ofs

A Furukawa Company

FTTX

OFS Multi-Dwelling Unit (MDU) Solutions

A FOX SOLUTION® GUIDE

The MDU network is changing. It needs the bandwidth and reliability of fiber. OFS brings unique solutions for fiber in the MDU. OFS' FOX Solution Offering for Multi-Dwelling Units features several end-to-end solutions optimized to distribute fiber in buildings and individual living units.

Solutions to Bring Fiber to the Living Unit:
- HomeRun Outdoor and Indoor Cabling Systems
  - Fast and low total installed cost method
- V-Linx™ Spool and Play Solution
  - Optimized for dense, multi-story buildings
  - Speeds installation in large or small MDUs
- Classic SlimBox™ distribution boxes and cables
  - Features traditional premise cable and components

Solutions Within the Unit:
- EZ-Bend® Drop Cables
- EZ-Bend® InvisiLight™ Indoor Living Unit Solution
- SlimBox distribution boxes

These products help you install the MDU network fast, efficiently, and reliably with outstanding optical performance. In addition, these solutions are field proven in widespread FTTH deployments around the world.

Solutions to the Unit (Solution 1) – HomeRun Outdoor Cabling System Featuring EZ-Bend Fiber

For indoor or outdoor deployment, horizontal or vertical configurations

The HomeRun Outdoor Cabling System saves time by pulling up to 12 bundled individual drop assemblies at once.

Features:

- HomeRun features ruggedized 4.8 mm Indoor/Outdoor cable with EZ-Bend® Ultra-Bend Insensitive Fiber.
- Deployable either indoors or outdoors
- Vertical or horizontal configurations
  - Vertical deployments (buildings)
  - Horizontal deployments
    - Passing strip malls
    - Stadiums for DAS deployments
      - Outdoor deployments – drop coils are placed outside a window – simply drill a hole into the unit and pull the cable inside
      - Indoor deployments - bundles are located in a riser space next to the living unit
      - CO end – available either bare or pre-connectorized
    - Home end – Typically pre-connectorized with SCA connectors

RISER

400 A2 LIU
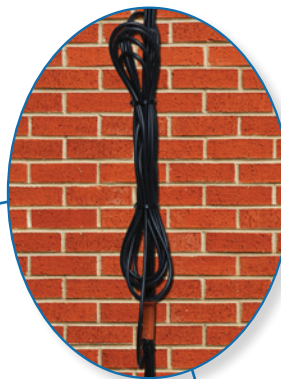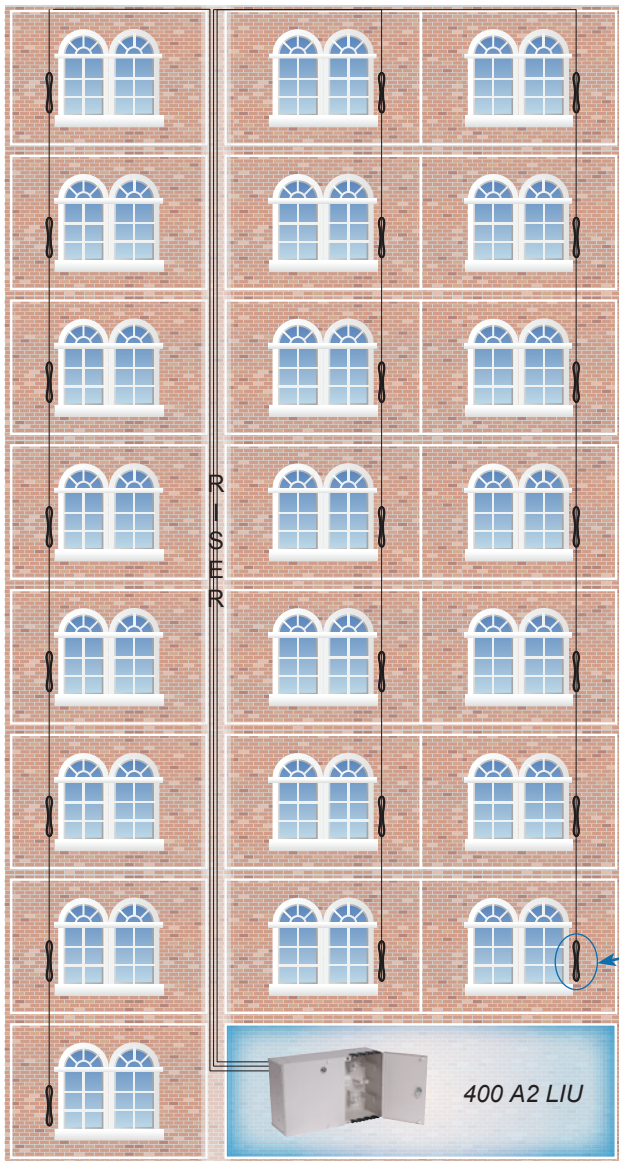
To Install:

1) Install the bundle by pulling them up or down the side of the building
2) Connect the bundle to the electronics or fiber distribution
3) When a customer subscribes, drill a hole through the wall, uncoil the bundled end, run the cable through the wall and plug into the ONT

Items Needed to Specify:

1) Number of fibers/cables in the bundle (typically corresponds to number of floors)
2) "A" = Tail length – Distance from electronics to the first bundle location
3) "B" = Distance between floors (or distance between bundles for horizontal application)
4) "C" = Bundle length

"A"   "B"

Electronics or fiber distribution

"C"
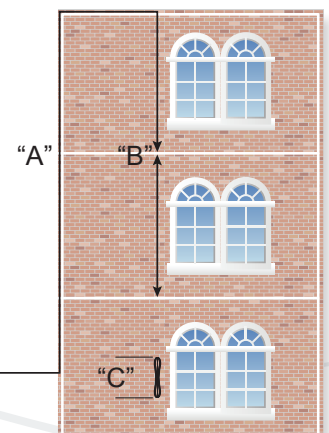
Solutions to the Unit (Solution 2) – HomeRun Indoor MDU Cabling Solution

OFS' HomeRun MDU Cabling Solution is an excellent choice for small buildings and garden-style apartments. It features an innovative cable design that helps minimize capital investment and enables customers to be quickly and efficiently added as they sign up for service.

The small diameter cable can fit in small riser spaces, and can be installed in a drop ceiling, in wire molding, or directly attached to the wall. The cable may consist of up to 12 fibers.

To install:

Simply run the cable down the hallway. When a customer signs up, pull out a drop cable, install a connector, and plug them in.

Features:

- Pre-connectorized option on the upstream side to simply installation
- Enables smooth installations without snagging on obstacles through the installation path

Easily installable in buildings with variable distances between doors

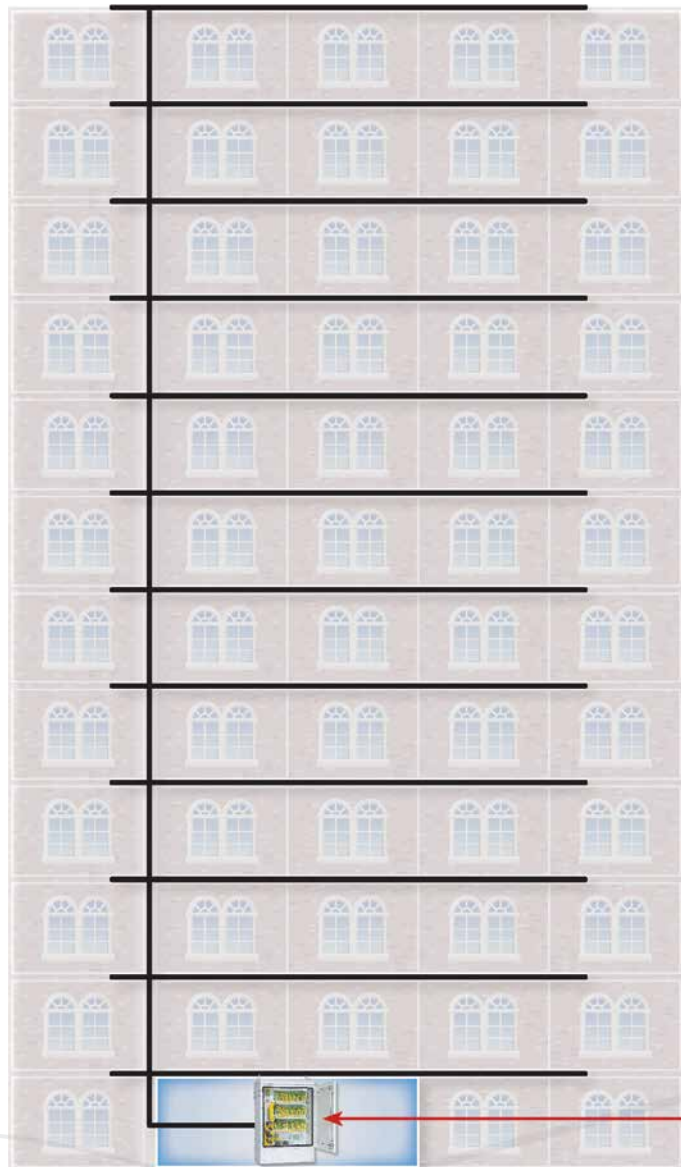Excellent solution for small buildings or garden apartments.
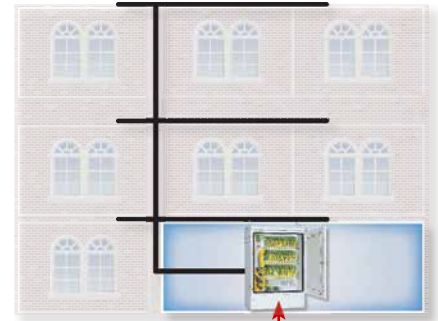
Fiber distribution hub for PON or patch panel for point-to-point systems

Turning service on for a customer is easy!

1) Cut 2 windows in cable. Cut and pull back 0.5 m (18") of 1.6 mm cordage
2) Mount OFS/FEC Mechanical Splice or Fusion Splice-On Connector on cord
3) Plug connector directly into subscriber's ONT or into SlimBox unit at the door and run EZ-Bend InvisiLight products into the living unit

Color coded small 1.6 mm cords allow easy and accurate fiber tracing and connection from entry point to living unit along with fast easy stripping and termination.
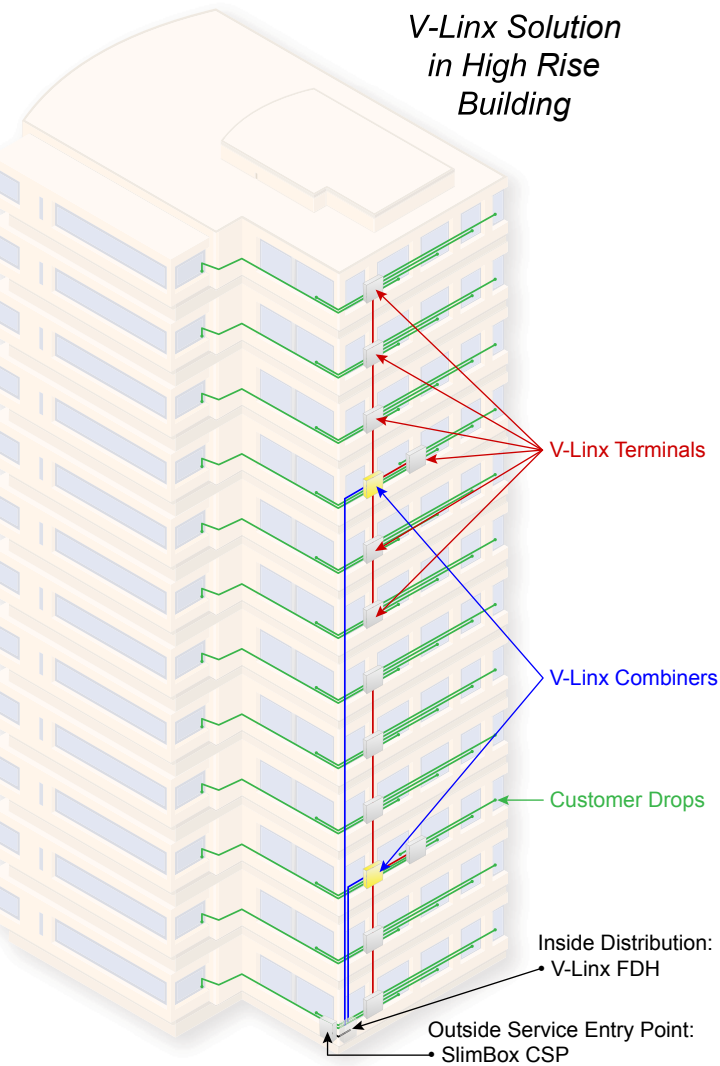
Midspan Access

Items Needed to Specify:

1) Fiber count
2) Length
3) Connector type (if pre-connectorized on telecom closet end) for horizontal application

The HomeRun MDU Cabling Solution inside a large MDU minimizes riser space needed

V-Linx Solution in High Rise Building

V-Linx Terminals

V-Linx Combiners

Customer Drops

Inside Distribution:
V-Linx FDH

Outside Service Entry Point:
SlimBox CSP

Solutions to the Unit (Solution 3) – V-Linx Spool and Play System

The V-Linx Solution is designed for dense, multi-floor buildings.

Significantly speeds installation and requires less labor to install the backbone by using our short length spool-and-play technology.

Drastically reduces number and length of cables, and riser space required versus other installation systems

V-Linx Combiner – Used for larger buildings

- 60 fiber aggregation pre-stubbed aggregation point
- Minimizes cables in the riser and installation time
- Available in bare or pre-connector-ized versions
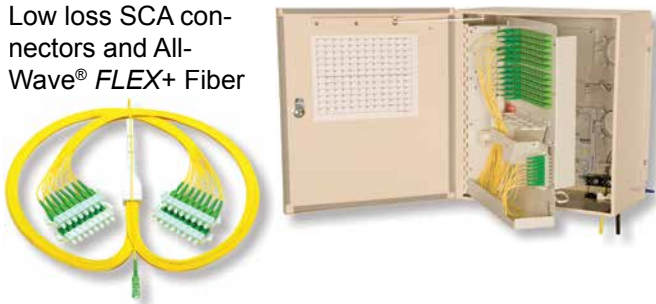- Simply place and spool out cable to the electronics closet

V-Linx Terminal – Used for large or small buildings

- 6 or 12 fiber connector terminals for drop cables
- Available in bare or pre-connectorized versions on the electronics side
- Integrated fiber management
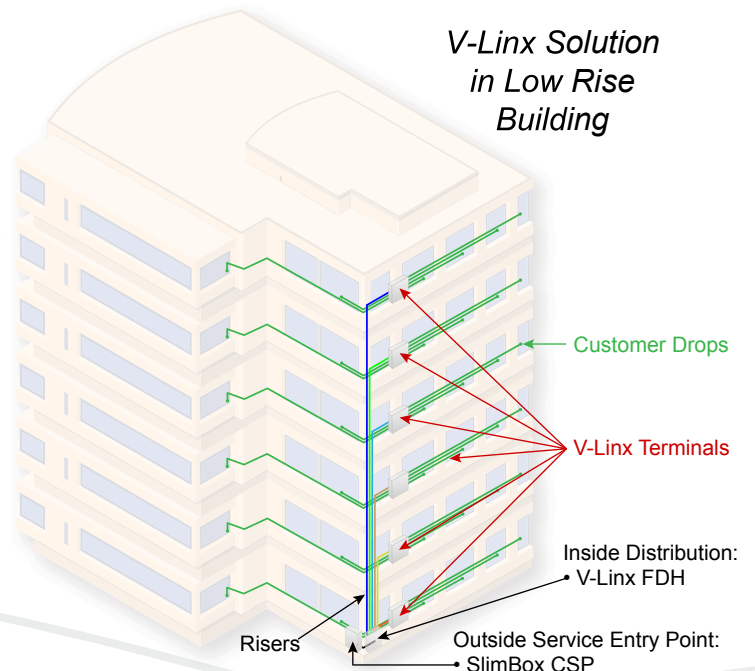- Simply place and spool out cable

V-Linx FDH

- Serves up to 144 subscribers (128 when using 4 splitters)
- Uses OFS Direct Connect Compact PLC Splitter
- Intuitive fiber management
- Low loss SCA connectors and All-Wave® *FLEX+* Fiber

V-Linx Solution in Low Rise Building

Customer Drops

V-Linx Terminals

Inside Distribution:
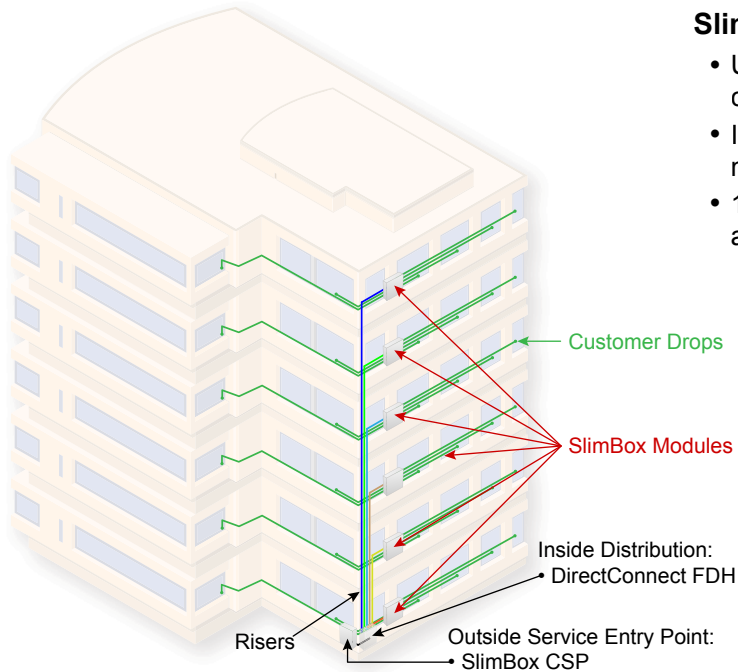V-Linx FDH

Risers

Outside Service Entry Point:
SlimBox CSP

Items Needed to Specify:

For terminals:

1) Connector type, both ends
2) Tail length
3) Number of ports for drops (6 or 12)

Solutions to the Unit (Solution 4) – Backbone Cables and SlimBox Distribution Modules

Customer Drops

SlimBox Modules

Inside Distribution:
• DirectConnect FDH

Risers

Outside Service Entry Point:
• SlimBox CSP

SlimBox 12-Fiber Module

- Used to connect the riser cable to many drop cables
- Inexpensive distribution module
- 12 splice and/or 12 connector adapter capacity

DirectConnect LFC FDH

- Cost effective lower fiber count metal unit for inside building/cabinet applications
- Uses LGX® panels and Direct Connect splitter
- Available as W2, W4 and W8 wall box with SCA or LCA connectors
  - WM2 – 24 fibers
  - WM4 – 48 fibers
  - WM8 – 96 fibers
- Double capacity with LC connectors
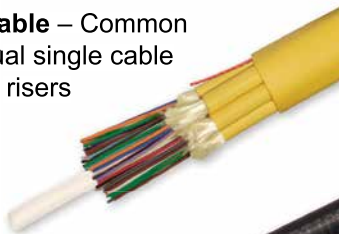- Optional splice tray

Riser Cabling Options

Different cable types are available for various MDU situations. Available with bare ends or pre-connectorized.
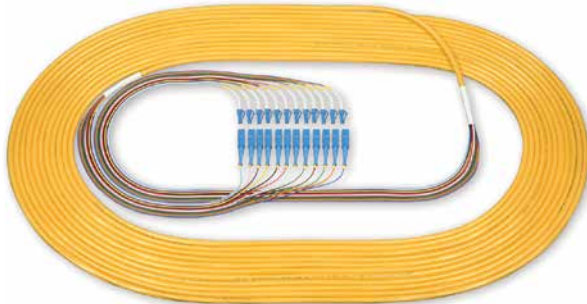
- **ACCUMAX® Distribution Cable** – Common indoor cable type for individual single cable deployments to each floor in risers
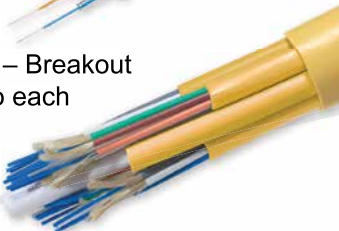
- **AccuDry® Indoor-Outdoor Cable** – Similar design to AccuMax Cable, but Indoor-outdoor cable design

- **MiniCord® Breakout Cablel**– Breakout style cable for deployment to each floor

- **AccuFlex™+ Ribbon Cable** – Indoor ribbon cable for high fiber count applications

Items Needed to Specify:

1) Length and number of fibers of each riser cable for each floor
2) Cable type
3) Connector type for pre-connectorized cables
4) "B" = Distance between floors (or distance between bundles for

Drops and Solutions in the Unit

Deployment solution for new or existing units
EZ-Bend 3.0 and 4.8 mm Optical Cable - Stapled

EZ-Bend Optical Cables help speed and simplify indoor optical drop cable installations using breakthrough technology pioneered by OFS.

They can be routed around corners and stapled using traditional fast and easy copper wire installation practices, with negligible signal loss and are ideal for aggressive routing environments where space is at a premium.

Available in 4.8 or 3.0 mm diameter ruggedized simplex cordage with macrobending performance far better than ITU G.657B3 requirements.

Backward compatible with installed G.652D fibers.

Fiber Distribution Modules

SlimBox™ Modules

Can be termination or splice points for optical fiber in an indoor wall mounted environment.

Available in 2, 4, or 12 fiber splice or termination versions, they can either be used with splices or connectors.

2 or 4 fiber versions are typically used at the living unit.

The 12 fiber version is often used as a distribution box on a floor.

Drops and Solutions in the Unit Feature:

EZ-Bend® Optical Technology

EZ-Bend® InvisiLight™ Optical Solution

Deployment solution for existing units
EZ-Bend InvisiLight Indoor Living Unit Solution

The OFS EZ-Bend InvisiLight Optical solution is a revolutionary new system that enables fast, easy, virtually invisible in-residence fiber drop connections.

The installer uses an innovative, simple process to adhere a tiny (< 1 mm diameter) micro-drop fiber into the grooves between molding and walls or ceilings, resulting in a protected fiber link that blends seamlessly into the residence.

NOT SEEING IS BELEIVING

TAKE A CLOSER LOOK
Almost invisible to the eye

OFS' EZ-Bend Fiber enables the EZ-Bend InvisiLight Optical Solution to be routed around the many corners in a residence with negligible signal loss, enabled by its 2x-3x better tight bending performance than competing ultra bend-insensitive fibers. This plug and play solution reduces the need for field terminations and solves the slack management challenge through an innovative auto-slack manager.

Deployment solution for new units

Cordage in micro-conduit – Features 2.0, 3.0 or 4.8 mm AllWave FLEXI Optical Cable

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* 3.0 mm Cables are not recommended for stapling.
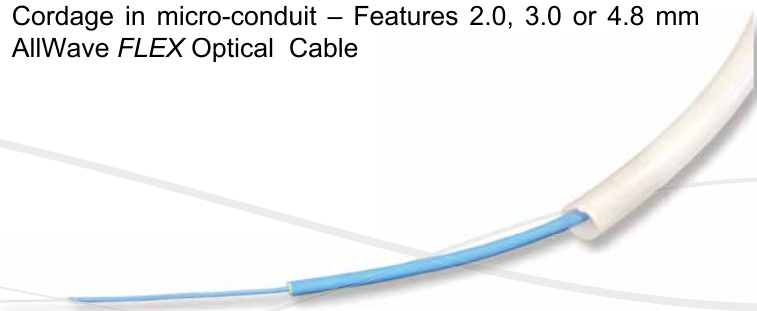
The Fiber is the Network™

Fiber is moving into new places, including single-family homes, apartment buildings, and condominiums.

These places require fiber and cables that can withstand tight bends, stapling, and the long-term strains from expansion and contraction of buildings.
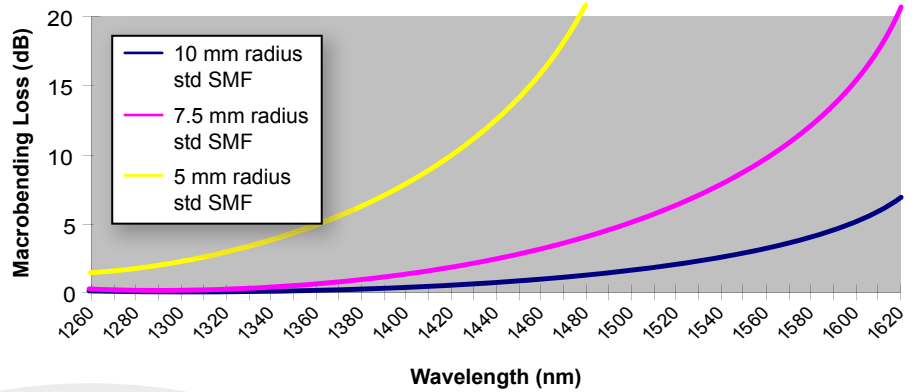
With conventional fiber, the tighter the bends, the higher the loss.

OFS' AllWave *FLEX+* and EZ-Bend Fibers are the ideal solutions for MDU environments:

- The longer the wavelength, the higher the loss
- Next generation PON systems are expected to have 3X loss of this generation

Optical Fiber Bending Loss Increase vs Wavelength
Macro-bending Loss of typlical standard G.652 SMF
Single 360 degree turn (maximum loss)

Standards Body	Current Generation PON		Next Generation PON on Same ODN		Bending Loss Increase
IEEE	GE-PON downstream	1490 nm	10G E-PON downstream	1577 nm	3X
ITU-T	G-PON downstream		10G-PON downstream		
			WDM PON	1625 nm	4X
SCTE/ITU	RF-Video downstream	1550 nm	RFoG upstream	1610 nm	2X

OFS Bend-Optimized Fibers are Important Today and Even More Important for Tomorrow's Technology

OFS Bend-Insensitive Single-Mode Fibers

ITU-T G.6.57 Minimum design radius	G.652D Compliant For long reach and most short reach needs	G.652D Compatible For short reach applications with sharp bending (MDUs, In-Residence)
10 mm Bend Challenged OSP Cable (Managed bends)	G.657A1 — AllWave® *FLEX* Fiber Zero Water Peak	**G.657B1?** Not a Standard
7.5 mm Most Connectivity Applications (Managed bends)	G.657A2 — AllWave® *FLEX+* Fiber Zero Water Peak	**G.657B2** *This specification is obsolete*
5.0 mm In-Home/MDU Drop (Unmanaged bends)	**G.657A3?** NOT A STANDARD	G.657B3 — EZ-Bend® Optical Technology
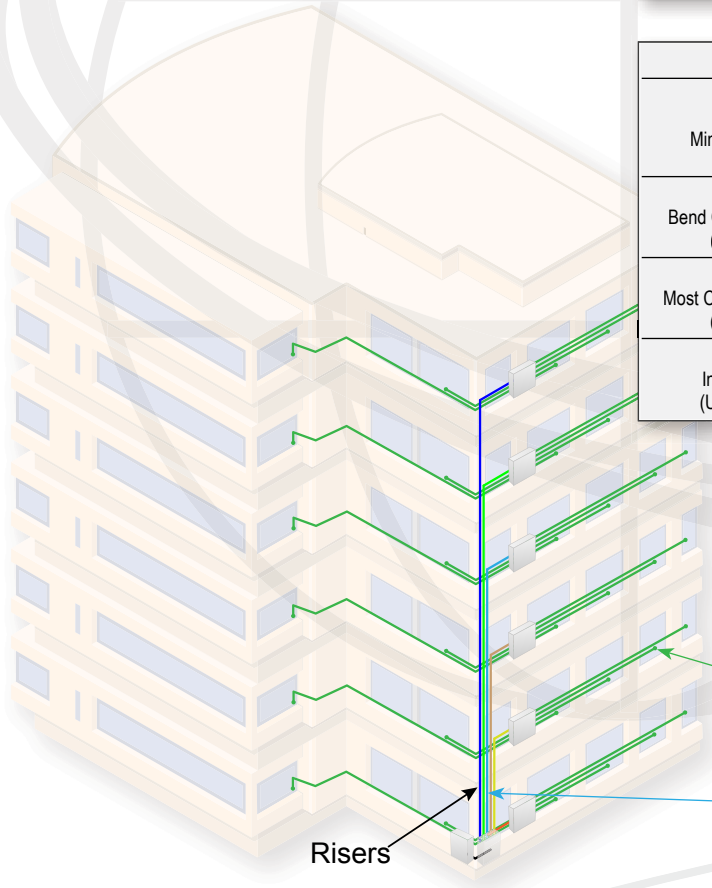
Risers

For drop cables to the unit:
- Specify EZ-Bend Fibers

For riser cables:
- Specify AllWave *FLEX+* or EZ-Bend Fibers

Pre-Connectorized Options

OFS brings a variety of connectorization options for MDU environments.

All distribution systems, HomeRun Indoor and Outdoor MDU Cabling, V-Linx components, and riser cables are available in a variety of pre-connectorized lengths.

Cables

Pigtails, jumpers and patch cords are also available in customized lengths and configurations for no additional charge.
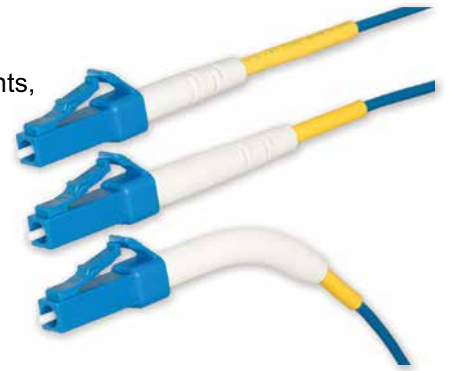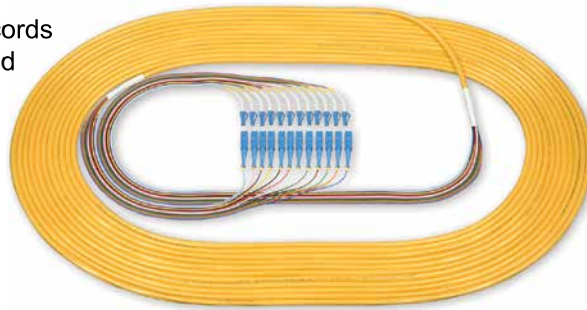
Field-Installable Connectors

Fusion splice-on connectors (FSOC) or Mechanical splice-on connectors (MSOC) can be installed on-site in the field.
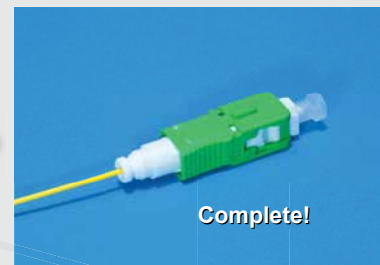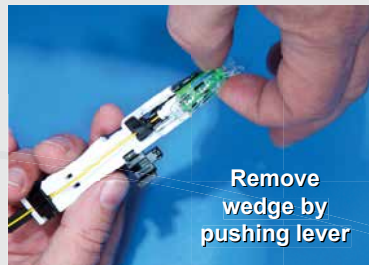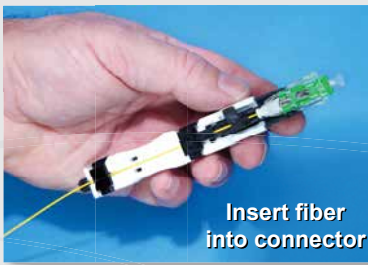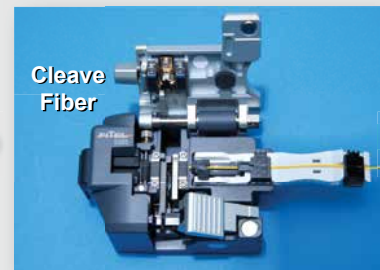
The main advantage of a field installable connector is to eliminate slack management issues.

Fusion Splice-on Connectors use a cleaver and fusion splicer to splice a connector to the fiber.
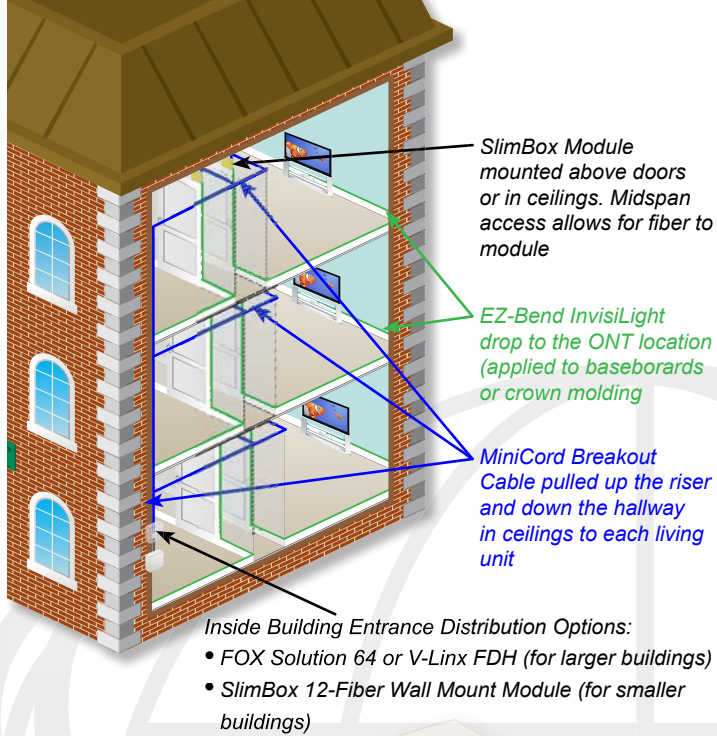
Available in a variety of connector ends with two different connector types.

Mechanical Splice-On Connectors only need a cleaver for installation. Available in a variety of common connector ends
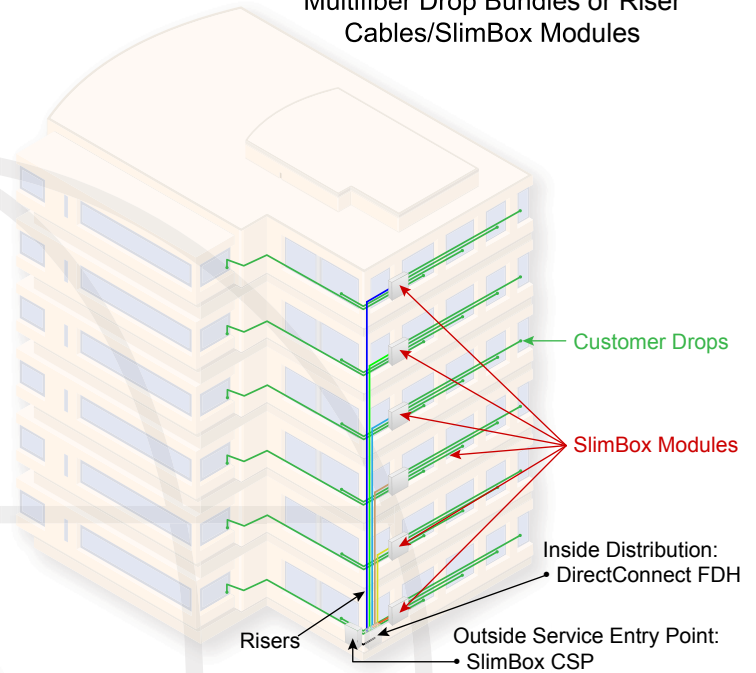
Strip coating

Place fiber in Fiber Holder
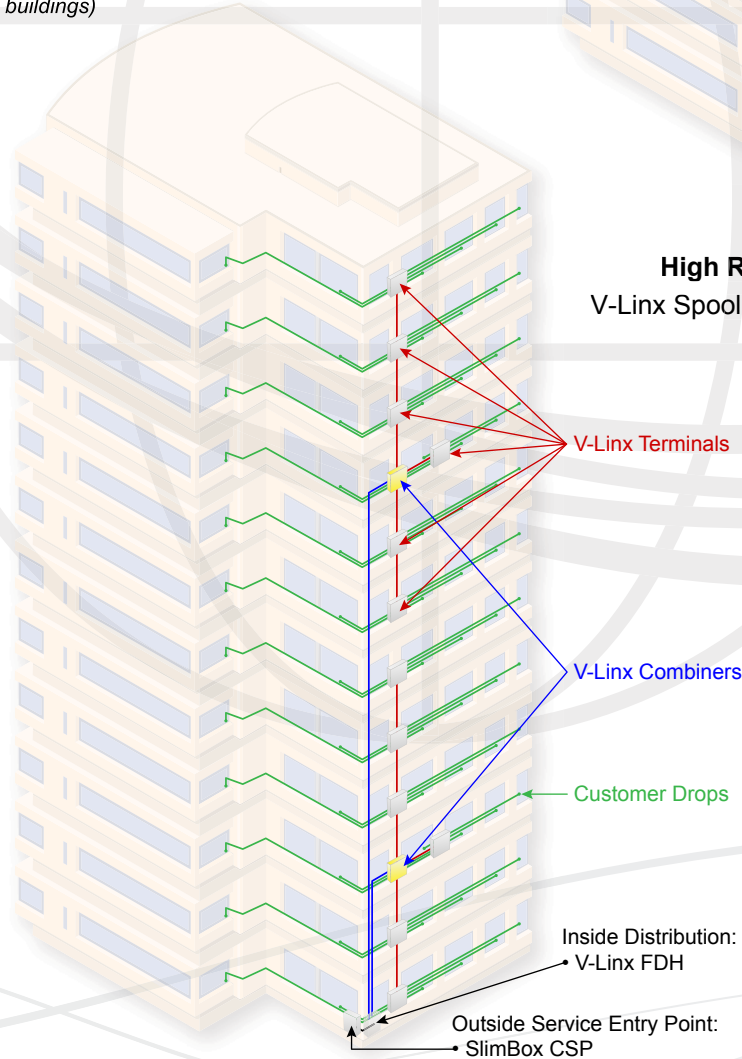
Cleave Fiber

Insert fiber into connector

Remove wedge by pushing lever

Complete!

Common Solutions by Building Types

Garden Style Apartments
HomeRun MDU Cabling System

SlimBox Module mounted above doors or in ceilings. Midspan access allows for fiber to module

EZ-Bend InvisiLight drop to the ONT location (applied to baseborards or crown molding

MiniCord Breakout Cable pulled up the riser and down the hallway in ceilings to each living unit

Inside Building Entrance Distribution Options:
- FOX Solution 64 or V-Linx FDH (for larger buildings)
- SlimBox 12-Fiber Wall Mount Module (for smaller buildings)

Small Building
Multifiber Drop Bundles or Riser Cables/SlimBox Modules

Customer Drops

SlimBox Modules

Inside Distribution:
- DirectConnect FDH

Risers

Outside Service Entry Point:
- SlimBox CSP

High Rise
V-Linx Spool and Play

V-Linx Terminals

V-Linx Combiners

Customer Drops

Inside Distribution:
- V-Linx FDH

Outside Service Entry Point:
- SlimBox CSP

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