

Fiber to the MDU: Compact V-Linx Architecture for Easier Installations

OFS uses mini-hubs every five floors, rather than one large hub in the basement, to distribute fiber. Compact on-floor concentrators can handle up to 60 units a floor.

By Dan Hendrickson, Pete Weimann, and Hongbo Zhang ■ OFS

A new optical aggregation architecture, the V-Linx Solution, can help unlock the business case for fiber to each unit within MDUs. V-Linx can halve installation labor costs, reduce inventory requirements, and speed system deployments to help win customers faster.

The system uses bend-optimized fiber throughout to reduce equipment size and ease fiber-laying without sacrificing performance, reliability, or compatibility with existing single-mode fiber. The compact riser cables reduce the number of floors passed by cable, reducing crowding in the riser space that may be already occupied in existing MDUs.

The spooling features reduce the time required for handling cables and monitoring cable pull, and help reduce the number of technicians required for installation. The spooling features also provide a convenient, integrated, and compact means for handling cable slack. Use of factory-terminated connectors throughout can eliminate the time and expense of fusion splicing during installation. Finally, a new bend-optimized and robust drop cable assembly protects

the fiber routed to connect subscriber units to the drop terminal.

The Business Case

As fiber-to-the-premises stakes out its position as the preferred method for broadband delivery, products and deployment techniques must evolve to support a broader array of FTTx-based applications. The latest “x” in FTTx is the multiple dwelling unit (MDU), as carriers consider the merits of deploying fiber directly to dwellings in high-rise complexes.

The reasons for this interest in fiber *within* the MDU are familiar to anyone who has followed the maturation of FTTH: cost parity with metallic media solutions; reduced operating expenses; and a future-proof value proposition. The success of an MDU FTTH deployment, however, depends upon the architecture of the system, and the impact of the architecture on deployment costs. In this article, we compare traditional MDU architectures with V-Linx, a new, robust approach developed by OFS. The new architecture, and its associated cabling and apparatus, can reduce the labor required for installation of a MDU fiber backbone up to 50 percent while minimizing inventory and simplifying installation.

The future-proof value proposition for fiber in the MDU is easy to understand. The metallic cabling in many existing highrises is simply incapable of supporting services available today, much less the bandwidth demand of next-generation services. Therefore, infrastructure upgrades or replacement will be required in many – and probably almost all – existing MDUs.

Given the bandwidth demands of next-generation services, it will also be extremely desirable to deploy fiber in new MDUs. Fiber deployment could become another plus for developers and building owners, as homeowners are willing to pay \$4,000 or more extra for fiber-connected homes, according to surveys by RVA and associates. High-end condominium buyers could perceive a similar benefit.

Obviously, the overall business case for fiber in the MDU environment is strong. Fiber’s near-unlimited bandwidth is attractive, especially since the bandwidth is distance-independent. Signals on coax degrade over distances between MDU buildings, or even over a few hundred feet within large buildings; that alone can make fiber the most economical choice.

Deploying fiber to each dwelling unit can also support a full array of services

without the telecommunications rooms and abundant riser space necessary to support comparable services with metallic media. Such premium real estate may not be available in older buildings, and is expensive to provide in new buildings. However, in order to take advantage of fiber in real-world MDU deployments, it is necessary to shrink both apparatus and cabling, while lowering overall labor construction costs. Consequently, the overall architecture of an MDU FTTH system must be optimized in order to make deployment a success.

The ability to conserve space in MDU fiber deployments is also complicated because most deployments use some variation of a point-to-point topology. If a carrier deploys passive optical networking into a high-rise, it is typically desirable to have all splitting occur at an entry box where the feeder cable connects to the building. If a carrier deploys active Ethernet, or if all services are supported from an equipment room inside the building, it is still desirable to centralize all electronics in one space. Dispersing switches throughout the building would require multiple telecommunications rooms, and defeat the advantage of fiber's distance capability. Therefore, in almost all cases, taking fiber to each dwelling in a high-rise building has translated into large fiber counts in the riser space.

Traditional MDU FTTH Backbone Installations

Because of the need to centralize splitters or electronics, designers have typically opted for a dedicated riser cable for each floor, as shown by the schematic in Figure 1. Although the solution depicted in Figure 1 may be typical, some problems are obvious. First, a great deal of cable termination and handling is still required at each cable end. Even if the dedicated riser cables are preterminated on one end, significant fiber management and splicing is still required. More importantly, the volume of riser space needed to support these single-floor cables is substantial, even with the size advantages provided by fiber. The odds of

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having significant riser space in an older building are slim. The odds of convincing a developer to provide this much riser and fiber management space in a new building might be equally slim.

Given that the traditional architecture shown in Figure 1 has high costs and potentially limited long-term viability, what other options are available for MDU FTTH? One possibility is a

Traditional MDU FTTH Installation

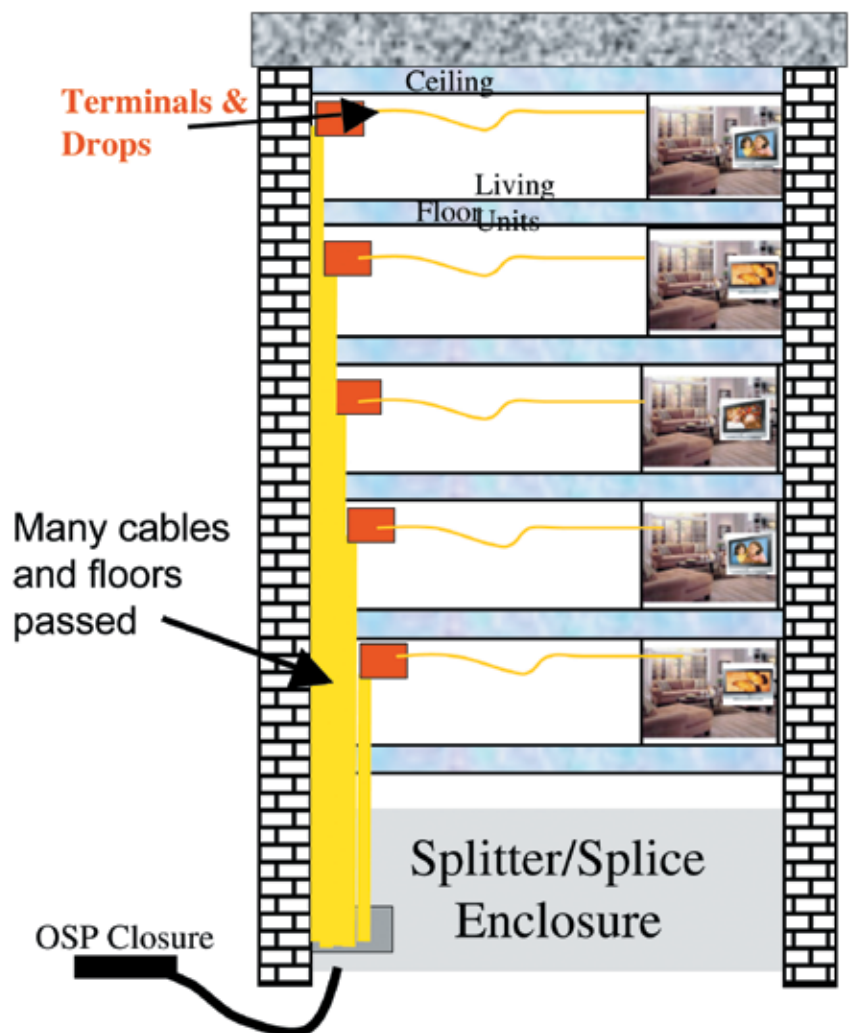


Figure 1. Traditional architecture for MDU FTTH deployment; note dedicated riser cable for each floor, coming up from ground level.

eight-story building, one combiner/riser assembly would be deployed serving the top five floors with a drop terminal on each floor, while the bottom three floors could be served by fiber drop terminal tethers pulled to connect directly into the entry FDH. For high-rise buildings, this five-floor-per-combiner architecture would simply be repeated.

Here are the details of each element in the system:



Figure 3. EZ-Plug fiber distribution hub.

Entry FDH with Pluggable Riser Connections

The EZ-Plug FDH (Figure 3) accommodates up to four compact Direct Connect 1x32 splitter modules to service up to 144 living units. Typically, this FDH would be placed in the basement of an MDU, and would be connected to the OSP network through a fusion-spliced, 4-fiber feeder cable. Riser terminations can be either spliced or plugged in with multifiber connectors to feed the riser backbone.

Combiner-Spooled Riser Cable Assembly

The next element is a simplified riser assembly, in which a compact AllWave FLEX ZWP ribbon riser cable (8.4mm diameter) is terminated with multiple 12-fiber MPO connectors in a small interface housing called the EZ-Spool Combiner (Figure 4). Typically a 60-fiber combiner unit will be installed on the third floor of a MDU, and every fifth floor above that (8, 13, and so forth).

Integration of cable spooling with the combiner housing allows rapid, direct spool-off of cable into the riser and down to the FDH in the basement. This



Figure 4. EZ-Spool Combiner Assembly and EZ-Spool Tool.

direct payoff feature eliminates the time typically required to “figure 8” riser cable inside hallways, where construction workers or tenants could interfere with it. The spool-off capability enables hands-free installation by allowing the unit to be temporarily mounted on a reusable fixture, so a single technician can install the fiber in the riser without monitoring the housing and cable. After the riser cable has been run to the basement, it may be terminated at the FDH by fusion splicing, or by using “plug and play” MPO connectors.

The small size of the combiner also enables technicians to work within confined closet spaces, staying out of the path of tenants and eliminating the need for larger dedicated telecommunications rooms. Once the riser cable has been installed, the spool on the combiner unit may be removed and discarded, followed by permanent installation of the combiner on the wall of a closet.

Drop Terminal with Spooled Tether

The system uses a compact terminal (Figure 5) that is similar to the combiner. It is intended for installation at each floor or area within the MDU. Five 12-fiber terminals, placed throughout the building, can be fed from a 60-fiber combiner. Typically, terminals are installed on each of the two floors above and below the combiner, with one terminal installed on the same floor as the combiner. Each terminal includes a 50-foot feeder cable wound on an integrated cable hub.



Figure 5. EZ-Spool Terminal. Twelve single-fiber adapters are protected by the hinged dust cover, shown in the top right of the picture.

One end of the feeder cable is terminated with a factory-installed MPO connector; the other end is terminated into 12 individual single-fiber adapters under a lockable “living hinge” cover. Terminals also allow an integrated spooling technique similar to the combiner riser installation, while still taking advantage of the spool for slack storage. Once the feeder cable is installed, it is terminated at the combiner by simply plugging in the MPO connector. Any cable slack may then be taken back up on the terminal spool, enabling a very flexible and compact location of the drop terminal on each floor.

Robust MDU Drop Assemblies

The drop assemblies are the last element of the system. These drop assemblies include robust crush-resistant cordage housing AllWave FLEX ZWP bend-optimized fiber, as well as high-performance factory-installed connectors that feed each living unit. The assemblies are capable of navigating MDU pathways to and within units, using easy attachment and routing methods. These drop assemblies are available connectorized on one or both ends, typically with SC-APC connectors. **BBP**

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