



CORNING

Beyond Building the Network

Preparing for Day 2

All across the globe, service providers, communities, and power utilities are building fiber-based broadband networks, laying a foundation for a better future. These stakeholders recognize that world-class communications networks built on fiber are the foundation for long-term economic prosperity. Indeed, the decisions to embrace and build these networks have far-reaching implications that shouldn't be understated. They are monumental investment decisions that can help determine the future of a community and you may only get one chance to get it right.

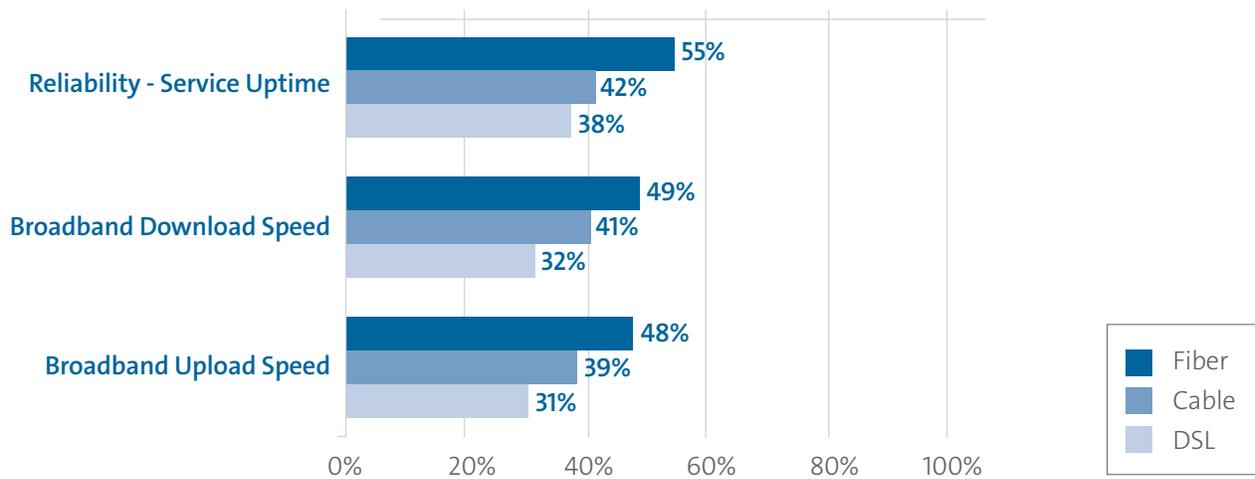
For some, initial analysis of these investments can result in reservations, with concerns for achieving an adequate return-on-investment. It's an understandable response, given the nature of these investments. What's required, though, is a comprehensive analysis of not only the costs required to build these world-class networks, but the total benefits these networks can bring to bear for a service provider and a

community. The totality of installing new fiber optic cables (or rewiring) a community for its future must be taken into consideration.

This comprehensive analysis should bear in mind that fiber-based broadband networks are laying the foundation for the next 50+ years. All too often, capital expenditures required to build the network are the primary focus, with little attention paid to the implications and benefits that begin to accrue on "Day 2," once the network is operational. Indeed, Day 2 and what happens after it are critical components of the equation that are all too often overlooked and not factored into the initial evaluation. Operational considerations to include in the evaluation process include customer experience, network flexibility, network management, end-customer demands, and extreme weather, among others.

Fiber Has Higher Satisfaction By All Key Factors

Very Satisfied By Type of Provider | RVA Consumer Study, May 2018



Fiber Can Enable an Excellent Customer Experience

No other technology, copper or wireless, can deliver the customer experience (CE) that is enabled through a fiber-based network. And in today's competitive environment, CE can make or break a service provider's business plan. Deliver a poor CE in the face of competition and you do so at your own peril. In a world where Amazon Prime and Netflix prevail, customers have no patience for a poor CE and will vote with their wallets.

By deploying fiber, network operators are modernizing their network, giving them a unique opportunity to layer on systems and processes that put CE into primary focus. Networks can be built to the specifications and expectations to enhance the CE, delivering the experience that exceeds competitive service providers. This is an opportunity to set the new bar in CE in the communications business. Simplicity and automation are key, and fiber networks allow service providers to explore any and all possibilities, without fear of impact on network performance.

There is no application or demand that can't be met through fiber, both now and in the future. No other technology can make this claim. By deploying fiber, network operators can

ensure they have the underlying technology foundation to address and handle whatever CE capability is required to achieve and maintain competitive differentiation.

Innovation Demands Network Flexibility

Fiber technology is often referred to as future-proof. At Corning we call it "future-ready." This reality creates a tremendous advantage, providing much-needed flexibility in an ever-changing marketplace. The pace of technology innovation is now unprecedented. Applications that no one can dream of right now can be developed, incubated, and deployed in relatively short order in the future. A new "smart lifer" persona is emerging, where consumers are embracing connected technology like never before. Market research firm GfK now counts 16 million "smart lifers" in the United States and growing rapidly.

Service providers need a network that is flexible enough to support these new innovations and consumer categories. Only fiber can deliver this flexibility. One has to look no further than the smart city to understand this imperative. Smart-city applications are emerging rapidly and promise to make

a significant impact on the quality of life for citizens and to provide a wealth of education, healthcare, and e-government opportunities for the community. To take full advantage of whatever smart-city applications emerge, service providers should embrace fiber networks. With sound fiber network design, network operators can connect network elements at the street level that enable virtually any Internet of Things (IoT) service or application, regardless of bandwidth demand or latency requirement.

This design approach takes on more urgency as we move into a 5G world, where fiber backhaul is the foundation of any 5G network. Communities that don't want to be left out of the promising 5G future must ensure they have robust fiber infrastructure to enable that future. Considerations for upsizing cables should be well understood and planned to minimize having to place additional cables at a later date. Lighting up 5G in a community will require a fiber network designed to easily add access points at the street level for small cell and other required 5G infrastructure. In some cases the fibers for 5G sites will utilize existing fiber that has active customers; developing a plan that minimizes any effect on the existing working services must be well understood.

Meeting Business Customer Demands and Winning Important Deals

Long-term success for any broadband network is determined, in large part, by the ability of a service provider to meet any demand or service request from a diverse customer base. While much attention is paid to residential consumers, service providers should aim to meet varying demands from business as well. Ensuring that networks have the ability to support business- and enterprise-class services can contribute greatly to a successful business and can be a catalyst for economic development in the community by enticing new business to set up shop. The revenues these services generate are critical for operational success, particularly in a competitive environment.

Having the ability to bring fiber connectivity to support a rapid and dramatic expansion of wireless infrastructure is not only critical for any community's future, but also important to the bottom line of a network operator's business plan.

Network Considerations Increasingly Should Include Weather

Extreme weather circumstances are on the rise and that is a critical consideration for "Day 2" operations. Service providers all across the globe are facing extreme weather from more intense hurricanes or "super storms," tornadoes, and expanding and frequent wildfires, to name a few. Preparing network operations to "weather" these extreme circumstances is now required, and once again fiber comes out ahead.

Extreme storms bring high winds and flooding, both of which can be catastrophic to copper-based and wireless networks. Flooding can destroy copper-based networks, while high winds can take out important wireless infrastructure.

Residential and business customers are becoming ever dependent on network connectivity and quick restoration of their connection is essential.

Flood-damaged copper infrastructure often must be replaced, creating significant delays in service restoration. Bad storms interfere with wireless signals, especially fixed wireless signals, and can take down necessary towers and antennas, prolonging the time required for service restoration. Fiber networks are not immune to extreme weather but are less susceptible to flooding damage and can better withstand increasingly extreme weather.

Additionally, if designed and constructed correctly, fiber infrastructure can be more quickly restored after a storm hits. Much of the delay in restoring service after storms comes from repairing and replacing network drops to the customer premises. The use of preconnectorized solutions for fiber drops can dramatically reduce the time to restore these damaged customer location drops. These solutions make for faster and less costly restoration, providing benefits to both customers and network operators. Residential and business customers are becoming ever dependent on network connectivity, and quick restoration of their connection is essential.



With extreme weather now so much a part of our reality, designing networks that are both less susceptible to damage and quicker to restore are important factors that aren't necessarily taken into consideration from the beginning. Networks that are less damaged and more quickly restored provide a better CE when the community needs it most. These networks also can restore revenue-generating activities more quickly – Day 2 factors that should not be ignored.

You Get One Chance to Get it Right

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Conclusions

Broadband stakeholders have important decisions to make regarding the future. Perhaps there is no more important infrastructure decision to be made than wiring cities and communities for communications networks. No other decision has as much impact on a community's economic potential and future.

There are different options to consider, with fiber broadband widely viewed as the underlying technology with the most promise and the only one to be commonly labeled as future-proof. As stakeholders evaluate this important infrastructure decision, they must ensure they include all factors, including the operational factors that come on Day 2, once the network build is complete. Only this comprehensive evaluation can provide the full picture, providing all the necessary inputs to make the right decision. You're only going to get one chance to get it right.

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