

Network System Cost Study

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OBJECTIVE

As network bandwidth demands continue to grow, AFL strives to assist each and every customer in achieving scalable growth and effectively managing network costs through innovative solutions. Included herein is a study which identifies a number of key elements where new cable technology notably impacts fiber optic network installation and maintenance costs.

These key elements below represent just a few areas of primary cost savings:

- Rights-of-Way (pathway and facilities)/Lease cost reductions
- Longer cable lengths to reduce reel end splice points
- Reduced scrap via larger master reels and less residual lengths
- Decreased time for access splicing and cable preparation
- Faster installation speed and improved handling

In a recent high profile access project currently underway in metropolitan New York City, AFL was able to tangibly substantiate the value and savings associated with the key elements noted above.

PROJECT HIGHLIGHT

In 2014, the New York City Administration issued a competitive RFP to re-purpose payphone infrastructure with free WiFi, phone calls and advertising. A large consortium group submitted a proposal for a WiFi project and was chosen for its innovative and community-first approach. They were awarded the 12-year franchise contract to provide the new infrastructure for the communication services. This large consortium group is an organization of experts in technology, media, user experience and connectivity that includes Intersection, Qualcomm and CIVIQ "Smartscales."

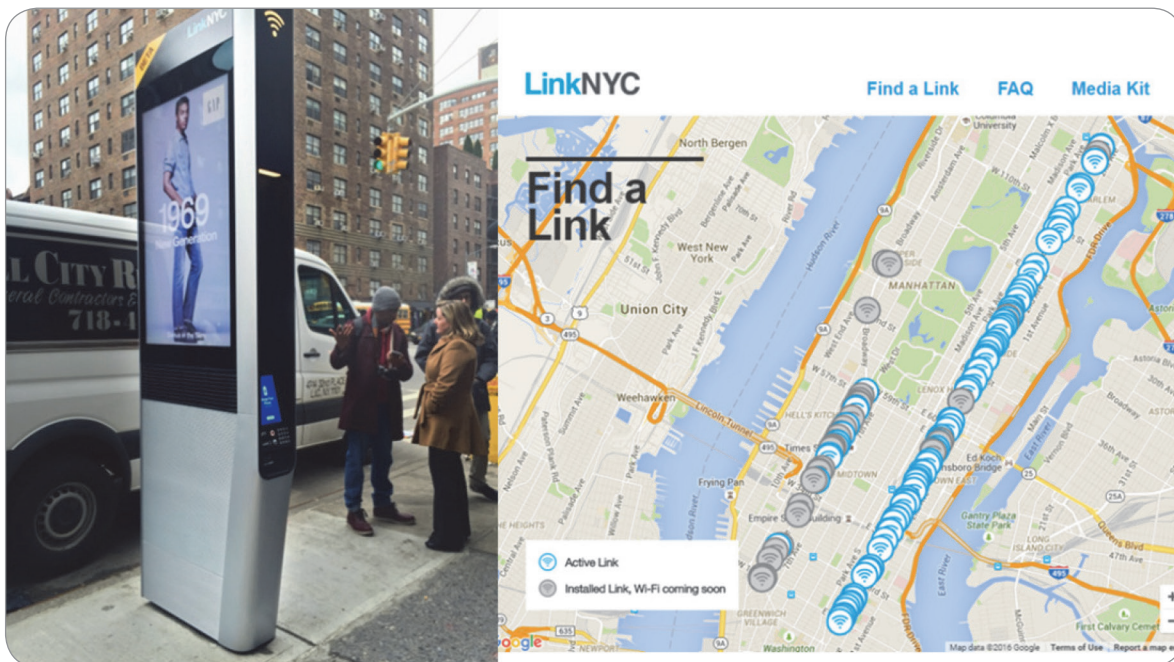


ABOUT THE WIFI PROJECT

- This WiFi project will bring free, super-fast WiFi across New York City with a network of at least 7,500 Link kiosks.
- Each gigabit Link is powered by an all-new, purpose-built fiber optic network that will deliver speeds up to 100 times faster than average public WiFi.
- The consortium group is making a significant investment to build hundreds of miles of new fiber optic cable that will deliver gigabit connectivity to Links in all five boroughs.
- Each Link has the capacity to support hundreds of WiFi users simultaneously.
- In partnership with the City, the consortium group will also bring gigabit service to an indoor public center in each borough for New Yorkers to access educational opportunities and connect to their communities.

NEW TECHNOLOGY NETWORK

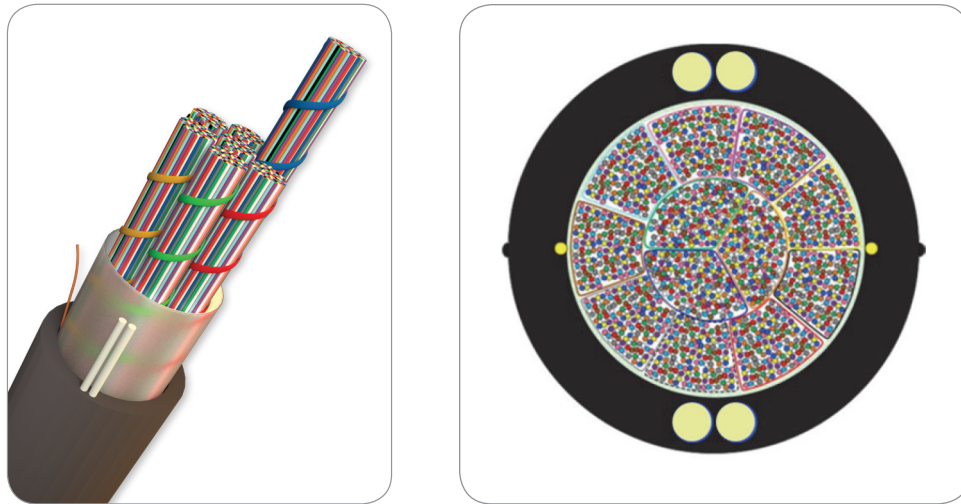
The high-speed pathway for the WiFi project is being built by the owner/operator of dark fiber network in New York City, which provides backhaul fiber and passive wavelength connectivity to all major co-location facilities throughout the New York metro area, as well as to macro sites, small cells and WiFi nodes. The company's backhaul solutions connect carrier and enterprise aggregation points back to their core network facilities and common carrier services collocated at carrier hotels.



WiFi Project Kiosk and Kiosk Locations in Manhattan

The WiFi kiosks are now interconnected with a number of AFL fiber optic technologies. These products provide the high speed pathway for connectivity of the gigabit system. Each kiosk provides connection to any enabled wireless device for access to internet, voice calling, 911/411 services and other information services.

The main backbone fiber system is the AFL Wrapping Tube Cable (WTC) with SpiderWeb Ribbon® (SWR®). The backbone cable used is a 1,728 fiber Wrapping Tube Cable that was chosen due to the cost saving technology that it offered.



With the smallest diameter and lowest weight of any 1,728 fiber cable in the world, this cable eliminated the need for a second 2-inch conduit that would have been required for a different cable technology. The result was the elimination of 50% of the annual pathway expense.



Congested NYC Manhole with 2-inch Innerduct Pathway

WTC also offers another significant cost reduction in that it allows longer cable lengths – up to 30% longer. These longer cable lengths provided savings on reel-end splicing costs by allowing the cable runs to go further without the need for a splice. Additionally, mid-cable access splicing times were greatly improved through reduced cable preparation time and faster mass fusion splicing time.



4,578 meters (15,020 ft.) Reel of 1,728 Fiber WTC

Furthermore, WTC realized even more savings due to the installation improvements as a result of the cable handling itself. The smaller diameter and lighter weight allowed for faster installation than the pulling of traditional cables as well as accommodating the use of standard installation apparatus and methods when pulling the ultra-high fiber count cable.



Standard Installation Apparatus Pulling 1,728F WTC

During the installation process, whenever slack was required or when installation constraints forced bi-directional pulls, WTC was quickly coiled into figure-8 coils and transitioned to the next pulling stage. The smaller diameter and lower cable weight ensured that the cable could be coiled into large figure-8 storage points then quickly pulled in the opposite direction.



7,000 feet of 1,728F WTC in Figure-8 Coil

COST IMPACT SUMMARY

Although the project is still in the early stage, a number of specific cost savings on key elements have already been realized. Some savings are direct and easy to identify. Others are somewhat intangible and require more details to quantify into specific savings, but nevertheless are known and accepted to have a positive value proposition and cost saving impact.

The key elements that have achieved cost savings to date are as follows:

1. Cost of Right-of-Way for the project was initially identified as needing two (2) 2-inch innerducts for most of the underground network. With the use of AFL's WTC, the network could pull a single 1,728 fiber WTC rather than two (2) 864 fiber cables and eliminate one (1) 2-inch innerduct. This resulted in a significant cost reduction per year for the first phase of this project alone.
2. By using WTC which offers a 30% smaller diameter and 55% lower weight than a traditional ribbon cable, AFL was able to provide cable reels at 4,570 meters (15,000 feet) rather than 3,500 meters or (11,500 feet). This reduced reel end splice points by 25%.
3. Consideration of scrap impact resulted in a calculation of residual scrap of an estimated average of 200 meters (656 feet) at the end of the cable pull. With the use of a larger master reel, the scrap impact equals 200 meter per 4,570 meter master, or 4.3%, versus 200 meters per 3,500 meter master, or 5.7%. This is a savings of 1.4% per reel.
4. With WTC being a dry core cable, the access splicing cable preparation and the reel-end splicing preparation is reduced by 50%. Actual mass fusion splicing time is approximately the same; however overall splicing and cable preparation combined was reduced by approximately 35%.
5. The final factor reviewed was installation time during the actual cable pulling process. While traffic control and permitting for dense city traffic was the most significant issue for pulling underground in an urban environment, the impact of the cable was not significantly apparent. Previous studies have indicated that typical savings of time is an estimated 11% decrease. Many of the savings for this project were more intangible in nature including elements such as size of work areas for figure-8 coils and amount of set up space for tandem pulling with multiple capstans.

In conclusion, the many positive attributes associated with AFL's Wrapping Tube Cable have made a significant impact on the deployment costs of the WiFi project. As this project is still currently progressing, a more detailed analysis will be completed and may potentially be the subject of a future published paper. For further information, please contact AFL.

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