



## **The Road to 5G is Paved with Good (Fiber) Intentions**

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By Johnny Hill, COO, Clearfield

There is no doubt that the advent of 5G will soon be upon us and everyone from service providers to customers are excited about the potential of what 5G can bring to the table. For service providers in particular, it is the ability to be able to meet the increasingly high bandwidth demands from their customers. In a world that is dominated by the need to access high quality video and applications from anywhere at any time, service providers are grasping at any solution that might provide a wider pipeline for bandwidth and speed. That is where the potential of 5G comes into play and becomes an increasingly attractive option to leverage to meet customer demands. As with any transformative technology however, come the growing pains and the need to update how service providers create the infrastructure needed to support such radical change.

According to Cisco's Visual Networking Index (VNI) Global Mobile Data Traffic Forecast Update, global mobile traffic data grew 74 percent in 2015, reaching 3.7 exabytes per month by the end of 2015, up from 2.1 exabytes per month for 2014. The Cisco VNI also predicts that by 2020, mobile traffic data in North America alone will grow 6-fold, compounding at an annual growth rate of 42 percent. Additionally, American research and advisory firm, Gartner, Inc. predicts that 20.8 billion devices will be connected to the internet by 2020, compared to the estimated 6.4 billion that are connected today. These are just a few of the stats and figures that are driving the market to push so aggressively for the implementation of 5G. The transition to this new form wireless technology will not be an easy one though, and will require key assistance from the fiber community. Reaching the minimum 1Gbps speeds that 5G promises to achieve isn't the only driving factor toward fully implementing 5G.

Consider the amount of connected devices in a single home - from tablets and smartphones, to connected refrigerators, thermostats, lights, security systems, etc. All of these devices and services need dedicated bandwidth and high speeds to stay constantly connected. As more and more consumers add these devices to their homes and we begin to fully realize the Gartner prediction of 20.8 billion connected devices in the next three years, the bigger the expectation of what 5G can and should do, will be. The point is, the technology needs to work, and it needs to be ready to tackle the immense challenges the market and service providers will require of it. The only way the 5G revolution can occur is if service providers embrace the role that fiber will play. Fiber will be the backbone that 5G will use to make that final connection to the consumer successful. According to the Cisco VNI report, mobile offload exceeded cellular traffic for the first time in 2015. Fixed networks were utilized to handle nearly 51 percent of the total mobile data traffic, which works out to about 3.9 exabytes of data being offloaded onto the fixed network each month. 5G will need a robust wireline infrastructure in place in order to meet the expected amount of offloaded data from wireless network users.

The "always-on consumer" will not accept a lack of access to the high speeds and bandwidth 5G promises because the legacy wired network cannot handle the amount of traffic being placed upon it. Service providers will require a fiber infrastructure that meets the needs of not only the customer, but also the wireless network itself, and provides that allocated bandwidth for offloading data within a short distance. The key will be the implementation of "small cell" configuration to help increase the network's capacity and density, which will support backhaul from the sites themselves.

Tier-1 carriers such as AT&T, Verizon, Sprint and others have all made efforts to incorporate small cells into their network builds, deployments and upgrades. Small cells – such as Femto cells, Metro cells, Micro cells and Pico cells – when placed into an existing network can significantly increase the amount of throughput and total network bandwidth. This in turn gives the service provider the flexibility it needs

to effectively provide hotspots that feature denser connectivity possibilities. In order to be fully successful in providing the backhaul necessary to support the 5G network, small cell backhaul capability will need to be expanded. There are several considerations to review before service providers can go down this road:

- Service providers need to understand and clarify how much speed and capacity they will need to meet the demand of their customers. Short-term and long-term needs will need to be factored into these decisions.
- Service providers will need to figure out how quickly they will be able to turn up small cell deployments, and what role fiber will play in meeting their time-to-market goals.
- Simplifying the installation process will also be a priority.
- The disruptive nature of fiber deployments, especially in urban environments, needs to be taken into account, as much of the infrastructure is located underground or in cabinets next to busy streets.
- There is no “one-size-fits-all” infrastructure for fiber deployments, therefore implementing standardized solutions into their network that are both scalable and modular ensure that carriers are able to maximize their network elements as they adapt and evolve their networks.
- Finally, service providers will need to move towards plug and play solutions that do not require skilled labor for deploying fiber. Lowering labor costs means service providers will be able to back more individual deployments that will support small cell deployment and backhaul for 5G.

The current 4G network infrastructure in place providing customers 4G LTE connectivity can still be leveraged to provide 5G; however, there will need to be many additions to the overall wireless infrastructure to support the 5G speeds. Currently, 4G LTE occupies the frequency bands up to 20MHz. 5G is expected to sit on or around the 6GHz band. While this means far more information will be able to cross back and forth over these frequencies than 4G LTE, it also means the signal will not travel nearly as far. Providing this connectivity strictly over the existing 4G LTE network will not be sufficient to supply 5G to existing customers. Wireless service providers will need to build more cell towers capable of handling the amount of information 5G will be carrying across the network, as well as adding new base stations and mounted antennas to capture signals.

Fiber will be that last bit of connection that can handle the load of information 5G networks will be transmitting. By creating a “pipeline” that runs backhaul from macro sites, tower and rooftop connection points, the end-user can have a flawless and complete 5G experience. The fiber infrastructure will provide a reliable and secure network that will power the bandwidth needed to meet customer expectations as well as support the Internet of Things (IoT) and other applications that will only be able to run on a 5G connection. Smart homes, city infrastructure, governments and millions of consumers around the globe will be relying on a robust 5G network to power the applications required to run their individual operations.

Customer demand for faster and better service means service providers will be doubling down on their efforts to bring 5G technology to fruition even faster than originally expected. Ensuring customers have a seamless transition and use of the 5G network will be paramount, not only from an expectation standpoint, but also from a financial consideration. Deploying 5G before the infrastructure is in place to handle it would seriously jeopardize adoption of the technology itself, throwing service providers’ existing and growing 5G networks and deployments into doubt. By solving the fiber challenge now,

service providers will be able to maintain a high quality of service for their 5G networks as they are introduced, and provide that much needed network support backbone.

Fiber will allow 5G providers to service a very broad variety of customers, including fixed-line and business, as well as to connect the mobile base stations that provide the critical last mile connectivity needed to reach end-users. Fiber will pave the roads that 5G, once implemented, will be using every day. Service providers need to be prepared now to meet the inevitable challenges they will face to ensure their 5G deployments are ultimately successful.

***Johnny Hill Bio***

*Johnny Hill is the chief operating officer of Clearfield, Inc. Formerly the vice president of engineering and product management, Hill is considered a longstanding leader and a founding member of the company.*

*Hill has approximately 15 years of strategic and hands-on experience in the telecommunications networking industry. He started his career at Americable Inc. in 1996. He was Americable's national sales manager when the company was acquired by Clearfield's precursor, APA Cables & Networks in 2003. Hill was promoted to Clearfield's vice president of product management and development in 2006, and vice president of engineering and product management the following year.*

*During his career, Hill has amassed a national reputation within the telecommunications industry on such issues as fiber management; harsh environments; network design and transport; fiber and copper assemblies; network security; premise network equipment; structured wiring; among others.*