CORNING

Simplifying Last-Mile FTTH Overbuilds is a Smart Move

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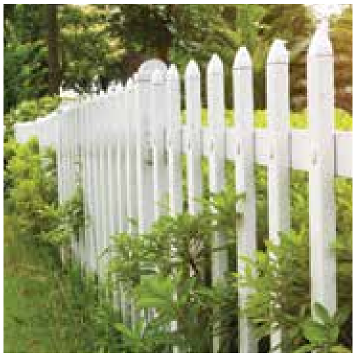



Introduction

Fiber-to-the-home (FTTH) technology is happening, and there is a specific reason why. As a service provider, you are delivering voice, video, and data – or you're left with a declining revenue base and increasing operational expenditures. As cable and wireless operators began running away with precious, last-mile customers, the telco operator soon discovered that multimedia bandwidth capability is more than just a high-tech fantasy.

Our aim is to discuss how old local loops are being overbuilt with next-generation FTTH technology in order to provide advanced services like large-screen HDTV, real-time video gaming, and optical Internet access. More importantly though, we will dive down to reveal a fundamental, economic shift in FTTH distribution technology that optimizes the cost benefit of the last-mile operator's investment. Also, some things are better left alone. The industry-accepted, preterminated fiber drop cable is no exception here; this last-mile innovation was designed specifically to reduce the time and cost of connecting customers into the network when they request service.

Ready to dive down into FTTH? Historically, last-mile fiber cables were first overlashed onto wires attached to utility poles. Next, a splice technician had to be dispatched to terminate the ends of the cable before that bandwidth could be utilized. For example, point-to-point digital loop carrier (DLC) technology uses a fiber cable to transport the multiplexed signals from many legacy DSL loops back to the central office. These backhaul connections are static in the sense that once they have been installed and then spliced in the field, there is little change that has to occur. As FTTH is now preferred to deliver these advanced services to the entire community, the need to have flexible, just-in-time fiber connections became apparent. Unlike the upstream side of the neighborhood cabinet, those neighborhood distribution and drop cables must be quickly connected together in order to let those multimedia photons loose. Fiber has always been fundamentally superior, as corroborated by DLC loops, for example, but squeezing every ounce of value out of that fiber is what it takes to economically overbuild the last mile with FTTH.

FTTH Then

FTTH innovation first came to light with the flat, aerial drop cable that supports its own weight and is purposely shaped so that it can be easily attached to utility poles and homes. Simplifying the process of joining the single-fiber drop cable to the distribution terminal as customers are turned up on a case-by-case basis came next. You probably figured it out; for the typical drop installation nowadays, splice machines are simply not needed, because the drop has already been preterminated and is ready to be connected into the multiport terminal and residential NID.

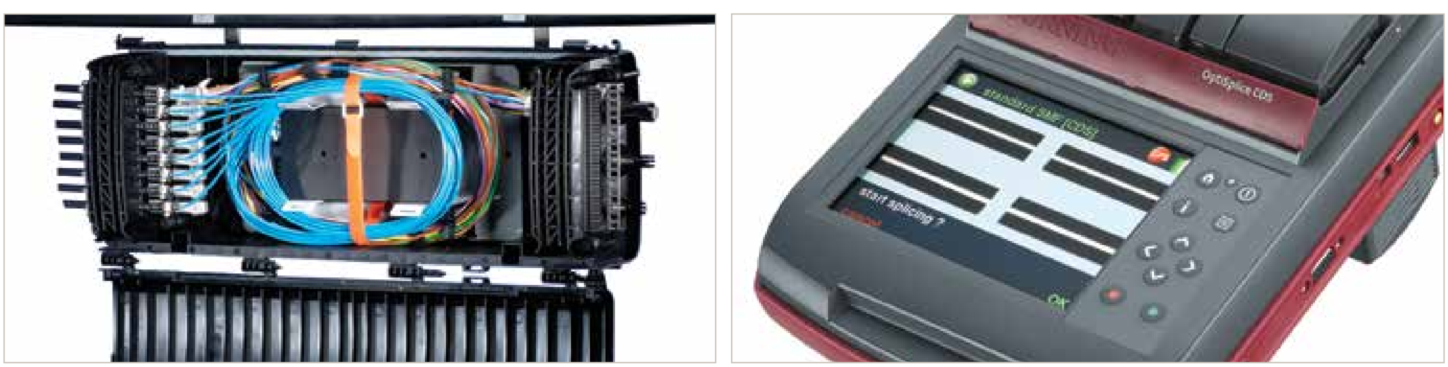
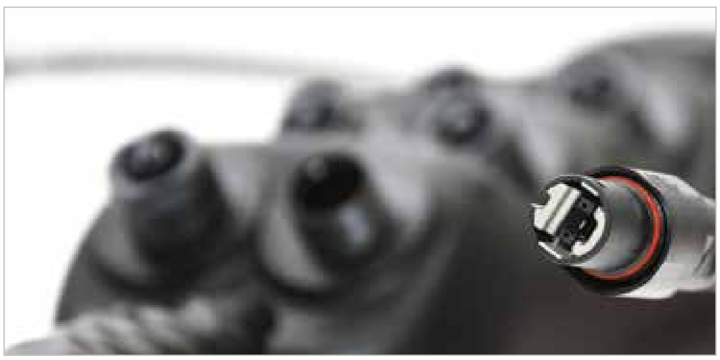


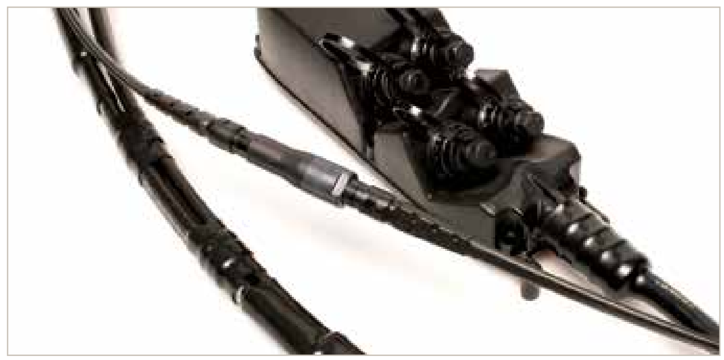
Figure 1: FTTH Installation Tools; Left: OptiSheath® Terminal; Right: OptiSplice® Fusion Splicer

The upstream side of the aerial distribution terminal sets the stage for the fundamental shift we alluded to earlier. Conventionally, the distribution cable was looped in and out of terminals, with fibers also being dropped at each terminal. For example, a 72-fiber distribution cable can serve 72 homes from a local convergence point (LCP) cabinet. This single-cable approach is generally necessary for aerial FTTH deployments due to the utility pole infrastructure. Considering each terminal can support six homes, then a total of 12 terminals would be needed.

Looping the distribution cable in and out of each terminal until all 72 fibers have landed at a terminal is a mid-span access procedure. This procedure requires the splice technician to open the cable at each terminal by removing the sheath and then extracting the six fibers for that terminal. Those six fibers are either contained within a buffer tube or a ribbon matrix. Therefore, yet another mid-span access procedure is required for a particular unit inside the distribution cable. All other units of the cable can be conveniently coiled up inside the terminal. This mid-span access method works best overall, because without it all 72 fibers would need to be spliced at each of the 12 terminal locations. Making 864 total distribution splices deploying a 72-fiber distribution cable is far too expensive; mid-span access reduces total splicing at the terminals to only 72 fiber splices. See Figure 1 for the equipment needed to deploy FTTH distribution cables and then terminate them in the field with a fusion splice machine.

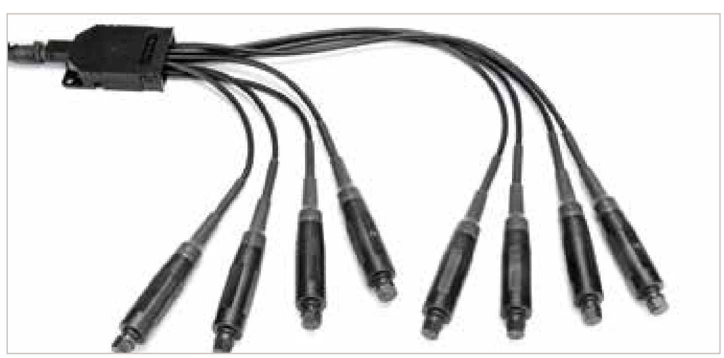
FTTH Now





Preterminated Distribution System; Left: OptiTip® Connector; Right: FlexNAP™ System Showing Connected OptiTip Connectors

Simplifying the customer turn-up process was a significant milestone in the FTTH industry, because it reduces the cost of delivering advanced services. Clearly, that innovation is working for a variety of network operators throughout the United States and around the globe. Again, innovation squeezes every ounce of value out of FTTH, and now the FTTH deployment method has also been simplified to further enhance the cost benefit of the operator's investment. This technological innovation is known as a terminal distribution system. The distribution "plant" has matured into a factory preconfigured, preassembled, preterminated system that enables the operator to add the familiar multiport terminal when the time is right. For last-mile overbuilds, this is a sound strategy; an operator may choose to hold off installing the terminals until revenue is being generated, which is exactly why this field-proven, last-mile innovation has become so popular in such a short period of time.



Critical Last Mile Products; Left: OptiTect HD Cabinet; Center: Network Interface Device; Right: MultiPort Flex

The upshot of the FlexNAP™ distribution system is that there is no need to terminate each fiber with a fusion splice machine. Splicing occurs in the controlled factory environment. A tether cable has already been spliced onto the distribution cable, and the other end of the tether has already been preterminated and lands in an environmentally hardened, multifiber connector receptacle. The multiport terminal is a separate element that can be conveniently connected into the hardened receptacle. Without an effective way to pay this technology off, it would be impractical to deploy. So, this network access point (NAP) area is protected with a flexible sheath, and the tether cable is secured to the main cable. During deployment, these NAP elements simply roll right through standard installation equipment – installation crews are able to handle these terminal distribution systems in the same fashion as standard outside plant cable. This mid-span access technology allows this innovation to be commercially practical, and the preterminated NAP enables its commercial success. Just like the innovative, preterminated drop cable, the terminal distribution system cuts down both splicing time and cost. Therefore, homes are already passed with fiber after the terminal distribution system has been overlashed. Another significant benefit is that the widely varying splice practices in the field are now history, because that aspect has already been perfected and controlled in the factory.

Comparing the time and cost savings of the terminal distribution system is the best way to understand the true value it affords the operator. Back to our 72-fiber example with six fibers dropped per terminal: Using the field mid-span access method, it typically takes a well-trained splice technician four man-hours from start to finish to complete the splicing at each multiport terminal. At a loaded labor rate of $100/man-hour, this costs $4,800 in splice labor alone to get these 12 terminals ready to accept the preterminated drop cables. In addition, the labor cost to lash the distribution cable itself to the existing aerial infrastructure must be factored in. Let's contrast this method of landing fibers in multiport terminals to the splice-free FlexNAP terminal distribution system. That's an easy calculation, $0 of field-splice cost because after this system has been overlashed, that's it – homes are now passed with FTTH and ready to be connected into the network via the multiport terminal. Lashing is the same for both of these mid-span access methods, which means that for every 288 homes, the terminal distribution system can reduce FTTH deployment cost by nearly $20,000 as opposed to first lashing the cable and then going back to field-splice terminals.

Summary

Simplifying the process of deploying FTTH in last-mile overbuilds is a smart business strategy, because it allows the network operator to initially distribute fibers throughout the neighborhood without having to pay for splice labor and terminals. As customers call in to request service, the industry-accepted, multiport terminals can be quickly and easily connected into the multifiber receptacles located at NAPs along the main distribution cable. In a competitive marketplace, innovation will occur whenever there is an opportunity to add more value in delivering a product or service. FTTH innovation falls right in line with this premise. The first innovation, the flat fiber drop cable quickly developed into a preterminated fiber drop cable. Now, the terminal distribution system enables the multiport terminals to be quickly connected in series between these on-demand customer drops and the neighborhood cabinet ports in no time at all. Indeed, last-mile distribution "plant" has been simplified by design in order to enhance both the cost benefit and reliability of FTTH overbuilds.

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