



White Paper

The Overlooked Risk in Fiber Expansion

Why Splicing Quality Determines Network Performance



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How advanced splicing methods, testing protocols, and field infrastructure ensure long-term network performance.

As fiber networks become denser and more complex, splicing quality is no longer just a construction step—it is a critical determinant of long-term network performance.

From data centers to residential fiber networks, the demand for fiber is ever-increasing. As fiber availability expands throughout the country, splicing quality remains an often overlooked risk. Poor splicing quality can undermine the long-term performance of a fiber network, creating excess dB loss, trouble shooting challenges, and requiring expensive restoration work. Through high-precision equipment, standardized testing processes, and controlled field environments, quality splicing ensures a network performs in the future.

Fiber-to-the-home deployments bring increased challenges, with higher density and fiber counts often reaching up to 432 and 864+ fibers. Fiber packing density has increased from around 3% in traditional cables to over 13 - 31% in modern high-density cables – roughly a 4 to 10x increase in fiber density [within the same cable footprint](#). As providers reach more homes through expanded networks, previously existing long-haul networks require more network convergence. With more communities and businesses depending on these interconnected networks, the margin for error significantly decreases. Splicing new and existing fiber together efficiently is key to network reliability in a dense fiber ecosystem.

1. Sullivan, K. (2025, May 21). [Microbending loss in single-mode fiber for hyperscale and AI data centers \[White paper\]](https://www.aflhyperscale.com/resources/white-papers/microbending-loss-in-single-mode-fiber-for-hyperscale-and-ai-data-centers). AFL. <https://www.aflhyperscale.com/resources/white-papers/>

The Hidden Cost of Poor Splicing

It can be common in the fiber construction industry to find practices that create gaps, negatively impacting operational efficiency. Some crews only utilize single-ended testing, which isn't always harmful, but is less accurate than bi-directional testing.

Not every crew has a controlled environment for splicing, accurate documentation, or consistent internal processes, resulting in excess splice loss and signal degradation within the network. Because of the intricacy of splicing, troubleshooting a problematic network is far more time-consuming, expensive and difficult than completing quality splicing the first time.

Defining High-Quality Splicing

What makes splicing high quality?

🔴 **Equipment is a key component when it comes to accurate splicing.** Using equipment that complies with industry standards, like the Fujikura 70 and 90 series splice machines, ensures the capacity to splice both single and ribbon fiber. With automated alignment, calibration, and reporting, advanced splicing equipment decreases opportunities for human error.

Testing equipment, like the EXFO OTDR and Exfo Fiberscope, offers testing from 1310 to 1625 wavelengths and allows splicers to accurately determine limited light loss over a specific fiber network. Quick detection of light loss issues is critical for adaptability and scaling, a key component to meeting Tier 1 provider standards.

🔴 **Standard training processes for splicers, such as AFL certifications, ensures each splicer is well-versed in correctly using this equipment.**

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When splicers are trained to use the same equipment and have standardized processes, they're able to move quickly and operate in different environments as needed for maintenance, finishing out networks, or emergency repair.

🔴 A stable environment allows splicing to be a controlled, precise operation. Fully equipped trailers with heat and A/C protect delicate splices from the outside environment, offering storage for equipment and fiber management systems. While there isn't always an industry standard for environmental control, a trustworthy splicing team will prioritize a stable environment that facilitates splice consistency, technician efficiency, and safety.

Even with defined best practices, the real test is execution in environments that are changing, and where downtime within existing networks isn't an option.

Specialized Capabilities

Specialized capabilities help overcome the challenges of working on active networks.

Mid-sheath splicing, a technique where splicers splice into a fiber at a point along its length (not the ends or in a terminal), allows splicers to reconfigure existing fibers or insert new network branches without replacing an existing cable that's at capacity. This advanced technique reduces the need for additional construction and permitting by adapting existing networks to provider needs.

Hot cuts, the term for cutting into a fiber carrying live traffic, require precise planning and speed to prevent disruption to a network. While hot cuts carry more

risk, they are critical for emergency restoration work or expanding critical infrastructure. These advanced capabilities, particularly on active networks, enable rapid emergency response and network expansion with minimal disruption.

Beyond technical execution, the ability to deliver consistent splicing quality across large-scale deployments presents an additional challenge.

Large-scale deployments require carefully planned resources, multiple crews, and the ability to adapt quickly to any changes. Equipping each splicer with standardized resources, including their own splice trailer, allows crews to be deployed quickly and provide consistent splicing quality no matter where they are. Standard equipment across crews and certified training for all splicers supports multi-market builds and aggressive timelines without sacrificing quality. While equipment and infrastructure set the foundation, long-term network performance is ultimately determined by the consistency of the technicians executing the work.

Splicing quality, while sometimes overlooked, directly impacts network performance, reliability, and costs, both short and long term.

Precision tools, controlled environments, rigorous testing standards, and certified splicers aren't optional, but critical for success. Providers who prioritize finding a splicing team with proven quality upfront will avoid long-term performance issues and costly remediation.



A leading provider of contracting services to telecommunications providers, Velox meets the growing need for infrastructure across the country. Based in Huntsville, Alabama, the Velox team provides customers with a seamless experience from network design to fiber construction, emphasizing safety, efficiency, integrity, trust and communication.

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