Fiber

An Essential Facet of the Connected Community

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Content

Fiber: An Essential Facet of the Connected Community

This white paper is meant to be an educational tool and reflects the views of the authors.

Abstract

Consumers are preparing for the new opportunities offered by the rollout of fifth-generation (5G) technology and the broader Internet of Things it enables. The backbone of these new communications tools is fiber connectivity. Fiber that is deployed both aerially and underground is essential to 5G. Challenges to fiber deployments exist in several areas. Access to the right-of-way (ROW) is often an obstacle in terms of time and of cost. Municipalities face their own hurdles, including having robust permitting procedures and adequate staff in place, which can delay deployments. However, municipalities can adopt practices that promote transparency, foster trust among stakeholders, and allow efficiencies that save time, money, and promote connectivity. This report will study the role of fiber in next-generation connectivity, and address actions that could help bring connectivity to Americans to maximize the advantages that come from a 5G rollout.

Introduction

5G wireless networks are poised to transform nearly every industry, connecting billions of devices throughout the world, enabling changes to everything from how people communicate to how businesses monitor their assets. Indeed, in 2035, 5G will enable $13.2 trillion of global economic output, according to a 2019 IHS Markit report.[1] The buzz around 5G focuses on the wireless aspect of the technology. However, the connectivity it advances is only made possible by extremely dense fiber networks.

About 11 percent of internet traffic is carried by wireless networks, according to a 2017 report by Deloitte.[2] The other 90 percent of traffic is supported and carried by wireline networks. The quality and reliability of a wireless network typically depends on the fiber network carrying traffic to and from cell sites.

Compared with previous generations of wireless technologies, 5G wireless networks are the first to use higher frequency millimeter waves, in addition to other frequencies. Notably, millimeter waves can only travel about 250 feet – so dense fiber networks close to customers are needed for high-speed backhaul.

The number of devices connected through the Internet of Things (IoT) is projected to reach 20.4 billion by 2020, according to a forecast from Gartner Inc.[3] IoT sensors generate a continual stream of data about the products and equipment they are connected to – and high-speed, low-latency fiber-optic networks enable that data to travel to data centers, other repositories and the internet extremely quickly.

To achieve the lightning-fast speed and dependability offered by 5G, ubiquitous connectivity is vital. Fiber presents this opportunity, functioning as the connective tissue of next-generation services. This report explores the changing nature and architecture of fiber networks needed to support 5G; challenges to building fiber networks that enable next-generation services; and best practices that municipalities, utilities and other stakeholders may adopt to facilitate connectivity and the many opportunities it provides to their communities.

Fiber's Evolution to Serve 5G

5G network design requires the use of more fiber to improve network coverage, capacity, and quality, because other options, like traditional copper transport and wireless backhauling, cannot scale to the massive amount of data that requires backhaul. In 2018, the world generated 33 zettabytes of data, which represents enough information to fill around 33 million human brains. This massive and ever-expanding demand for data transfer, compute and storage is driving the need for networks that leverage extremely dense topologies to deliver not only maximized accessibility, but optimized capacity as well. To truly support 5G applications and meet the needs of the technological future, the infrastructure network will have to do more than just evolve, it will require a revolution. Underlying networks will be completely reimagined to densify wireless on an unprecedented scale. Especially when it comes to more metropolitan areas, empowering densification efforts for fiber networks to connect densified wireless antennas is essential to creating a future where 5G can thrive. In areas like New York City, this can mean antenna locations need to be placed at every intersection, which are only 250 feet apart or so, instead of every few miles. To achieve this, industry will leave behind the era of the Digital Radio Access Network (D-RAN) and move into the Cloud Radio Access Network (C-RAN) world of centralized or cloud-based architectures.

Of course, this is not to say that backhaul architecture will become completely obsolete. Instead, as network builders move into more 5G deployments, older fiber infrastructure elements will be used to manage backhaul needs from edge data centers as they connect to the core. However, they will be complemented by new and vital fronthaul elements consisting of ethernet applications, as well as lit and dark fiber service solutions. Fronthaul, like backhaul, will provision high capacity, but it will also play the pivotal role of ensuring a high degree of data accessibility as it connects network edge locations to the masses of new antennas that will continue to be placed wherever and whenever possible. Luckily, the implementation of fronthaul is being driven by the fact that more mobile operators are understanding the model as a "horizontal cell tower," presenting a huge opportunity as a shared resource that can help achieve an economy of scale.

Reinventing Underlying Infrastructure

As networks extend closer to the user and reach even farther to deliver futuristic capabilities and 5G opportunities, signals from the macro base stations are being divided and redistributed into a dense fabric of small-cell and antenna sites. This process will continue to serve either as a cornerstone of 5G success or as a barrier to it, depending on how effective the industry is at revolutionizing these networks.

Unfortunately, while industry continues to build toward this dense, robust ecosystem of antennas, roadblocks in the path to 5G-capable infrastructure can inhibit progress. For instance, when mobile operators look to expand their backbones and implement densification projects, they can be hindered by a lack of understanding on the part of municipalities. With this much infrastructure being deployed, issues of public ROW or aesthetic concerns over antennas can raise issues for local governing bodies. Beyond that, since this model of network expansion is still relatively new (especially on the municipal side), municipalities and state and local governments have not yet produced homogenized, standardized requirements and processes for deployment. Without a universal regulatory framework recognizing wireless and wireline interoperability, each location may have different rules, regulations and expectations for building wireless small cells or antennas on street poles and other street furniture, which will make many new projects a challenge to navigate.

Impediments to Building a Fiber Network

The role of physical network infrastructure will only grow as 5G rollouts continue. The impediments to building a fiber network may seem daunting at the onset of a project, but obstacles that are identified can be surmounted with proper planning and execution. Identifying roadblocks and implementing a plan to overcome them can ensure a successful project. When contemplating the challenges to building a fiber-optic network, issues likely will arise in the pre-planning administrative stage; the design and permitting stage; and the construction stage. It is also important to consider the differences that exist in each of these phases depending on whether the project is aerial or underground network construction. While many of the impediments are similar for both types of fiber deployments, the subtle nuances of each suggest different courses of action for either type of build.

Any entity wishing to construct a fiber-optic network must be a certified communications carrier or recognized as a valid deployer of communication, broadband, internet, etc., under federal or state guidelines. A school district that wants to deploy a private solution can be denied aerial attachment access to utility poles because it does not meet the criteria set forth by the pole owners and public service commissions to attach to those poles. Similarly, a private entity may be required to post a bond or other financial considerations to gain access to the public ROW. These financial considerations are a way to future-proof for situations that may arise later. For example, taxpayers should not have to pay to relocate an underground conduit system if the company deploying the fiber declared bankruptcy.

The Pre-Planning Administrative Phase

In aerial deployments, one of the first steps in the pre-planning administrative phase is to procure an Aerial Attachment Agreement with the pole owner. These agreements specify the terms and conditions of making an attachment to the pole. Administrative functions include the execution of the contract, the provision of certificates of insurance, as well as surety and financial capability statements. Fiber-optic builds can cross territorial boundaries so sometimes multiple attachment agreements need to be in place to account for different pole owners across the build. Regardless of the owner, the attachment agreement will specify the cost of attachment, typically in terms of cost per attachment per year. It also will detail the process for making an attachment application as well as the timelines associated with gaining approval to access the poles. While many entities have developed or adopted electronic portals for filing and paying for attachment requests, other entities still rely on paperwork filings that are difficult to track and monitor. Municipal ordinances that are unduly restrictive and/or economically infeasible may hinder getting much-needed fiber to that community. Obsolete attachment agreements that do not address new types of utility installations hinder 5G deployments. Additional impediments to consider in the pre-planning stage would be any specialty permits that may be required to complete the fiber-optic build and include many examples such as railroad crossings, private easements, highway crossing permits and similar challenges. In each of these examples, the authority must be contacted and their terms for allowing access must be met.

During the administrative phase of an underground project, challenges are similar, but they tend to involve a greater number of entities or authorities. While pole owners tend to cross the boundaries of localities, municipalities, townships, counties and states, underground ROW tends to be much more localized in their governance and the standards of application vary considerably. Sometimes sub-jurisdictions within one authority can have different procedures. For example, a state Department of Transportation may have different preferences and policies from district to district. Access to municipal infrastructure is governed by different rules than access to utility infrastructure. During the administrative phase of a project, it is important to identify each of the authorities that will need to be engaged and become familiar with the requirements and procedures of every entity.

The Make-Ready Process for Aerial Planning

The largest challenge to building a fiber-optic network is the time it takes to get permission to build the network, coupled with the unpredictable costs to make the poles ready to accommodate the new fiber deployment. This "make-ready" process is often the single biggest impediment to deploying an aerial fiber network.

The make-ready process can vary greatly from pole owner to pole owner and it is prudent to provide an outline and definition of the process. When discussing make-ready, it is important to delineate between power make-ready and communications make-ready. A joint-use utility pole is separated into power space and communications space. The power space is the top section of the pole that houses power attachments such as power cables, transformers, neutral lines, streetlights and the like. The communications space begins 40 inches below the neutral lines and is home to communications attachments such as telecommunications providers, CATV and private fiber carriers. The communications space must provide adequate clearance above ground level for the safety of the public and common-sense reasons such as adequate clearance for vehicles. The make-ready process is intended to ensure the maintenance of safe distances between the power and communications spaces as well as adequate separation of each attachment.

The entity applying for permission to attach to the pole is the "cost causer" when the new attachment necessitates make-ready work by existing attachers to accommodate it. During the make-ready survey, which is always conducted at the cost causer's expense, the pole owner determines the make-ready work that needs to be completed. Generally, costs associated with make-ready work will be borne by the cost causer. However, the cost causer is not responsible for remediating "pre-existing conditions" during the make-ready process.

In an effort to expeditiously deploy broadband and set fair and reasonable rules, the Federal Communications Commission in 2018 enhanced its existing rules for the make-ready process. Those changes streamline make-ready processes by cutting the existing timeline to complete communications make-ready in half, adding a one-touch make-ready option, adding a self-help remedy for power make-ready, and allowing attachers to certify new contractors to perform make-ready surveys and make-ready work, among other reforms. The complete order can be found here.

While these timelines are baked into federal law, delays can occur if errors are discovered or authorities are understaffed. Weather conditions, storm duty, and utility outages also can impact

Railway ROW are often a great place to deploy fiber because networks tend to follow networks; however, rising costs associated with railway occupancy has become a barrier to deployment. Telecommunications and transportation networks are harmonious in the endeavor to connect people, especially when distance is a barrier. Within railway ROW there are three primary deployment methods: longitudinal, aerial or track crossing. Each method requires separate regulatory and cost analysis. In general, the telecommunications carrier chooses which method best suits its needs.

Railroads were granted public lands for public purpose, mostly through the public condemnation process. As such, railroads have an obligation to support the public interest. However, some challenges occur when trying to deploy fiber in the railroad ROW. It can be tedious and costly for carriers to determine who has underlying ownership and associated rights. Second, costs vary among railways, regardless of whether the track is a longitudinal deployment or track-crossing fiber deployment. These potential obstacles must be addressed holistically for carriers to deploy fiber in the railroad ROW.

timelines. Existing attachers that do not have adequate resources readily available to move their equipment is another factor that can stall the buildout.

Cost Factors

While time spent on the make-ready process continues to be a challenge, so, too, does cost. In some scenarios, the utility pole may simply be too full or too old to accommodate further attachments. As more fiber is deployed, the pole may become too populated to maintain safe separation distances between the existing cables or adequate clearance from either the power space or ground level. At that point, the pole may need to be changed to a taller one. Where the pole owner is not regulated or an electric utility, pole changeouts are subject to the willingness of the pole owner. While a reasonable approach would be for the pole owner to charge only the actual costs incurred to complete make-ready work, many pole owners, such as municipally and cooperatively owned utilities, are not subject to any regulatory rules and may include a flat-rate mark-up on top of their estimated costs. Those estimated costs do not bear any regulatory scrutiny, either, and may grossly overstate the anticipated costs to ensure the electric utility profit on the work.

Underground Planning

A challenge similar to aerial make-ready, though far less complicated, is the process for using existing underground infrastructure. During the permitting and design stage of a new fiber-optic build, a fiber deployer will decide whether to make use of existing underground conduits or to apply to place new conduit in the ROW. Identifying the unique ROW filings and occupancy requirements of each entity that the fiber will traverse can be daunting, in part, because of the number of jurisdictions involved. Further compounding jurisdictional issues is the lack of modern systems for many of the entities that would detail specifics such as conduit location, availability and vacancy. Progressive entities have developed electronic portals that detail the information, but, in fairness, visiting every manhole to determine the exact inventory would be a tremendously costly endeavor due to the complexity involved in accessing manholes.

If data is inaccurate, it is often discovered during physical field verification. In short, challenges that may crop up in the planning stage of an underground project can be just as difficult to foresee as the subsurface existing plant itself.

Companies deploying fiber need to register with the state or jurisdictional "One-Call" system to ensure their excavation plans do not damage any previously installed infrastructure. Maps will need to be updated and routinely provided to the One-Call system to ensure the existing networks are protected. Some authorities use online applications, which helps to streamline the process. Even with electronic filings, insight into the data is not always available, in part because some authorities hesitate to provide open access to the records, citing security or competitive conflicts.

Other possible impediments to underground permitting issues would be any crossing of physical obstacles such as roadways, railways or waterways. These types of underground permits typically carry a heavier degree of engineering and can be unique in their requirements and the timelines associated with obtaining permissions.

Construction Challenges

The average time to complete a fiber-optic build typically ranges from nine months to one year. The actual construction is the shortest phase of the project and depends largely on the size of the build and resources available. Miles of fiber can be aerially installed in a few days, while underground builds may take slightly longer to complete. The largest impediment to construction is the lack of skilled labor.

For aerial construction projects, the one-touch make-ready process cannot always be used. Delays in the make-ready process can leave sections of the network incomplete or temporarily built until the newest attachment can be positioned into its final attachment point. Safety should be of utmost importance and items such as proximity to the power space, traffic control, and exposure to the elements of nature should be addressed during the construction of the network.

For underground construction, safety is also of grave concern. Traffic control, setting up the proper equipment, testing for dangerous gas buildup in the manholes, and purging the gases and excessive fluids from the manhole are necessary tasks that require considerable time. Fiber deployers request locate tickets through the One-Call authorities so that each entity has sufficient time to mark its facilities in the location of the new construction to avoid inadvertent damage to those subsurface facilities. While digging to bury a fiber-optic cable or install a new conduit may be costly, striking underground gas or power lines may prove deadly. Mismarks of existing underground utilities are uncommon, but they can occur.

Another subsurface impediment to deploying fiber is the existence of rock in the proposed pathway of the new construction. While rock can be avoided, excavated, or cut, it typically requires larger equipment and takes longer than excavating through normal soil. The existence of rock can increase the time and cost of the project.

Of further financial consideration are the costs of road and/or curb repair disturbed during the construction of the network. These costs vary greatly from one jurisdiction to another and can often result in costs beyond the control of the parties deploying networks, as each jurisdiction may complete designated repairs internally or have preferred contractors that complete this work without the need to provide competitive pricing. While all these factors may indicate that aerial network construction may be less costly and difficult, it is important to remember that aerial deployments typically take much more time to complete due to the make-ready process. It is not uncommon for underground fiber projects to be designed, permitted and built within 60 to 90 days, depending on the size of the build.

In both aerial and underground scenarios, other impediments to consider include the schedule of the project and whether it will encounter weather-related difficulties. Underground construction in northern portions of the United States depend heavily upon temperature cycles and when the ground freezes or thaws. Aerial deployments are less affected by weather issues such as snow or rain, though they can also contribute to delays in construction. Plowed roads, for example, may not allow a bucket truck to get close enough to the pole line to complete the required work.

Further causes of delay include construction moratoria that exist in the jurisdiction where the work is being completed. While these moratoria typically are in effect around holidays, it is not uncommon for jurisdictions to have moratoria that are local and less likely to be identified during the planning stage of a project. For example, college towns may impose construction moratoria in conjunction with school functions such as new student move-in days, game days or other student-related activities.

Best Practices

Although the range of issues that may be encountered in any given build precludes a one-size-fits-all solution, a number of recommended best practices may help stakeholders navigate the process from start to finish, or from the conceptualization and planning phases to the completed construction. The best practices listed here are certainly not intended to be exhaustive. Rather, they are practices that have proven beneficial to a wide range of stakeholders over many years of collective experience. They promote transparency, foster trust among stakeholders, and allow efficiencies to be adopted that save time, money, and promote connectivity and all its related benefits.

Communicate Challenges to Timely Deployment Early and Often Across All Interested Stakeholders

Deploying fiber networks, whether for enterprise service, to support wireless technologies, or both, can be a heavy lift for the companies and personnel involved. Impacted entities include the following:

- The utility that owns the infrastructure;
- Existing attachers or occupants on utility infrastructure;
- Municipal and state entities with oversight of the ROW through which the network will be deployed;
- And other interested parties, such as businesses along the street.

To ensure that all stakeholders have the information needed to understand and subsequently evaluate applications submitted in support of a build, open communication among all stakeholders is essential. One best practice for any significant new fiber-optic build is for the company undertaking the build to convene a kick-off meeting for any necessary utility, municipal and state stakeholders to attend. A kick-off meeting involving key stakeholders optimally provides an opportunity for the entity building the network to provide a high-level overview of the project, including its scope and components, and allows key stakeholders to ask important questions. Items of concern can be acknowledged and addressed before any applications exchange hands. Frequently, kick-off meetings raise awareness about other planned projects, which may generate the possibility of efficiencies for aerial and/or underground deployments.

In general, kick-off meetings facilitate the free flow of information and create an environment of transparency and trust among the interested parties. They also lend themselves to a continued, open dialogue and coordinated check-in points for the key players involved – which are both vital to the timely and cost-effective deployment of fiber networks.

Resource Constraints

With the volume of fiber attachment and occupancy applications consistently increasing each year, permitting entities and engineering departments may be understaffed and have difficulty keeping pace with the number of applications submitted. This has been exacerbated due to budget shortfalls and other challenges related to the COVID-19 pandemic. Fiber providers are aware that there are resource constraints nationwide. Although predictions for exponential increases in attachment application volumes have been circulated for several years, permitting agencies and utilities may not have hired adequate resources to field these changes. Many telecommunications and broadband deployment companies are willing to assist with the hiring shortfall by offering to fund contract resources to assist with application processing and engineering reviews. Likewise, if the staffing shortfalls are recognized early in the process, telecommunications and broadband providers may be poised to offer unique solutions to help the permitting entity meet applicable timelines and maintain the degree of assurance needed that any proposed deployments comply with the pertinent widescale and individual standards at issue.

Skilled workers qualified to perform communications space make-ready and power space make-ready are also in short supply. Pole owners and attachers alike are best served when pole owners qualify a sufficient number of make-ready contractors to accommodate construction within applicable timelines. Typically, the number of contractors needed to do the work depends on the market and project – but the maximum number of contractors who reasonably meet the qualifications set forth in 47 C.F.R. §1.1412 should be qualified as approved contractors.

Limitation of Make-Ready Costs to those Actually Incurred

To ensure the greatest scale of connectivity, costs associated with make-ready must be reasonable and should include only the actual costs for survey, engineering, and, if applicable, make-ready construction. Administrative mark-ups on make-ready costs, including application review, premiums on survey and engineering, and mark-ups on the costs of internal or external crews conducting make-ready construction can serve as barriers to deployment. Fiber deployments also commonly result in costs associated with street and curb restoration. Rather than adopting a schedule of costs that does not reflect costs incurred to complete street or curb restoration, restoration costs should be linked to the actual costs incurred and should be objectively reasonable.

Because pole owners own scores of poles, situations arise where a new attacher seeking to deploy communications facilities on poles encounters a pre-existing non-compliant condition, whether caused by existing attachers or the pole owner, when it surveys the poles for attachment. The party seeking authorization for a new attachment has not contributed in any respect to the pre-existing condition of the pole. Therefore, it should not be responsible to correct or pay to correct any pre-existing non-compliant condition as a prerequisite to attaching to the pole. Attempts to place the burden on the new attacher to correct the pre-existing condition or violation are unfounded and may chill the deployment of facilities on which next-generation services depend.

Flexibility

Flexibility among key stakeholders is vital to advancing connectivity and deploying fiber networks. That flexibility involves employing reasonable, common-sense approaches to review, standards, and engineering where communications deployments and connectivity goals are pursued. For instance, fiber companies should be allowed to design their fiber networks to the most reasonable and cost-effective deployment solutions, whether underground or aerial. Being more accommodating for deployment routes with limited make-ready costs is also a preferred posture. Communities also can demonstrate flexibility by being open to engage with industry to explore new technologies and methods to expedite deployment.

Remaining flexible throughout the design and budgeting stage of any project allows stakeholders to make well-informed decisions that will impact the overall cost and timeline of any given project. For aerial construction, a best practice is to investigate several possible fiber paths that may avoid concentrated areas requiring heavy make-ready. If a longer fiber path requires less make-ready, it could make that pathway more efficient than a shorter path requiring more make-ready.

Another potential design option is to avoid aerial make-ready costs and timelines altogether by investigating underground alternatives. While underground construction is much more expensive during the construction phase of a project, permitting issues are typically far more expedient and can realize a much quicker deployment cycle as technological advances in areas such as street boring and subsurface exploration have evolved. It is also highly advisable to seek any available underground infrastructure that may be available for lease in order to keep construction costs reasonable. In any scenario, it is critical to remain flexible, proactive and prudent during the design of a new fiber build. Additional spending on due diligence during the design stage can realize exponential savings during the deployment stage of the project.

Clarity

One particular impediment that may significantly stifle fiber deployments is the lack of universal standards regarding timeframes for review and construction. Quite often, municipal electric companies and cooperatives that own poles, though not subject to any state or federal regulations, are encouraged to adopt FCC attachment timelines. The transparency these regulations afford regarding deployment timetables encourage investment in communications networks in these areas, bringing vital services to these communities.

Obstacles and challenges are common in any project, and fiber builds are no exception. While the primary impediments are mainly the timelines associated with obtaining permits and the costs associated with obtaining those permissions, such as make-ready, barriers to completion of the project typically can be resolved with advanced planning. Properly budgeting a project and setting reasonable expectations for the completion of the project is paramount at the outset of a project. While recent attempts to streamline the make-ready process have been initiated, only time will determine if their effect will prove to lower costs and shorten timelines.

Conclusion

The deployment of robust and dense fiber networks is a mission-critical component in providing consumers with high-speed 5G broadband connections no matter where they live, at prices they can afford. It is certain that the push to build 5G and other advanced networks that support the Internet of Things (IoT) will continue to grow at an exponential rate, as will the labor needed to deploy it in the field. The sheer volume of that anticipated workload will inevitably overtax the existing processes as they exist today. If all stakeholders work in concert to find innovative solutions to fiber deployment challenges, it will make the progress enable by 5G a reality sooner rather than later.

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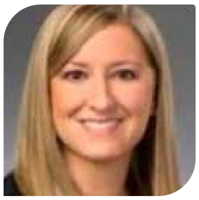

Rebecca Hussey serves as Managing Counsel, Utility Relations, for Crown Castle. Prior to joining Crown Castle, Rebecca represented telecommunications and utility clients in matters before state public utility commissions and the FCC. She served as an administrative law judge/attorney examiner for the Public Utilities Commission of Ohio, presiding predominantly over matters relating to electric utilities. She also represented the State of Ohio as an Assistant Attorney General and later as an Assistant Chief in public utility, power siting, and environmental matters in courts of law and before regulatory agencies. Rebecca enjoys collaborating with utilities, municipalities, and other entities to ensure the safe and timely deployment of communications equipment and services throughout the country.

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Pat Foster develops public policy positions and coordinates advocacy support for a wide range of issues affecting AT&T's businesses at federal, state, and local levels domestically, and internationally. He addresses policy matters affecting AT&T's next generation consumer services, including VoIP, broadband, and video services. He also advises on matters concerning N11 and network infrastructure, including pole attachments and rights of way. Prior to this role, he held positions at AT&T in network operations and product marketing. Pat earned an MBA with a concentration in Telecommunications Management from the University of Dallas, an MS in Industrial Engineering from the University of Oklahoma, and a BS in Industrial Engineering from Texas A&M University. He resides in San Antonio, Texas.

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As Co-Founder and Chief Executive Officer of ZenFi Networks, LaChance applies his leadership and proven industry expertise to build and deliver innovative communication infrastructure solutions to enterprise, carrier and wireless mobility providers in the New York and New Jersey metro markets. In this role, LaChance oversees all aspects of business operations for the company that recently merged with Cross River Fiber, and effectively leads a team of nimble, forward thinking experts to solve clients' network challenges created by the proliferation of mobile data. In addition to his role at ZenFi, LaChance is also a founding member of Metro Network Services, LLC, a company focused on fiber optic and mobile network planning, engineering, and deployment solutions for mobile network operators, tower owners and telecommunications service providers throughout the New York metro market.

LaChance is a Network Technology industry veteran with more than 30 years of experience managing teams that design, build and operate complex, high-capacity communication networks for large enterprises, carriers and wireless mobility providers. Prior to ZenFi and Metro|NS, he served as President and CEO of Lexent Metro Connect, LLC from 2004 to its successful sale in December 2010 to Lightower Fiber Networks. LaChance was also the Co-Founder of Realtech Systems Corp., an enterprise network integration and professional services firm, where he served as President and CEO. He received a Bachelor of Science degree in Computer Science from the State University of New York at Albany.

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Deron Leight is the Vice President, co-founder and owner of Celerity Integrated Services, Inc. Celerity specializes in the design, construction and ongoing service and maintenance of fiber optic and wireless infrastructure. Prior to founding Celerity in 2002, Deron started his career as a Tower Climber prior to moving to the fiber optic side of the industry where he spent time as a Fiber Splicing & Testing Technician, Project Manager, Bidding & Estimating Manager and Business Development Representative. Deron has 24 years of experience in fiber optic and wireless engineering and construction. He holds a Bachelor of Arts from Pennsylvania State University and a Master of Arts from Millersville University.

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Brandon Reed is vice president of Underlying Rights and Government Relations at Zayo. In this role, Brandon is responsible for building advocacy campaigns and establishing strategic relationships for the company across the United States, Canada and Europe. Brandon has more than 16 years of hybrid legal and lobbying experience, advocating before federal, state and local governments.

Prior to joining Zayo, Brandon was a senior manager at T-Mobile. Within his first year, he was named a T-Mobile Winners Circle and PEAK Award nominee, an award chosen out of 53,000+ employees and represents the top 1% at the company. Prior to T-Mobile, Brandon was an executive manager of federal, state and local for Collier County, Florida. He also served as the chief counsel's clerk within the U.S. Coast Guard (JAG), overseeing Macondo oil exploration following Deepwater Horizon. Brandon has held other Washington, DC based positions including with NACHA - The Electronic Payments Association, Russ Reid Firm, the Republican National Committee and the U.S. House of Representatives.

Brandon received his Bachelor's of Arts & Science from Louisiana State University and his Juris Doctorate from Southern University Law Center.

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Endnotes

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