-person solution for fast, clean installs. Add Air Boost to reduce friction and go even farther with a portable compressor.

Jameson | jamesontools.com

For more information, visit ISEmag.com/55325795

FIBER OPTIC DISTRIBUTION CABINETS

Raycap's fiber optic distribution cabinets are assembled at one of their three USA factories. They are customized to customer specifications, making them the ideal solution for successful network expansion. The robust FTTx cabinets provide anti-vandalism protection that makes them suitable for securing the operator's investment in 5G network infrastructure. Their modular designs enable the replacement of cabinet parts without service interruption. The well-designed interiors enable multiple equipment configurations, short installation times, and easy maintenance.

Raycap, Inc. | www.raycap.com

For more information, visit ISEmag.com/55325900

☆☆ FEATURED PRODUCT ☆☆

949 TWO-PIECE STAINLESS STEEL FIBER DROP CLAMP

The 949 two-piece stainless steel fiber drop clamp is optimized to support Corning's SST™ Fiber Drop Cable and Roc™ fiber drop cable, as well as similar cables produced by other manufacturers. Features include fast install—no need to set shim while placing over cable, integral shim/wedge design prevents installing without the shim, easy install even while wearing gloves, it can be loosened/reinstalled to adjust cable slack, and long bail wire allows extra clearance for attachment.

For more information, visit ISEmag.com/55325471

Allied Bolt
pgc.com/allied-bolt

RELIABLE EPC SOLUTIONS BACKED BY 30+ YEARS OF EXPERIENCE

Maverick Corporation, based in Boston, MA, is a trusted full-service EPC firm with over 30 years of proven experience delivering communications and power infrastructure projects across the U.S. and Europe. Backed by a 175+ member team, they provide seamless, end-to-end design, engineering, permitting, construction, and maintenance services. Certified by DCAMM and EVITP, Maverick brings deep expertise and a track record of excellence to every project.

Maverick Corporation | www.maverickcorporation.com

For more information, visit ISEmag.com/55325884

FROM IDEA TO INCOME

CHR Solutions helps broadband providers design, build, and grow smarter, more profitable networks. They deliver advanced engineering for network planning and deployment, integrated BSS/OSS software to automate operations and e-commerce, and cutting-edge cybersecurity and managed IT services to protect and optimize critical systems. CHR provides the expertise and tools providers need to enhance efficiency, increase revenue, and ensure reliable, secure connectivity for the communities they serve.

CHR Solutions | www.chrsolutions.com

For more information, visit ISEmag.com/55325510

SOUTHWIRE® DISCRETE POWER

Southwire is powering the expansion of 5G networks with Southwire® Discrete Power cables, built for maximum safety, sustainability, and ease of installation. Approved by Tier 1 carriers, these cables are constructed with high quality Class K tinned copper conductors, to meet ASTM B33, B172 and B174, a three-layer aluminum/poly/aluminum helically applied tape shield, overall tinned copper braid shield, PVC and nylon sheath insulation, and black sunlight resistant jacket.

Southwire | www.southwire.com

For more information, visit ISEmag.com/55325903

☆☆ FEATURED PRODUCT ☆☆

COMPREHENSIVE LINE OF FIBER DROP CLAMPS

MacLean Network Solutions offers a comprehensive line of fiber drop clamps to accommodate a wide variety of fiber cross sectional shapes, fiber types, and fiber span lengths. Through their engineering expertise and manufacturing capabilities, combined with close coordination with fiber manufacturers, you can rely on MacLean to continue offering the next generation of fiber drop clamps. Recent developments include fiber drop clamps for long span application of ROC™, SST™, and RPX® fiber types.

For more information, visit ISEmag.com/55325822

MacLean Network Solutions
www.macleannetworksolutions.com

TELSEC® MP3 WITH CELLULAR MODEM

The TELSEC MP3 provides reliable remote monitoring and alarming for critical infrastructure and telecom sites. It includes Ethernet for network communications and an optional LTE cellular modem for locations without connectivity. This compact, intelligent controller is rack or wall mountable and monitors temperature, humidity, intrusion, DC power systems, generators, fuel levels, and energy usage. Portable generator monitoring and tracking with GPS available for asset management. The MP3 reduces downtime and ensures your remote shelter stays connected and protected.

Quest Controls, Inc. |
questcontrols.com

For more information, visit ISEmag.com/55325898

NEW AI-ENABLED Q102-M12+ WITH NANOTUNE™ TECHNOLOGY

The Q102-M12+ is the next generation of ribbon fiber splicers. The new AI-enabled Q102-M12+ with NanoTune™ technology is key to deploying next-generation hyper-scale networks. This future-proof machine has been designed to maximize work efficiency with state-of-the-art technology, including NanoTune™, E-ACAS, dual independent ovens, tool-free replaceable v-grooves, and special coatings. Highly versatile, it easily adapts to 250µm and 200µm ecosystems and is compatible with Lynx-CustomFit™ Splice-On Connectors.

Sumitomo Electric Lightwave |
sumitomoelectriclightwave.com/product/q102-m12-plus

For more information, visit ISEmag.com/55325904

INNOVATIVE FIBER OPTIC SOLUTIONS

Specializing in custom product design for modern fiber optic networks. By taking a consultative approach, they can quickly bring new and innovative solutions to market to improve your current operations or future-proof your network. From FTTx splitters to wavelength division solutions for capacity issues to custom enclosures for the outside plant, they bring to the table over three decades of industry expertise and product development.

Plugin Optics | www.pluginoptics.com

For more information, visit ISEmag.com/55325893

FROM DESIGN TO DELIVERY, A TEAM YOU CAN TRUST

eXpress-tek
EXPRESS TECHNOLOGIES, INC

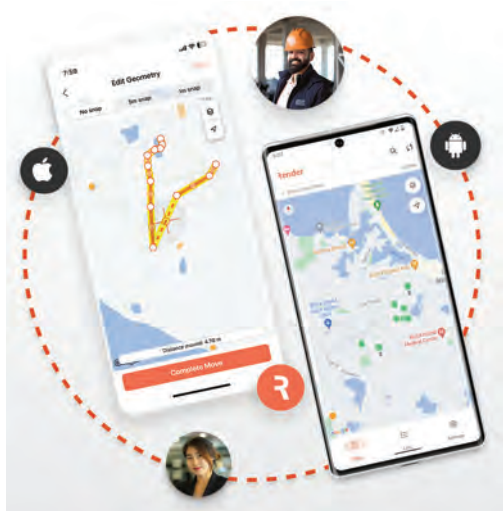
Express-tek specializes in building and protecting the systems that power connectivity. From utility consulting and construction to structured cabling, AV, electronic security, fire alarm, paging, and intercom, their team designs and delivers dependable infrastructure. With proven expertise across commercial, education, and government markets, Express-tek is a trusted partner for safe, innovative, and lasting solutions.

Express-tek | express-tek.com

For more information, visit ISEmag.com/55325699

☆☆ **FEATURED PRODUCT** ☆☆

ACCELERATE WORK CLOSEOUT AND INVOICING FOR BROADBAND CONSTRUCTION

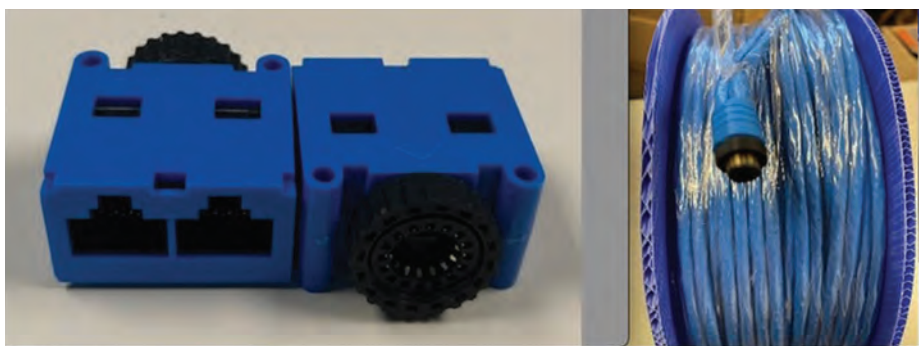


These field-first enhancements enable construction crews to adapt to field changes and variability in real-time while maintaining accurate records and visibility across the entire network build. With backhaul projects, including fiber to data centers, driving massive fiber demand and middle-mile deployments extending into remote areas, crews need flexible, intelligent tools that can handle unpredictable conditions and consistently deliver high-quality results.

For more information, visit ISEmag.com/55325902

Render
AI-FIRST MEETS FIELD-FIRST

Render Networks
www.rendernetworks.com/resources/media/advanced-mobile-capabilites



PRE-TERMINATED CABLING SYSTEMS

LynkFast is transforming the way network infrastructure is installed with factory-terminated, pre-labeled, and certified cabling kits. Unlike traditional keystone punchdowns, LynkFast's thin, low-profile connectors plug directly into patch panels and outlets, cutting installation time by up to 50% while reducing errors and rework. Each kit arrives with cable ID, and factory test reports, ensuring cleaner, faster, and more profitable projects across education, healthcare, commercial, and data center environments. Call 970-646-2706 to schedule a virtual demo.

LynkFast | lynkfast.com

For more information, visit ISEmag.com/55325815

REVOLUTIONIZE YOUR FIELD OPERATIONS WITH VETRO MOBILE

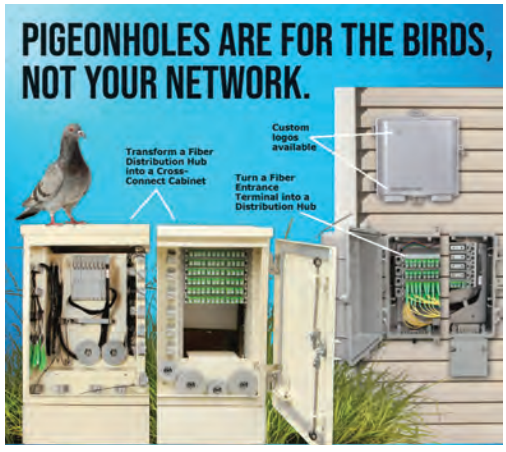
Take your fiber projects to the field with VETRO Mobile—the intuitive app that keeps your teams connected and efficient. Capture photos, complete tasks, and update project data in real-time, right from your phone or tablet. No paperwork, no delays—just clear, accurate information that flows seamlessly back to the office. Whether you're auditing, inspecting, or building, VETRO Mobile helps you work smarter, faster, and with confidence. Your network, at your fingertips.

VETRO | vetrofibermap.com

For more information, visit ISEmag.com/55325916

☆☆ **FEATURED PRODUCT** ☆☆

HAVE IT YOUR WAY WITH TII



Tii Technologies' focus is to make choosing your FTTH products as easy as ordering fast food—customize your enclosure by picking a feature from Column A, two from Column B, or three from Column C. Create a device that's fully adaptable and meets your needs with a modular solution that ensures flexibility, efficiency, and reliability—giving you the perfect fit for your network every time. Design fiber your way, start now!

For more information, visit ISEmag.com/55325908

tii technologies

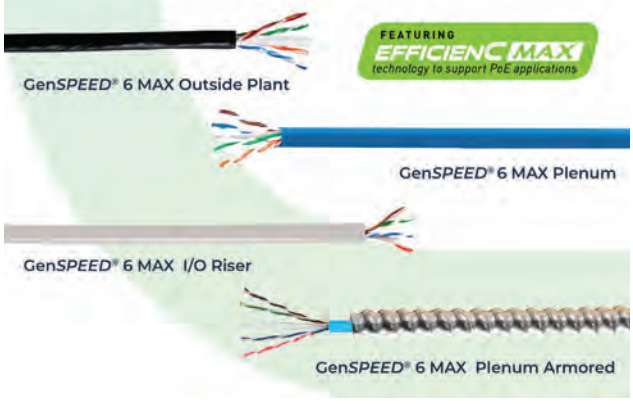
Tii Technologies
www.tiitech.com/FlippingBooks/FTTH_brochure

SYNCHRONOUS HDLC SERIAL TO IP ADAPTER

With the leased lines going away, Sunhillo has developed a simple cost-effective solution to utilize existing Ethernet to maintain your system without an upgrade to your control Infrastructure: synchronous serial to Ethernet, telecom assisted relaying scheme (POTT, DTT), bridge HDLC over IP, TDM to IP, and Power over Serial or PoE. Simply remove the existing serial modem cable and attach the Sunhillo Asbury to the device and an Ethernet cable to your existing switch.

Sunhillo Corporation
www.sunhillo.com

For more information, visit ISEmag.com/55325905



PRYSMIAN GENSPEED® 6 MAX COPPER CATEGORY CABLES

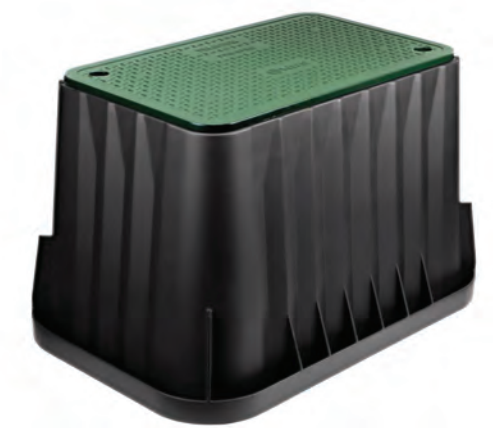
Prysmian's GenSPEED® EfficienCMAX® cables deliver high performance in demanding environments, with Type 4 PoE support for Wi-Fi, laptops, and 8K cameras. Manufactured in the U.S. and third-party verified for speeds up to 1 Gbps at 200 meters, GenSPEED® MAX offers unmatched versatility for building automation, wireless access, and security systems—while helping reduce equipment, installation, and maintenance costs.

Prysmian | na.prysmian.com/markets/digital-solutions/multimedia-and-enterprise-networks/extended-reach

For more information, visit ISEmag.com/55325897

PRO-SPEC TELECOM BOXES AND COVERS

Protect vital fiber optic systems with the NDS® Pro-Spec® 17" x 30" x 24" Telecom Box (SKU 327BCBT). USA-made from UV-resistant HDPE, it's engineered with reinforced ribs for long-term strength and reliability. Meeting ANSI/SCTE 77 Light Duty standard, this enclosure offers quick, secure access



with NDS's patented Universal Locking Mechanism and convenient finger slots. Its slip-resistant TELECOM-marked cover provides protection against dirt and debris, ensuring easy identification and dependable performance for demanding telecom applications.

NDS | www.ndspro.com/us/en/products/valve-meter-telecom-boxes/telecom-boxes

For more information, visit ISEmag.com/55325889

☆☆ **FEATURED PRODUCT** ☆☆

YOUR TRUSTED PARTNER IN CLIMATE CONTROL, CABINETS, ENCLOSURES, AND RACKS

For 30 years, ICEqube has been a trusted manufacturer of climate control, cabinets, enclosures, and racks certified to UL NEMA Type 12, 3R, 4, 4X, and BABA compliance standards. Their dedicated team of integration experts deliver turnkey solutions to reduce infield startup time and optimize your equipment setup. By choosing ICEqube, you're not just investing in cutting-edge solutions; you're partnering with a company that values innovation, quality, and customer satisfaction. Don't cut corners. QUBE IT™

For more information, visit ISEmag.com/55325791

ICEqube, Inc.
iceqube.com

FTTH WATERPROOF CONNECTIVITY

DYS offers reliable FTTH waterproof connectivity solutions designed for outdoor environments requiring superior protection and performance. Their products feature robust sealing, UV resistance, and easy installation, ensuring long-term stability in harsh conditions. With IP68-rated connectors and optimized optical performance, DYS provides efficient and secure connections for fiber-to-the-home networks, supporting high-speed data transmission and reducing maintenance costs.

DYS Fiber Optic Limited | www.dysfiber.com

For more information, visit ISEmag.com/55325677

TRUSTED FIBER BROADBAND SUPPLY CHAIN PARTNER

KGPCo is North America's leading supply chain partner and systems integrator for fiber broadband providers. They deliver scalable, end-to-end solutions—from core to customer—using trusted passive and active components. With deep inventory, strategic sourcing, and made in America/BABA-compliant offerings, KGPCo ensures deployment continuity and speed. Their expertise in middle and last mile builds positions them to help providers meet aggressive timelines and fully leverage federal funding opportunities for fiber broadband expansion.

KGPCo | www.kgpco.com

For more information, visit ISEmag.com/55325802

DELIVERING HIGH-PERFORMANCE NETWORKS FROM PLANNING TO COMPLETION

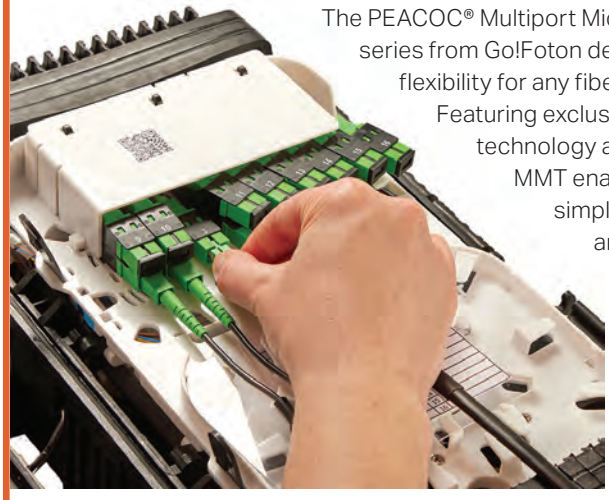
National OnDemand is a turnkey telecommunications construction partner, specializing in fiber, wireless, and last mile infrastructure. From engineering and permitting to material procurement and network buildout, they manage every phase of broadband expansion. With coast-to-coast resources and a flexible, scalable workforce, they help clients meet tight deadlines, navigate complex environments, and deliver high-performance networks to market faster. Their experience ensures quality, efficiency, and accountability—critical for completing your network expansion project on time and on budget.

National OnDemand | www.NationalOnDemand.com

For more information, visit ISEmag.com/55325888

☆☆ FEATURED PRODUCT ☆☆

TERMINALS THAT REDEFINE FLEXIBILITY



The PEACOC® Multiport Mid-Span Terminal (MMT) series from Go!Foton delivers unmatched flexibility for any fiber network architecture. Featuring exclusive spreadable adapter technology and modular trays, the MMT enables faster installs, simplified reconfigurations, and easier maintenance, all in one rugged, watertight design. Available in three sizes, it supports splitters, TAPs, or splice configurations while meeting the industry's toughest standards. The PEACOC MMT helps fiber networks work smarter, not harder, saving time and money.

For more information, visit ISEmag.com/55325717

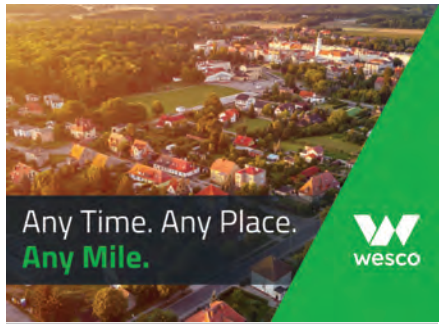
Go!Foton
gofoton.com

NEW TRANSCEIVER FOR DATA CENTER NETWORKING AND AI APPLICATIONS

The all-new Approved Networks 800G QSFP-DD 2x LR4 Transceiver is used in data center networking and artificial intelligence (AI) applications such as supercomputer clustering. It offers the ultimate flexibility with support for both InfiniBand and Ethernet networks. Available in a QSFP-DD form factor and available in distances of up to 100 meters over multimode fiber or up to 500 meters over single-mode fiber.

Approved Networks | approvednetworks.com/contact-us

For more information, visit ISEmag.com/55325487



PRODUCT DISTRIBUTION AND SUPPLY CHAIN SOLUTIONS

There's no one-size-fits-all solution. As the leading distributor and supply chain solutions provider, Wesco helps you get the right technology mix to meet your unique needs—whether it's fiber, wireless, or hybrid networks. With a comprehensive portfolio of industry-leading products and services, they empower service providers to build, operate, and maintain broadband networks. From urban centers to remote communities, Wesco is helping bridge the digital divide—one project, one mile, one connection at a time.

Wesco | www.wesco.com

For more information, visit ISEmag.com/55325918

ENABLING HARDENED CONNECTIVITY FOR ALL

US Conec's new HEC-DC connectors revolutionize hardened connectivity by offering SC, LC duplex and MTP® compatible versions in the same compact footprint. The HEC-DC's rugged design is IP68-rated and exceeds the requirements of the

toughest industry standards. The connector can be terminated onto both round and flat drop cables and features a secure DirectConec™ push-pull boot and blind-mate alignment for fast, tool-free installs—even in tight spaces. HEC-DC is ideal for FTTH, FTTA, industrial, and military use.

US Conec | www.usconec.com

For more information, visit ISEmag.com/55325912

☆☆ FEATURED PRODUCT ☆☆

BROADBAND FTTH PEDESTAL ENCLOSURE

This Panduit pedestal does double duty—housing both a multiport service terminal (MST) and a fiber splice tray holder for the ultimate in flexibility and scalability. The pre-installed MST bracket allows easy installation of an MST (up to 12 ports), simplifying deployment. The integrated fiber splice holder supports splicing at the installation site. Constructed of galvanized steel, the 10-inch pedestal protects critical connections from environmental factors, ensuring durable, consistent network performance.

For more information, visit ISEmag.com/55325892

PANDUIT®

Panduit
www.panduit.com

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THE ORIGINAL STANDARD IN CABLE PULLING FOR 50+ YEARS

For over 50 years, MULETAPE® has set the standard in cable pulling. The original, trademarked tape is pre-lubed, low-elongation, and zero-shrink for safer, faster pulls—especially on long routes and tight conduit. Accurate footage markings and splice-free lengths cut rework and waste, while made-in-USA quality ensures durability on every job. Pair with MULEGLIDE™ silicone lubricant and Trace-Safe® for even lower friction and cleaner installs. Trust the original that still leads: MULETAPE® by Neptco and Chase Corporation.

Chase Corporation | chasecorp.com/products/cable-pulling-and-detection

For more information, visit ISEmag.com/55325506

TETHERSMART MULTI-FIBER TERMINAL – THE SMART CHOICE FOR FIBER TO ANYWHERE

Clearfield's new TetherSmart Multi-Fiber Terminal (MFT) offers a highly configurable solution for a variety of network topologies. Measuring just 1.5 inches by 5 inches, this is the smallest 10-port form factor on the market. Its craft-friendly design requires no proprietary connectors, which cuts costs, reduces complexity and enables a mix-and-match approach for SC, MPO or HFOC requirements. Environmentally sealed and featuring crush-resistant tubing, the TetherSmart MFT is ideal for aerial, above and below grade deployments.

Clearfield | www.seeclearfield.com

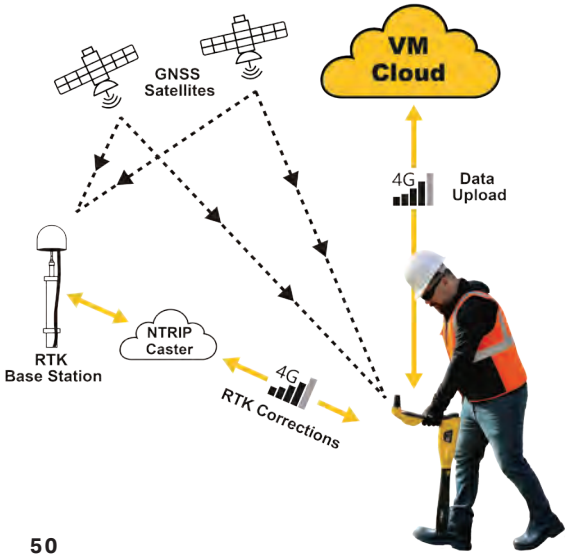
For more information, visit ISEmag.com/55325619

COMPLETE UTILITY LOCATING SYSTEM

Preventing damage to underground utilities starts with installing a reliable tracer wire system and ends by using reliable detection equipment. Copperhead's Complete Utility Locating System® is five simple steps to keeping underground assets safe.

Copperhead Industries | copperheadwire.com/complete-utility-locating-system

For more information, visit ISEmag.com/55325628



VLOC3 RTK-PRO: UTILITY LOCATOR WITH SURVEY GRADE GNSS

Vivax-Metrotech's vLoc3 RTK-Pro locator sets the benchmark in underground utility mapping, delivering survey-grade GNSS accuracy directly in the field with no external hardware required. Paired with the VMMap Pro mobile app, users can capture, visualize, and share precise mapping data in real time. Together with VMMap Cloud integration, this ecosystem streamlines workflows, boosts data accuracy, and empowers utility and municipal teams to make smarter, faster infrastructure decisions.

Vivax-Metrotech Corporation | vivax-metrotech.com

For more information, visit ISEmag.com/55325917

ENABLING HARDENED CONNECTIVITY FOR ALL

USCONEC

HEC-DC

HARDENED CONNECTOR PLATFORM

MPO | LC Duplex | SC Simplex

A harsh-environment connector with proven performance & reliability from your trusted partner.

WWW.USCONEC.COM

HEC-DC INSTALLATION
GET CERTIFIED!
CERTIFICATION

Enabling the Lifestyle of

Better Broadband... And Beyond

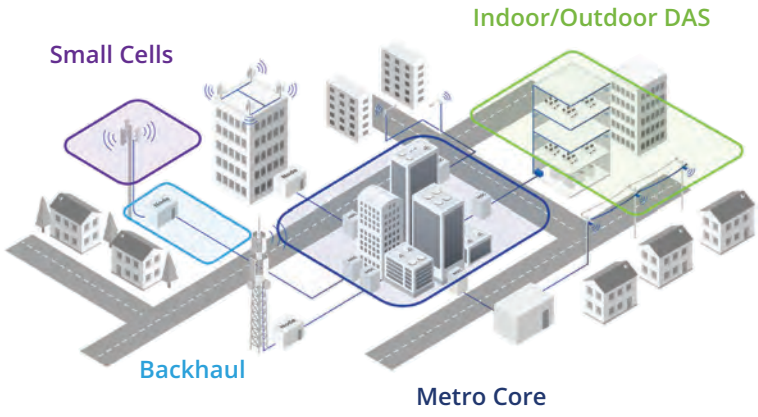
Simplifying a scalable, fiber-rich infrastructure across the entire wireless network

Clearfield's portfolio supports every segment of the wireless network, enabling rapid, repeatable and cost-effective deployments. From the metro core to the cell site, our fiber-first solutions:

- Scale quickly
- Boost versatility
- Ensure performance through rugged, tested designs.

These advantages ensure your customers have quality service whether they're working from home or streaming on the go.

Ask Clearfield® to tell you how.



CLEARFIELD

Technologies that speed your fiber broadband buildout.

Learn how to simplify your deployments at **SeeClearfield.com** or call 800-422-2537

BABA COMPLIANT