New Challenges for Fiber Distribution Systems

Fiber management systems designed specifically for smaller FTTP deployers help align capital investment with subscriber growth – and make it easy to accommodate that growth.

By Cheri Beranek Podzimek ■ *Clearfield*

Historically, fiber management was needed only at the central office or headend. In the early days, with copper-dominated networks, fiber needs were smaller. Fiber counts were relatively small, so devices like 72-port panels were considered massive and "all the fiber anyone could possibly need."

The design always started with the box, and the box had to be big enough to cram as much fiber into it as possible. Secondarily, the fiber had to be protected and managed. So as fiber counts grew, the boxes got larger, and more elaborate schemes were used to keep the "rat's nest" that could occur from entering the box. It was a costly and not very flexible configuration. "Modularity" meant growing capacity in large chunks, 96 or even 144 ports at a time.

In the late 1990s and early 2000s, fiber management began to change in order to reflect the large upgrades that the cable TV providers were making to their fiber networks. By placing all their fiber connectivity at the headend and packing more fibers into small spaces, the cable TV providers spurred fiber management manufacturers to produce even higher-count panels. In some cases, this could be as high as 288 ports in a single panel.

FIBER MANAGEMENT IN THE OUTSIDE PLANT

Fiber to the premises (FTTP) changed all that. Fiber was now entering the outside plant, with massive amounts of fiber being deployed in a single neighborhood. All of a sudden, the potential rat's nest of cabling called for changes in fiber management. Extensive fiber protection in the field was needed in order to avoid problems.

Traditional fiber management designed for the headend was just overkill in the outside plant. Too many needless components were driving up costs.

At first, most large-scale fiber management vendors modeled their designs on those used by large companies like Verizon and AT&T, which controlled nearly 90 percent of the nation's roughly 220 million access lines. These companies deployed fiber using a "cookie-cutter" approach, in which all fiber is laid at once. But while this approach minimizes the number of truck rolls, it forces service providers to invest heavily in capital equipment before they have the subscription rates to justify the investment. This one-size-fits-all approach did not resonate with independent telephone service providers or cable operators, as it did not fit their network deployment strategies.

Another problem was that although outside plant cabinets were bringing an increasing amount of fiber ever closer to the home, they were still essentially central-office panels modified for deployment in the field (for example, by being temperature hardened). With more experience, many vendors learned – and some are just now learning – that this is not a cost-effective management solution. Traditional fiber management designed for the headend was just overkill in the outside plant. Too many needless components were driving up costs.

DESIGNING FOR REAL-LIFE DEPLOYMENT SCENARIOS

Rather than "changing the lipstick," today's fiber management must be designed from the get-go for both the inside plant and outside plant. Fiber management today must be flexible and configurable so it can be tailored to meet a variety of deployment scenarios reflecting different degrees of customer

About the Author

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acceptance and take rates, as well as environmental concerns.

Especially in today's economic environment, service providers need to maximize the alignment between capital equipment and subscriber revenue. Investing in equipment that may not be used for several years can be extremely costly. As a result, it makes economic sense to take fiber management down to the lowest common denominator that aligns with the way fiber is deployed in the field – 12 fibers at a time.

A self-contained fiber management unit that addresses all the basic rules of fiber management (in terms of access to fibers, bend radius protection, physical fiber protection and route diversity) can serve as the building block of the fiber network. Scaling up 12 fibers at a time to any port count that the network application requires allows us to relegate the one-size-fits-all approach to the history books.

MDU CHALLENGES

FTTP deployment in older apartment buildings and other multi-unit dwellings (MDUs) pose many unique challenges. As each location is hugely different from any other, the key is flexibility.

A key to determining the basic type of fiber management unit needed in an MDU is whether there are closets that can be used as fiber demarc points – rather than whether there is existing conduit that can be used for the cable pools. If suitable closets exist, it's relatively easy to lay fiber closet-to-closet. But more often than not, there will be issues about available space, holes through floor, fire codes, asbestos and more.

Service providers will want to ensure a great deal of flexibility in their fiber management options, as it won't be possible to standardize on a single method for MDUs. It may be necessary to use inside wallboxes, outside pedestals or cabinets. What's more, each type may have a different port count or other requirements. Further, you'll want to ensure that all of the fiber management units are based upon a common platform or architecture to reduce training and installation time.

ARCHITECTURAL ALTERNATIVES

Fiber management suppliers are really vendor-agnostic when it comes to the electronics. In an active architecture there are many fibers located at the central office (inside plant) so it is crucial that strong, integrated fiber management is designed into the system from the beginning. In a PON architecture there is a trend toward consolidating the splitters in the inside plant for better system management.

Clearfield's "Pon in a Ped," or FieldSmart Fiber Delivery Point (FDP) 96-port PON pedestal insert kit with Clearview Cassettes in the back.

Deploying splitters at the inside plant panel is a very efficient way to populate a PON architecture. However, since it is usually not possible to deploy every splitter in the network in this manner, service providers will be forced to carry multiple types of splitters, thereby increasing their cost of inventory. Different splitters may be required for the inside plant panel, pedestal, wallbox or outside plant cabinet. An alternative is to standardize on a fiber management platform that uses the same splitter packaging at each leg of the network.

PEDESTAL CHALLENGES

In the early days of FTTP, sealed pedestals, sometimes called "Ped in a Ped" designs, were touted as the ultimate in environmental protection in the field – at a hefty price tag. More recently, providers have begun rethinking the tradeoff between protection and price. Some find that an open pedestal, which is an unsealed ped, provides basic protection at an attractive price.

An open ped accepts fiber at the access point. It provides a very simple approach to handing off fiber for drops to the home and providing mid-span capabilities for carrying fiber to the next drop point or pedestal location. Clearfield has one Northern Minnesota customer that has deployed roughly 8,000 of these pedestals in easily one of the harshest conditions in North America. They haven't had an issue with dust, rains, snow, ice or even critters, and they feel their experience reinforces the cost advantages of deploying this way.

To be sure, some parts of the country have other types of extreme environments where the open pedestal isn't going to be a good fit. In flood-prone or high-wind areas, where dust could become an issue, a more conventional approach is still warranted.

Another pedestal challenge is: How do you serve small outside plant fiber management needs if a full cabinet and the associated costs of a poured pad or underground enclosure aren't warranted? Some vendors are coming out with pedestal solutions that allow the ped to serve as a small cabinet. This can be a very attractive and cost-effective solution for small-scale environments. However, it is crucial that the architecture of the fiber management used in the ped is consistent with the fiber management deployed within the inside plant's panel system – as well as with the outside plant cabinet that may be used for larger serving areas. Further, it must be capable of meeting the optical component requirements of the outside plant within the fiber management functionality.

Finally, future upgradability is a crucial element in pedestal design. The ped may be deployed initially to meet the needs for a small PON serving area or as a drop-only pedestal. But two or three years down the road, service providers should expect to be able to redirect what previously was a distribution fiber to a feed fiber of a cabinet sitting upstream. They will then be able to quickly retrofit that pedestal to serve up to 96 homes. **BBP**