

Fiber Terminal Distribution Systems Cut Developer Cost and Risk

A seemingly simple idea – leaving an inexpensive terminal block to connect future homes – saves a bundle

By David Meis ■ *Corning Cable Systems*

Allow me to introduce the terminal distribution system, the hottest new toy for fiber-to-the-home (FTTH) networks. It's another example of how Corning and other fiber vendors are making deployments simpler, faster, more flexible and lower in cost. By improving the metrics for laying fiber within a development – the “terminal distribution system” – these new technologies make FTTH even more attractive to developers.

Today, in fact, the terminal distribution system can come pre-assembled, combining distribution cable, terminals and environmentally hardened connectors together in a convenient package that makes the deployment of FTTH infrastructure as easy as any other utility service.

This article highlights the advantages of this approach and compares it to traditional practices. Best of all, these technologies and the accompanying network design approach are equally suited for both large and small FTTH deployments, as well as greenfield and overbuild deployment scenarios.

10 Years of Innovation Squeezed into 3...

Developers who might have looked at fiber a few years ago and rejected it for its seeming complexity should realize that the rules have changed. It wouldn't be a stretch to say that the deployment methods surround-

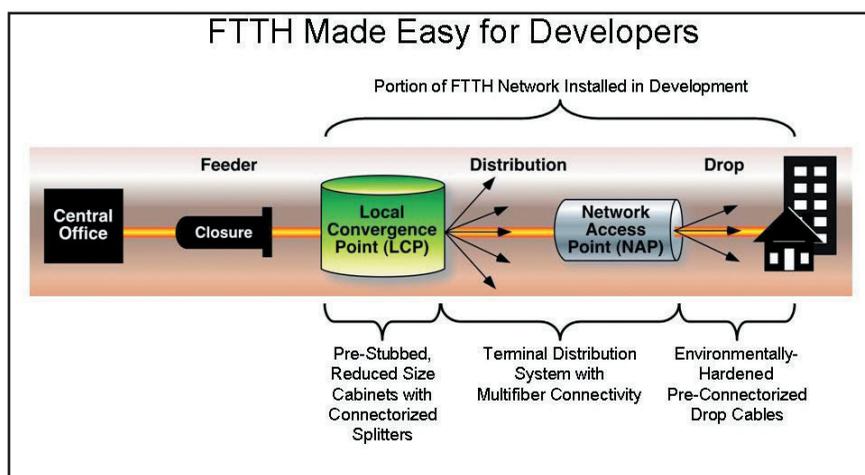


Figure 1: Advanced outside plant FTTH technologies make deployment now easier than ever. This article looks specifically at the portion of the network installed within the development. Usually, this part starts at the local convergence point, where pre-stubbed, reduced-size cabinets with pre-connectorized splitters are installed. It ends with environmentally hardened, pre-connectorized drop cables at users' dwellings. The area between LCP and the drop is the Terminal Distribution System.

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ing FTTH technology have changed significantly in recent years.

Looking back on some of the early FTTH deployments in the United States, these changes are evident in nearly every segment of the

network. The first network deployments in the country relied heavily on “force-fitting” solutions that were, quite frankly, designed for long-haul or metropolitan systems. Over a relatively short period of time, however,



Figure 2: The Terminal Distribution System and its key components. 1 is the system distribution cable; 2 is the tethered system access point and 3 is the system terminal.

those solutions were displaced by the novel components that now fit together like the interlocking pieces of a jigsaw puzzle.

This has transformed the way in which developers are approaching FTTH deployments today, reducing installation time and costs to a level that makes FTTH a financially viable choice over copper-based broadband communications systems. In fact, with the rise in copper prices and cuts in fiber, copper can actually cost more, while delivering far less bandwidth and requiring far more operating expense. The new fiber designs eliminate the need for high skilled labor in the distribution segment of the network – essentially the entire development.

The Terminal Distribution System Approach

As we look at the key components of a FTTH network from end to end, the segment where we can realize the greatest benefits lies within the development itself. At this place in the network, multiple distribution cables are each accessed numerous times by field staff to provision drop cable ports for future subscribers.

The installation time and the labor costs associated with installing the cables and the individual network access point terminals become substantial. In fact, it eclipses the much smaller material cost of the components themselves. Factor into this scenario the potential for craft

error, the risk of disrupting service to other “live” subscribers, and the resulting rework time and cost. It is easy to see that the “first-installed cost” figure can nudge deployment budgets upward.

Much as the pre-connectorized drop cable assembly has revolutionized subscriber connections, the distribution segment needed a solution that revolutionized the problem of time-consuming, repeated access. The answer for overcoming these hurdles resulted from taking a system-level view rather than a component-level view. Enter the terminal distribution system.

Terminal Distribution System Anatomy ... as Easy as 1, 2, 3

Developers want to know exactly what’s going into their coveted ground, especially when new technology is involved. In order to get a better feel for terminal distribution system technology, let’s take a moment to break down this solution into its three basic parts. The numbers refer to components pictured in Figure 2.

1) Foundation – The System Distribution Cable. The fiber optic distribution cable is the foundation of the terminal distribution system. These cables can be of dielectric or armored construction. Some feature fibers in a loose tube. Others use fibers in a flat ribbon that is protected with a strong outer coating. Typical cable fiber counts in these systems range from 24 to 216, with the 36-through 72-count flavors being most popular in today’s FTTH networks.

2) Framing – The System Access Point. The second key component of a terminal distribution system is the system access point. At pre-determined points along the distribution cable, the desired optical fibers are accessed from the cable sheath, spliced into a multifiber, connec-

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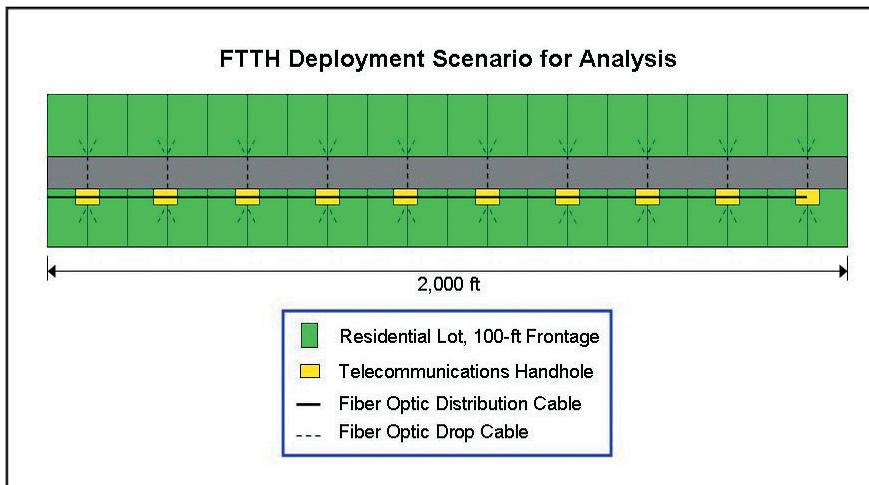


Figure 3: FTTH distribution area for deployment comparison analysis – 2000-foot run serving 40 homes, with 4 homes per network access point.

torized tether, and then sealed in a protective enclosure. The multifiber, connectorized tether is typically 10 to 15 feet in length and is “anchored” into the cable.

The environmentally hardened, multifiber connector on the end of the tether facilitates the rapid, low-loss connection to a similarly stubbed network access point terminal. The beauty in this solution is that this connection process can be deferred until the first subscriber from this location is provisioned with service. As homes are constructed incrementally over months and even years, the sealed connector lies in a ready state, eliminating the need to toss extra money into the hand-hole on Day 1.

3) Trim – The System Terminal. The final component that completes the terminal distribution system is the system terminal. This component, also known as a network access point terminal, mates with the system access point tether and provisions environmentally hardened, single-fiber connector ports for subscriber drop cable connections.

The important advantage of having the option to defer system terminals in a network rollout sets the terminal distribution system apart

from traditional FTTH deployment approaches. Putting it all together, the fiber terminal distribution system is installed in the same manner as a traditional distribution cable. The system provides a rapid, simple connection of system terminals at the pre-installed access points and occupies a minimal footprint in the installed configuration. Perhaps best of all, as soon as the terminal distribution system cable is secured in place, a developer can check off the residences adjacent to the system as *homes passed*.

The Tether Feature

The tether feature is the key to providing the desired flexibility in terminal placement during deployment. Now, instead of being anchored to a fixed point along the distribution cable for terminal placement in the outside plant, the tether, coupled to the system terminal cable stub, provides a zone within which an installer can “tune in” the final resting place of the terminal. Typically, current generation of terminal distribution systems affords installers a generous 15 feet of latitude in terminal placement on either side of the system access point. This is usually

more than enough breathing room to overcome any measurement inaccuracies that may have occurred in the site deployment survey.

While most will be comfortable with the flexibility afforded by the system, extra cable slack can also easily be factored into the design between network access points. Although this is an additional buffer, the additional \$5 or so of coiled-up cable sitting in the bottom of the handhole is a small price to pay for the peace of mind and confidence in knowing that the terminal distribution system will fit the intended deployment space as designed, even with minor deviations from the original plan.

The Value

Let’s take a closer look at this approach compared to traditional installation methods. To illustrate the value of the

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FTTH Deployment Comparison		
Material		
	Traditional Installation	Terminal Distribution System
48-Fiber, All-Dielectric, Loose Tube Cable, 2,000 feet (\$0.42/ft)	\$840	
4-Port Sealed Network Access Point Terminal with Accessories	\$225	
4-Port, Sealed System Terminal		\$150
Number of Network Access Port Terminals Required	10	10
Terminal Distribution System - 48-Fiber, 2,000 feet, 10 Pre-Installed, 4-Port, Sealed Access Points		\$3,590
Total: Day 1 Material Cost to Pass 40 Homes	\$3,090	\$3,590
Deferred Terminal Material Cost at 100% Subscriber Take Rate		\$1,500
Labor		
Distribution Cable Installation (\$4/ft)	\$8,000	\$8,000
Terminal Installation Time (Hours)	3.5	0.2
Loaded Labor Rate of Technician (per Hour)	\$65.00	\$35.00
Number of Terminals Installed	10	10
Total: Labor Cost to Pass 40 Homes	\$10,275	\$8,070
Total: Day 1 Cost to Pass 40 Homes	\$13,365	\$11,660
Installation Time (Man-Hours)		
Distribution Cable Installation	20.0	20.0
Terminal Installation	35.0	2.0
Total: Time to Pass 40 Homes	55.0	22.0

Table 1: FTTH deployment analysis comparing traditional installation with terminal distribution system installation

terminal distribution system, we'll analyze the deployment costs and installation time for a given scenario with a terminal distribution system as well as a traditional cable and network access point terminal installation.

The deployment scenario that we'll use for the analysis is a 2,000-ft-long distribution cable run, installed underground in an existing, 1-1/4 inch conduit system. This cable run passes a total of 40 single-family residences, and the design calls for

four subscribers per network access point, requiring a total of 10 hand-holes. Figure 3 illustrates the distribution area that will be used for the deployment comparison analysis.

From the analysis, it is evident that the terminal distribution system approach can be deployed in just 40 percent of the time that it would take to roll out the network via traditional practices. While noteworthy, the additional value of qualitative benefits such as risk avoidance, capital defer-

ral, and lower skilled labor requirements are not captured in the numbers shown. For these reasons and more, terminal distribution systems are revolutionizing the way in which developers are approaching FTTH deployments today. **BBP**

About the Author

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