



Fiber to the Multi-Dwelling Unit: Clearfield Solution Speeds Time-to-Market

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As service providers strive to maximize the broadband speeds they can deliver, they are increasingly deploying fiber-to-the-premises (FTTP). Best practices for deploying FTTP to single-family homes are well established, but the same is not true for multi-dwelling units (MDUs).

The MDU category is a broad one. It includes structures as different as high-rise apartment buildings with hundreds of units, garden-style Florida condominiums without basements, and New York City brownstones – former single-family homes that have been converted to separate apartments. The upshot is that service providers cannot use a one-size-fits-all approach to fiber deployment to MDUs – a reality that caused some service providers to skip MDUs when they initially deployed fiber to an area.

Service providers increasingly are making the determination that they must establish a firm strategy for the MDU market. As they undertake MDU deployments, they are seeking to standardize deployment practices as much as possible.

A critical concern is that in the internet era, time-to-market is more critical than ever. And with labor representing 70% of the cost of fiber connectivity, service providers cannot afford time over-runs and return trips to solve deployment challenges.

Fiber optic solutions provider Clearfield® has designed its offerings to address these concerns, standardizing processes to the extent possible while accommodating a wide range of MDU installation scenarios, all with the goal of speeding time-to-market and minimizing the time technicians spend on an installation. Clearfield's approach also offers service providers the option of deferring certain costs until individual customers within an MDU sign up for service, minimizing upfront investment required and enhancing overall deployment economics.

This white paper looks at the various scenarios that service provider technicians may encounter in deploying fiber to MDUs and how Clearfield solutions can help speed time-to-market and minimize labor requirements while maximizing performance.

Clearfield's Offering

Clearfield offers a range of products designed to accommodate virtually any fiber installation, including the various types of multi-dwelling units installers may encounter.

FieldShield® Microduct and Fiber

Clearfield is one of few companies manufacturing both microduct and fiber. Both offerings are built to matching standards to simplify the product selection process, while helping to ensure fiber performance. The company also offers fiber designed for installation without microduct for building owners who prefer that approach or for situations where, for example, existing ductwork is available for use by the network operator.

Microduct offers protection for the fiber contained within it. In addition, it simplifies installation, enabling fiber to be pushed or pulled through the microduct without damage.

Network operators can minimize their upfront investment in fiber by initially properly installing microduct throughout a MDU and adding fiber to individual units as customers sign up for high-speed services requiring fiber to the customer premises. This approach also eliminates the need to replace fiber damaged after it was installed but never used.

FieldShield Pre-Connectorized Optical Fiber

Clearfield offers the smallest form factor pre-connectorized fiber on the market. FieldShield Pre-

Connectorized Optical Fiber ensures consistent quality of the connection and minimizes or eliminates the need for technicians and special equipment to make splices at the customer site. This saves on installation time by eliminating the need for specialized – and costlier – labor at the site.

Installation time with FieldShield Pre-Connectorized Fiber is significantly less than fiber installation time using traditional splices.

For those situations where a spliced approach is preferred, Clearfield also offers bare fiber that is spliced inside the cassette.

Push or Pull Installation Methods

FieldShield Fiber supports both push or pull installation methods. FieldShield Microduct is prepopulated with a pull string, enabling installers to use a pull approach. Alternatively, Clearfield offers a FieldShield Assist Module, a belt-driven assist machine that can be coupled to a drill to support a push approach. The push approach is particularly useful when a network operator wants to use only a single technician to handle the installation.

Support For Various Network Topologies

Optimal designs for an individual MDU could be:

- Home run or point-to-point, in which every dwelling unit has its own fiber to the service provider.
- A centralized split, in which fibers from multiple dwellings are connected to a single fiber from the service provider at or near the point of entry into the MDU.
- A distributed split involving multiple splits – a design typically used for a multi-story deployment. Initially one or more individual fibers from the service provider would be split into multiple fibers. Each of those fibers would be split again, with a split occurring at each floor.

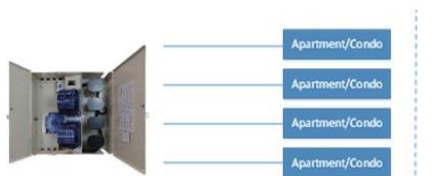


Figure 1 – Home Run, Point-to-Point

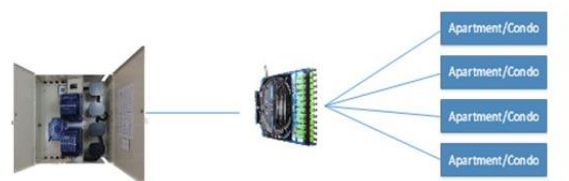


Figure 2 – Centralized Split

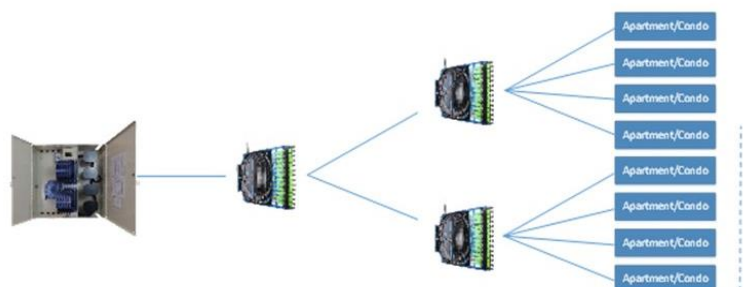


Figure 3 – Distributed Split

YOURx™ Flex Box

The YOURx Flex Box is designed for installation inside or outside an MDU and can contain multiple splitter or patch-and-splice cassettes, along with as many as 16 drop wheels. The network operator would use a splitter cassette when a single fiber is used to serve multiple dwelling units. A patch-and-splice cassette would be used if the network operator brings a fiber for every dwelling unit and can also serve as a demarcation point. The Flex Box acts as a termination point for microduct and a point of demarcation.

Clearview® Patch-and-Splice Cassettes

Clearview Patch-and-Splice Cassettes are designed to simplify fiber splicing by using in-cassette splicing, and offer time and money savings upon installation.

In a traditional network architecture, when connecting fiber from the service provider's central office or headend, technicians would have to install a splice case, as well as feeder and distribution cables, a vault and a splice tray. The Clearview Patch-and-Splice Cassette eliminates the need for a vault and splice case by bringing the splice tray inside the cassette. Splicing inside the cassette eliminates an entire point of connection, reducing lead time and labor costs, including prep time. The patch-and-splice cassette has a minimal footprint, yet also provides slack storage and additional storage space.

Clearview Patch-and-Splice Cassettes enable bare fiber to be easily spliced onto a bulkhead fan out assembly. They would typically be used to connect to the service provider network. Each cassette can accept up to 12 fibers and is pre-populated with the appropriate number of ports. (For example, an installation with four fibers from the service provider would use a single cassette pre-populated with four ports.) Multiple patch-and-splice cassettes can be installed in a single Flex Box.

Clearview Splitter Cassettes

Clearview Splitter Cassettes break out a single fiber into multiple ports. They are offered in a variety of port counts to meet a wide variety of installations. For example, a 1x32 splitter cassette might be used in the basement of a MDU to support a centralized split, while a 1x16 or 1x8 cassette might be used on each floor of a multi-story MDU to support a distributed split.

The input to each splitter cassette can be a multi-fiber push-on (MPO) connector or SC connector or bare fiber that is spliced inside the cassette.

FieldShield Drop Wheels

FieldShield Drop Wheels are pre-loaded fiber deployment assemblies. Purchased in increments of four, these wheels would be installed in a Flex Box, with each Flex Box holding up to 16 wheels. The fibers on each wheel is pre-connectorized on each end. At the time of service, one end of the fiber is pulled to the dwelling unit and the other is plugged into one of the ports on the FieldShield Drop Wheel assembly. Pulling only length of fiber needed to the dwelling unit and storing the remaining fiber on the drop wheel assembly eliminates the need for large slack storage equipment or space.

If fiber is initially installed only to dwelling units taking service, drop wheels generally would not be added for the remaining units until the units take service.

Drop wheels are specifically for use with pre-connectorized fiber.

Installation Scenarios

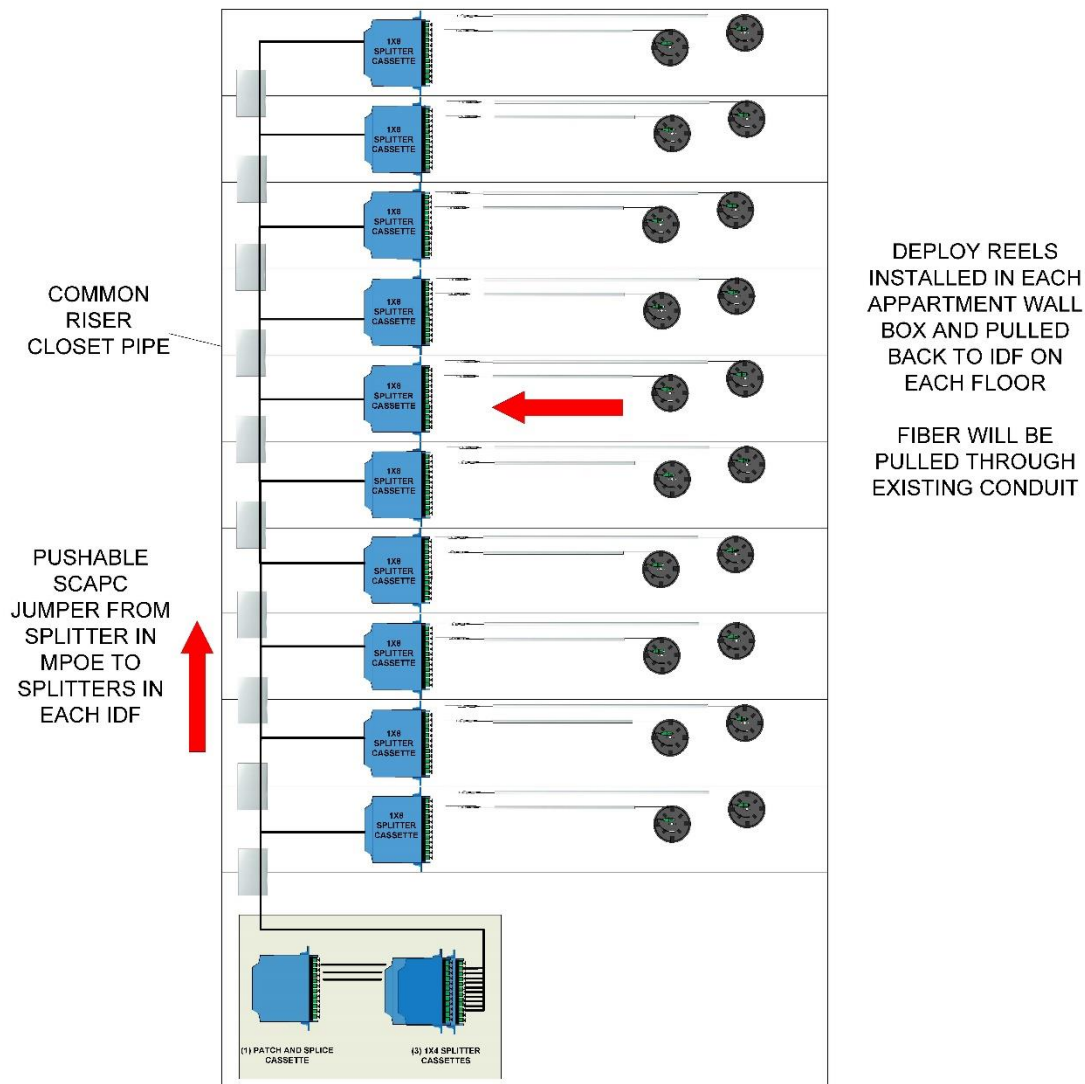
The following descriptions assume installers are using microduct and pre-connectorized fiber, but the same design principles can be followed for bare fiber that is spliced inside the cassette or for fiber installed without microduct if required.

These descriptions also assume individual fibers from the service provider are split, but Clearfield also supports a home run or point-to-point approach in which each dwelling unit has its own fiber connected to the service provider network. That approach relies completely on patch-and-splice cassettes.

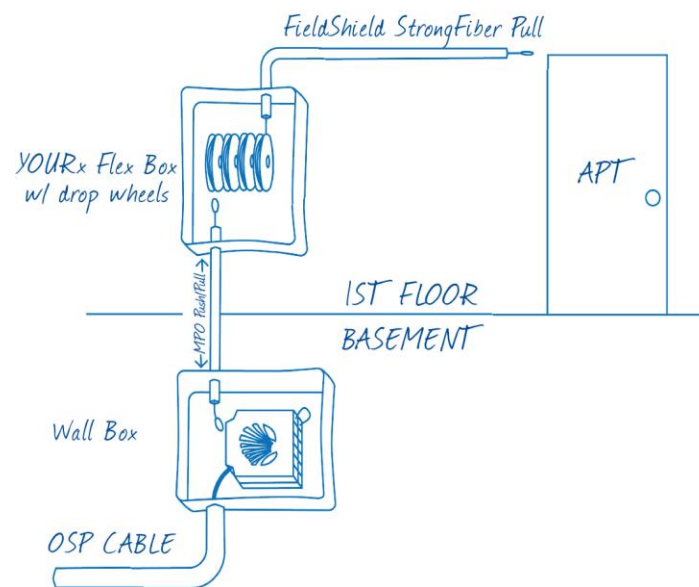
High-rise or multi-story low rise with riser

In this scenario, FieldShield Microduct and Fiber would be deployed in the riser at the time of the initial installation and microduct would also be deployed to individual dwelling units. Fiber can be brought to all dwelling units initially or can be added when an individual unit signs up for service.

In a typical high-rise installation, a Clearview Splitter Cassette would be installed at each floor, with the patch-and-splice cassette installed in the basement to act as a demarcation point and to convert multiple fibers from the service provider to conform to a pre-connectorized approach.



A multi-story low-rise would be more likely to use a centralized split, requiring a single Clearview Splitter Cassette in the basement, along with a Clearview Patch-and-Splice Cassette to act as a demarcation point.



Single-story low-rise MDU with a basement

In this scenario, a YOURx Flex Box would be installed in the basement or on the wall outside and would contain a Clearview Splitter Cassette to support a centralized split, as well as a Clearview Patch-and-Splice Cassette to act as the demarcation point. FieldShield Microduct would be installed on the basement ceiling to each unit and fiber could be added initially or later.

Single-story low-rise without basement

When a single-story MDU lacks a basement, installers will need to wrap the building with FieldShield Microduct. FieldShield Fiber could be added at the time of installation for all units or only for those taking service. A YOURx Flex Box would be installed on the outside wall and would contain a Clearview Splitter Cassette to support a centralized split, as well as a Clearview Patch-and-Splice Cassette to act as the demarcation point.

Multi-story low-rise without a riser

When a multi-story low-rise has no riser, FieldShield Microduct will need to be installed vertically on the outside of the building to reach the upper floors. On each floor, fiber would be installed above a dropped ceiling or below a raised floor or could be wrapped around the building. If the building has a basement, units on the first floor could be reached via microduct installed on the basement ceiling.

This type of installation could use a centralized or distributed split, with a distributed split most suitable for MDUs with a larger number of units. To support a centralized approach, a YOURx Flex Box would be installed at the point of entry into the MDU and would contain a Clearview Patch-and-Splice Cassette to act as the demarcation point and a single Clearview Splitter Cassette. To support a distributed approach, a YOURx Flex Box would be installed at the entry point into the MDU and would contain one or more Clearview Patch-and-Splice Cassettes to act as the demarcation point and one or more Clearview Splitter Cassettes. Additional Clearview Splitter Cassettes would be installed on each floor.

Summary

When evaluating MDU opportunities, service providers are faced with a wide range of deployment variables. Clearfield's FieldShield Fiber and Microduct, YOURx Flex Box and drop wheels and Clearview Splitter and Patch-and-Splice Cassettes address these variables, while also standardizing installation processes to the extent possible. The product line is designed to save installation time and to avoid overruns and return trips, thereby reducing lead times and speeding time-to-market, while also maximizing performance.

For more information, visit www.SeeClearfield.com or call (800) 422-2537.