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LiveWebcast

Fiber Optic Cable Management

April 23, 2014

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Your instructor today is

Larry Johnson

Director and Founder of Light Brigade

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Some Housekeeping Issues

First, for your convenience, this presentation will be available on demand within 24 hours after we conclude today at www.lightwaveonline.com

I encourage you to ask questions using the "Ask a Question" box that you should see on the left-hand side of your screen. To keep a consistent flow we will answer those questions at the end of the presentation.

If you have a tech support issue, you can alert us through this question box as well.

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The Light Brigade

- Founded in 1986.
- Over 45,000 trained in fiber optics since 1987.
- Strengths.
  - Staff.
  - Content.
  - Equipment.
  - Experience.
- Technology based.

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Fiber and Cable Management

- Fiber management.
  - Organization.
    - Color codes.
  - Bend radius.
  - Ribbon fibers.
  - Transition tubing.
  - Splices.
  - Fiber diameter(s).
  - Cross connects.
  - Splitters.

- Cable management.
  - Securing the cable.
    - Strain relief.
  - Bonding and grounding.
  - Bend radius control.
  - Buffer tube management.
  - Mid-entries.
  - Environmental sealing.
  - Color codes.
  - Flexibility for adds, moves, and changes

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Fiber and Cable Management Products

Description	CO/OSP Applications	Premises Applications
Fiber distribution frames	Central office, headends, nodes	Large high rises
Distribution panels	Central office, headends, nodes	Building entrance, hub
Splice panels	Central office, building entrance	Building entrance
Optical entrance enclosures	Central office, headends	Building entrance
Fiber distribution hub	Outside plant, serving area hubs	Indoor/outdoor FDH
Fiber access terminal	Outside plant	N/A
Multiport service terminal	Outside plant	N/A
Splice closures	Outside plant, aerial, vaults	Outside vault, intrabuilding
Premises panels	Fiber to the building	Intrabuilding
Transition terminal	Outside plant, next to ONT	FTTH (MDU/MTU)
Media outlets/MUTOA	N/A	FTTB (MDU/MTU)
Cable slack storage	Outside plant	Premises

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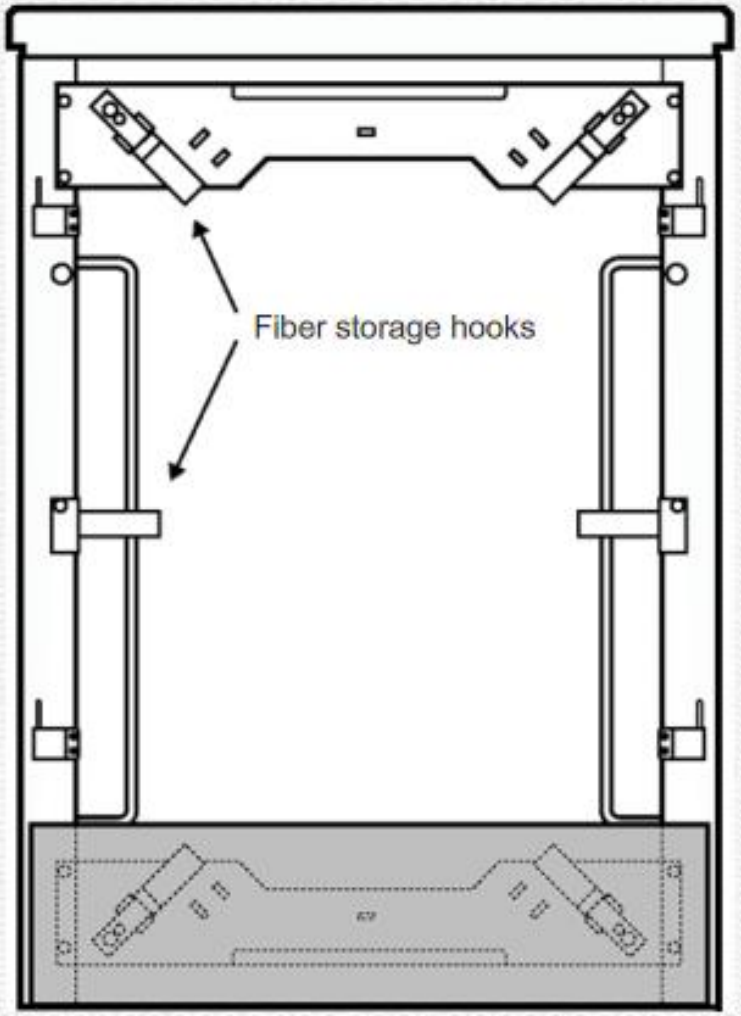
Cable Slack Storage Methods

- Underground.
  - Handholes.
  - Vaults.
  - Optipeds.
- Aerial.
  - Slack rings.
- Buildings.
  - Walls.
  - Storage cabinets.
  - Slack rings.
- Always observe cable's minimum bend radius.



Courtesy Moore Diversified Products

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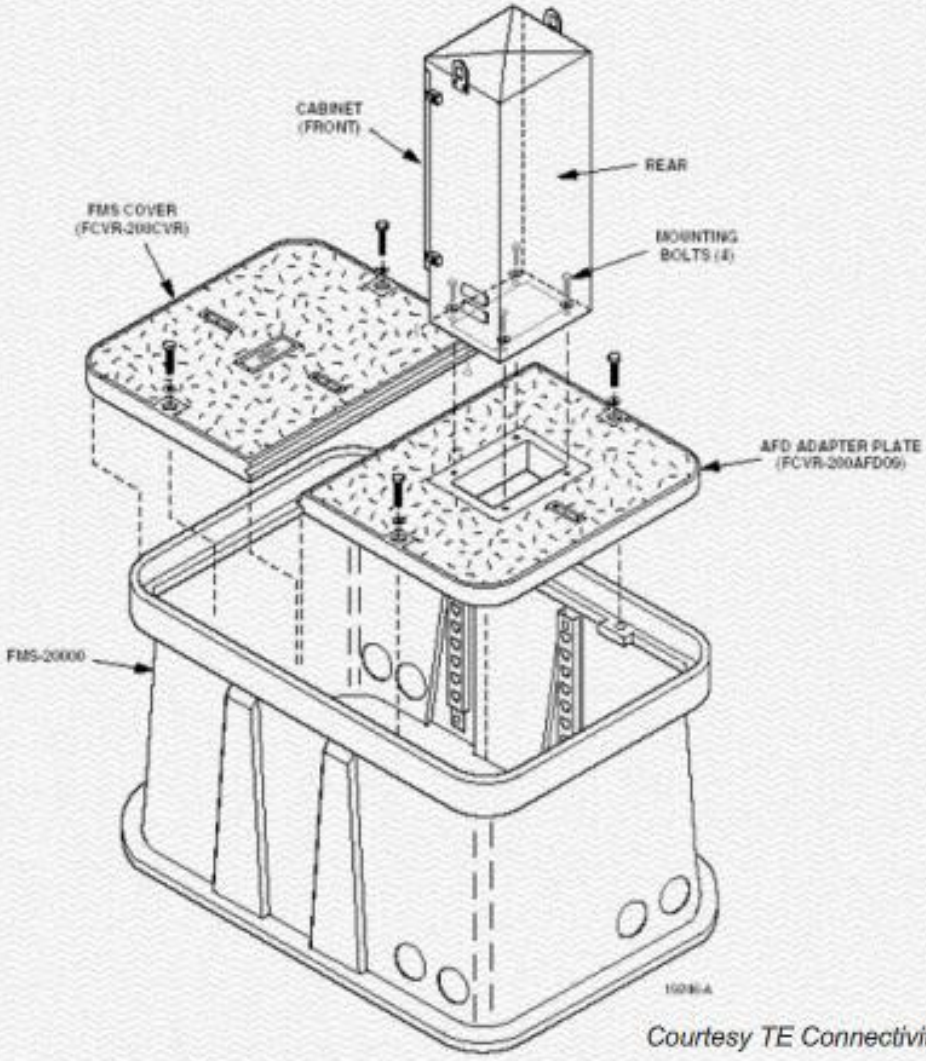
Underground Cable Storage

- Vaults.
- Handholes.
  - Load bearing.
- Cable slack.
  - Feeder and distribution.
- Drop cable slack.
- Closure mounting.



Courtesy TE Connectivity

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Aerial Cable Storage Products

- Snowshoes are a simple, low cost, and aesthetic method to storing cable slack.
- Use of one snowshoe allows a 180° transition when using butt style splice closures.
- Standard diameters of 16” and 24”, plus 7” version for FTTx.

Courtesy Multilink, Inc.

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FTTx Cable Management Products

- PON products for housing optical splitters.
  - Outdoor and indoor FDH.
  - Splitter boxes.
  - Fiber distribution terminals.
  - Fiber access terminals.
  - Multiport service terminals.
  - Drop/splice closures.
- Active Ethernet.
- Location.
  - Protection.
- Mechanical.
- Identification.

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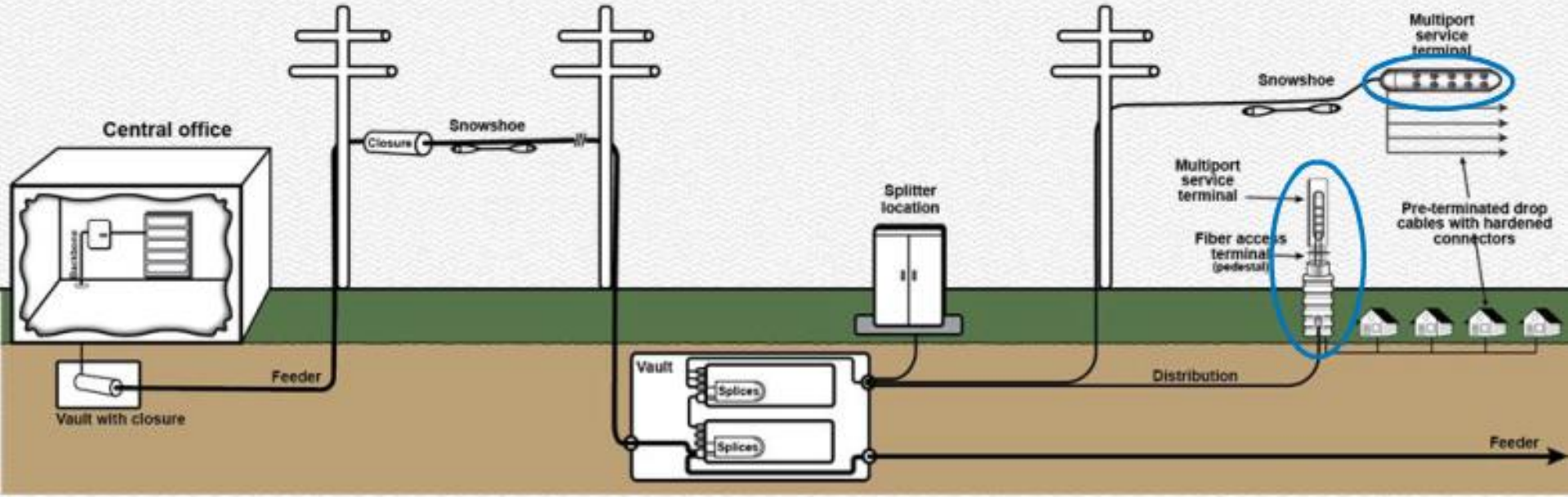
Drop Terminations

FTTx with Preterminated Drops

- Preterminated cables.
- Lower cost.
- Increased planning.
  - Location.
  - Slack cable.



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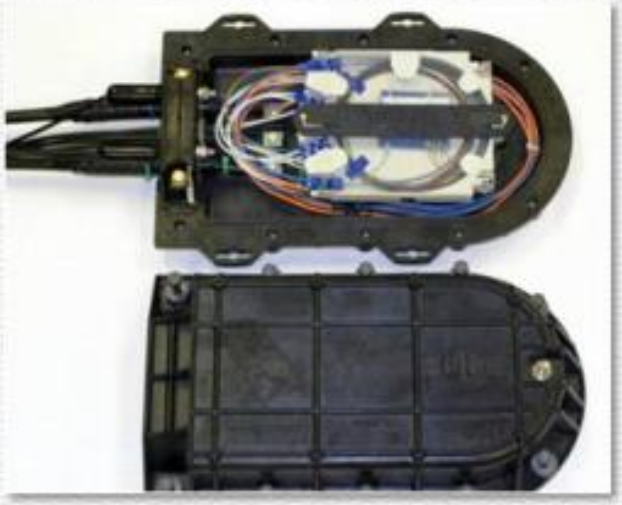
Splice Closures



- OSP closure.
  - High fiber counts.
  - Ribbon options.
  - In-line or butt style.
  - Larger.
  - Re-enterable.
  - Environmentally sealed.

- FTTx closure.
  - Small fiber counts.
  - Butt style.
  - Smaller.
  - Re-enterable.
  - Environmentally sealed.
  - Drop cable options.

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Splice Closures

Splice Closure Applications

- For aerial and underground applications.
- Design features:
  - Mechanical strength.
  - Environmental sealing.
  - Grounding capabilities.
- In-line splicing.
- Splitter functions for FTTx.
- Mid-entries.
- Restorations.

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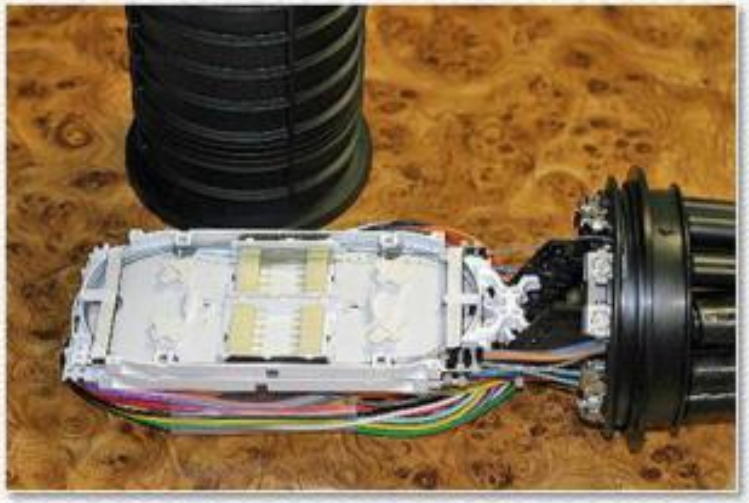
FTTx Splice Closures

- What to look for:
  - Slack buffer tube management.
  - Storage trays and baskets.
  - Cable strain relief.
  - Splitter mounting.
  - Ability to handle non-standard fiber/splice counts.
  - Splice trays.
  - Expandability.
  - Toning and grounding options.



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Outside Plant Cable Management

- This technique uses two splice closures.
  - Feeder.
  - Distribution.
- All localized drop cables are accessed from the distribution splice closure.

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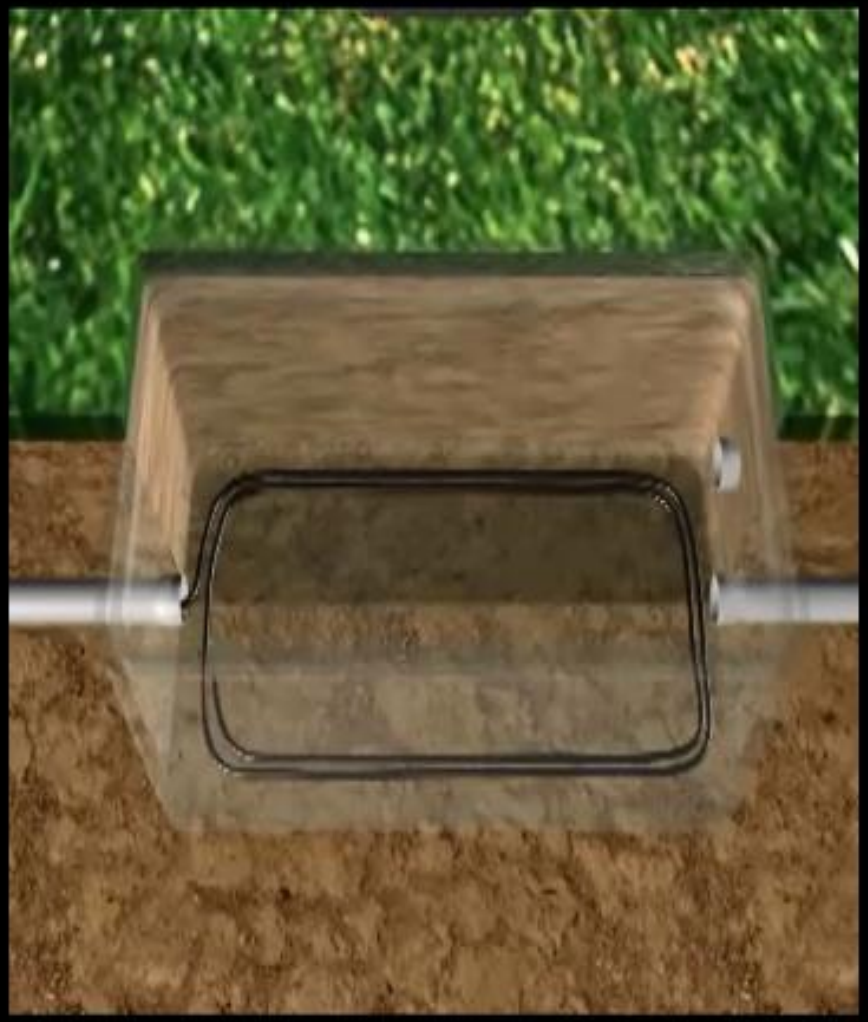
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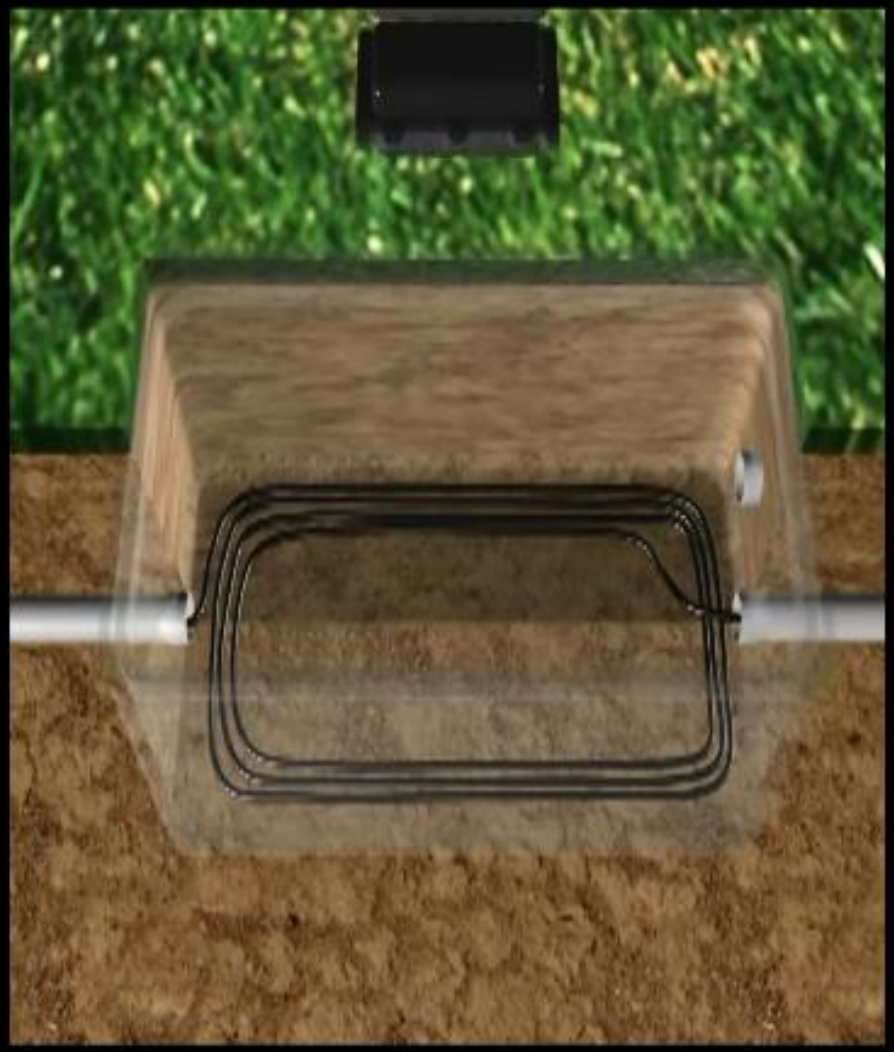

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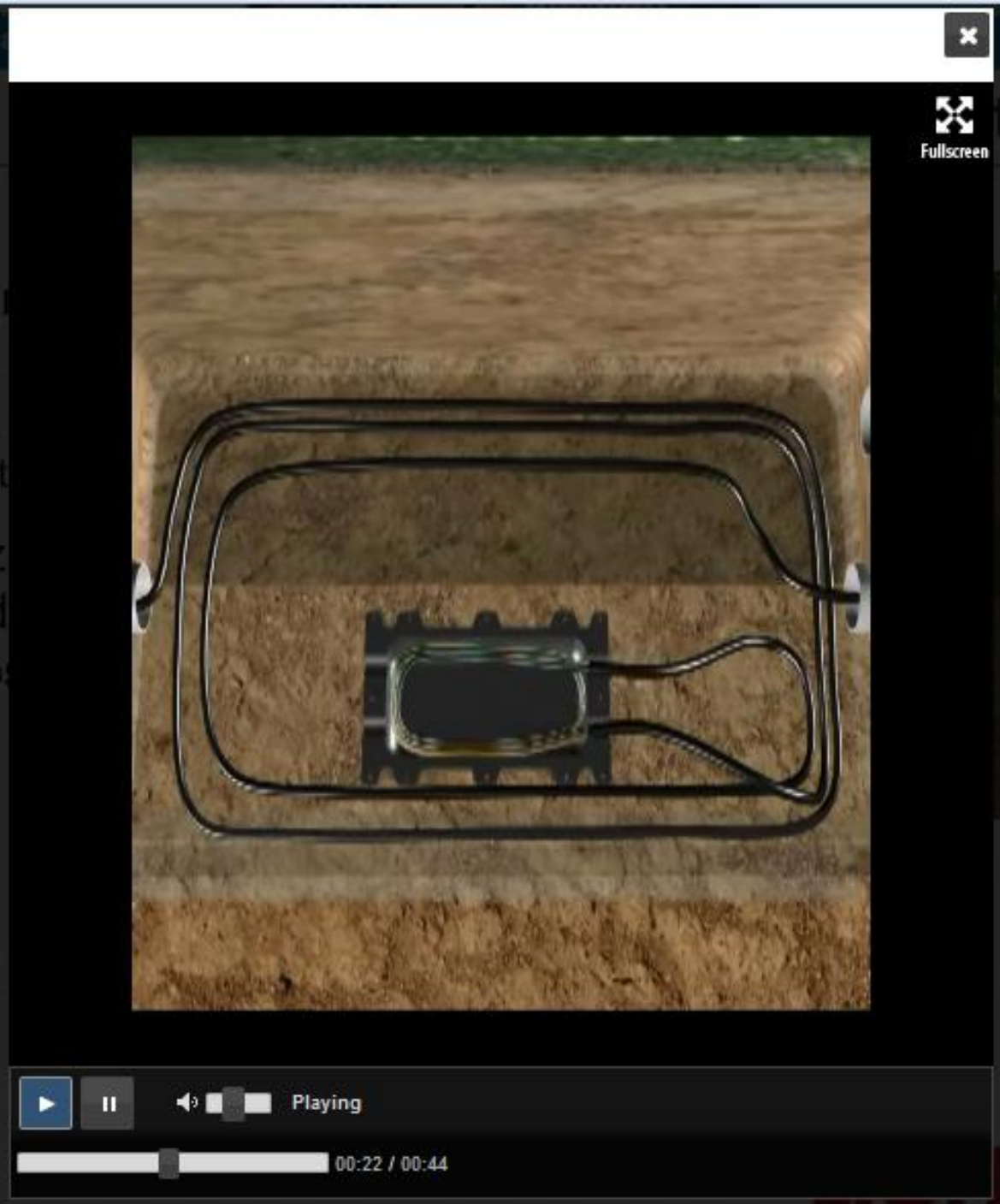

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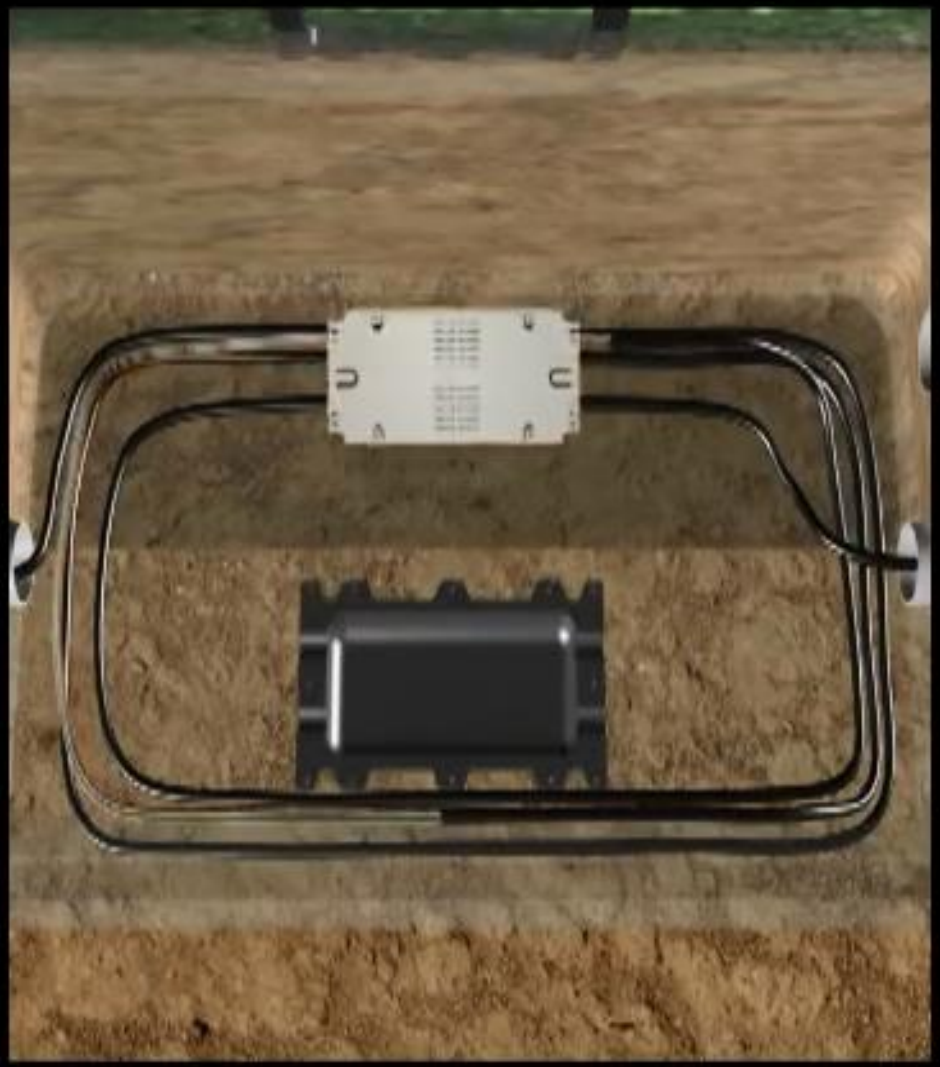

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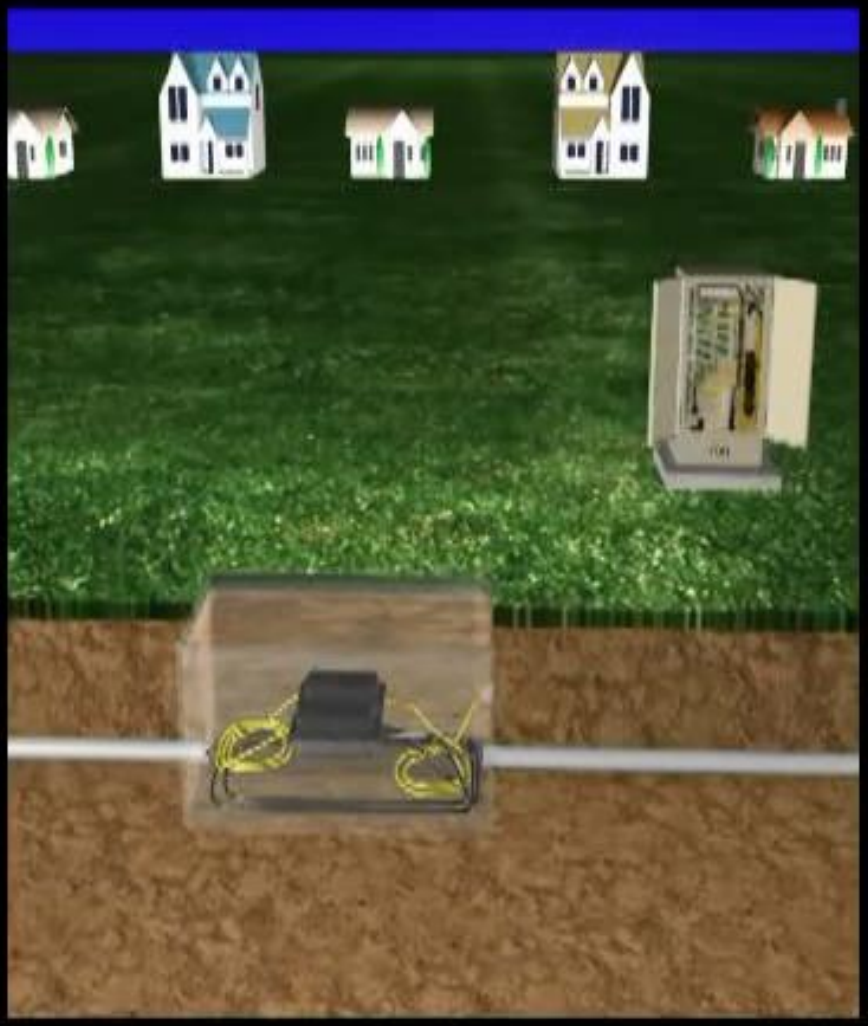

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Fiber Access Terminals

- Up to 288 fibers with single stranded cables and up to 432 with ribbon fibers.
- Connector panels.
- Hardened drop cable connections.
- Standardized SC/APC and SC/UPC connectors.
- Splitter modules (1:4, 1:8, 1:16, 1:32).
- Mid-entry access.
- Cable slack can be stored within the pedestal.

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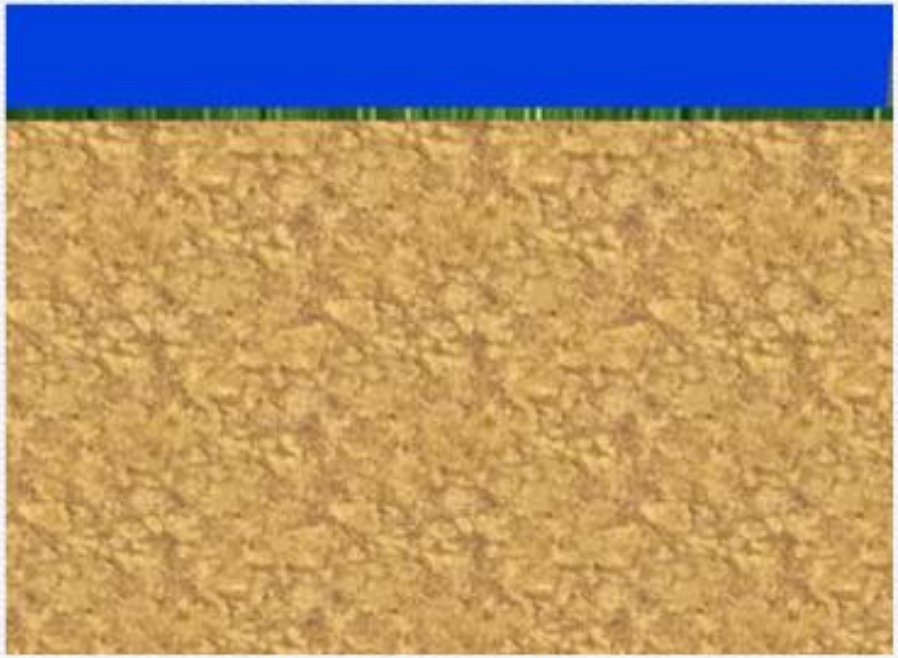
Pedestal Cabling Options

- Mid-entry with traditional spliced drops or hardened drop cables.
- Home run with traditional or hardened drop cables.
- Mid-entry with drops cascaded to splitters.

Mid-entry with cascaded drops



Mid-entry with traditional drops

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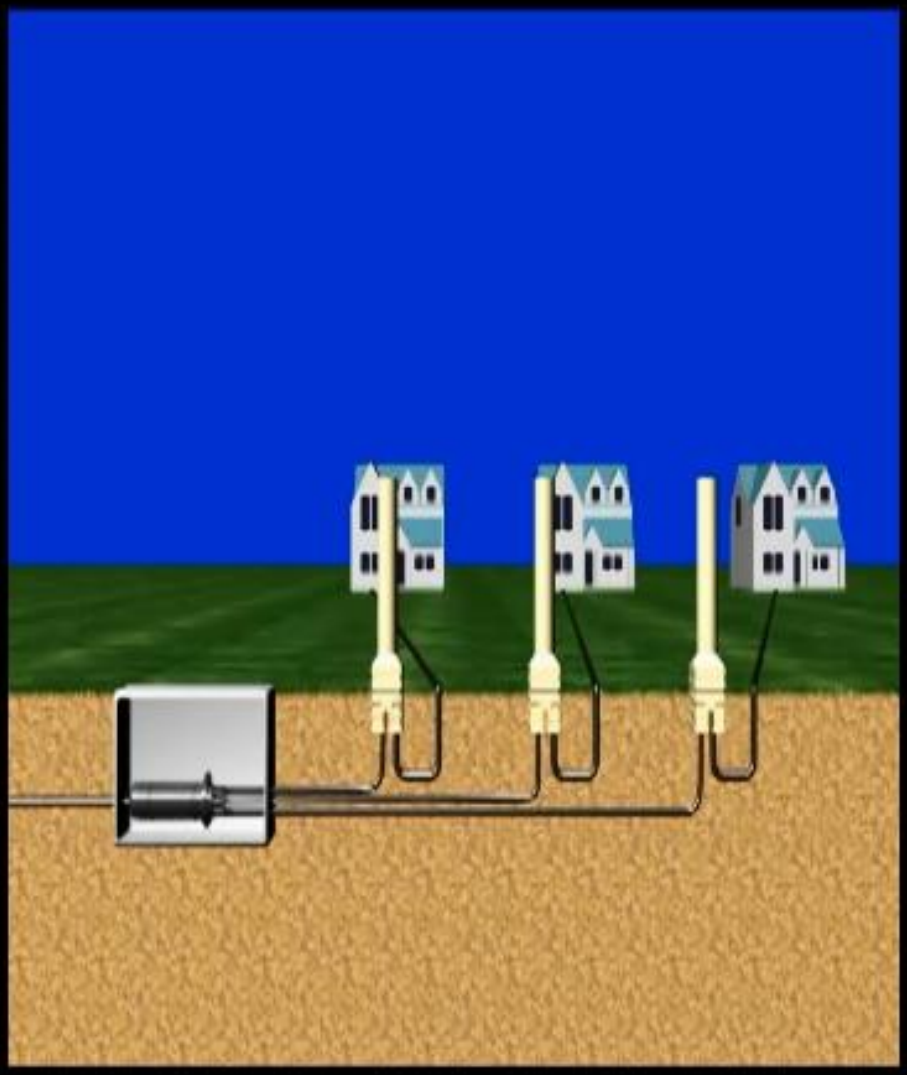

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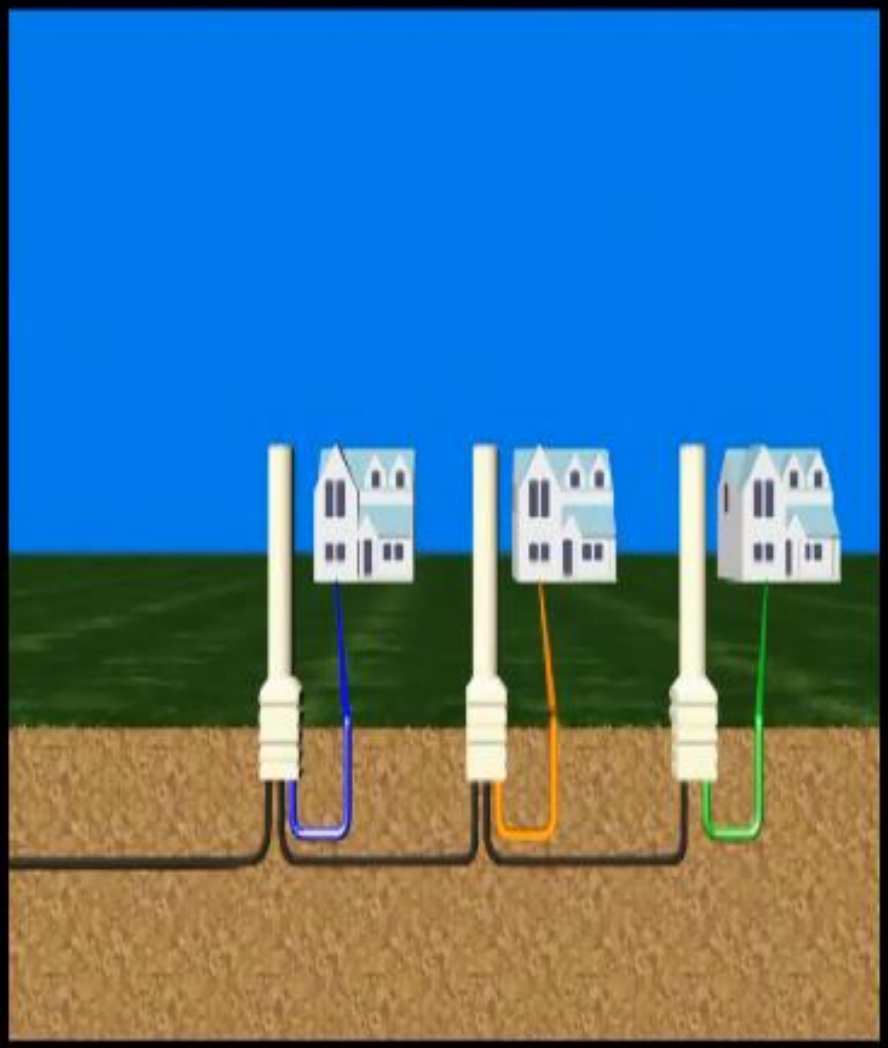

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Fiber Distribution Hubs

- Splice trays within FDH.
  - Splitter housing for PONs.
- Applications.
  - Feeder to distribution fibers.
  - Feeder to drop fibers.
- Cable options.
  - Cable stubs inbound and outbound splices in closures.
  - Flexibility, growth and migration.
- G.657 bend insensitive fibers.

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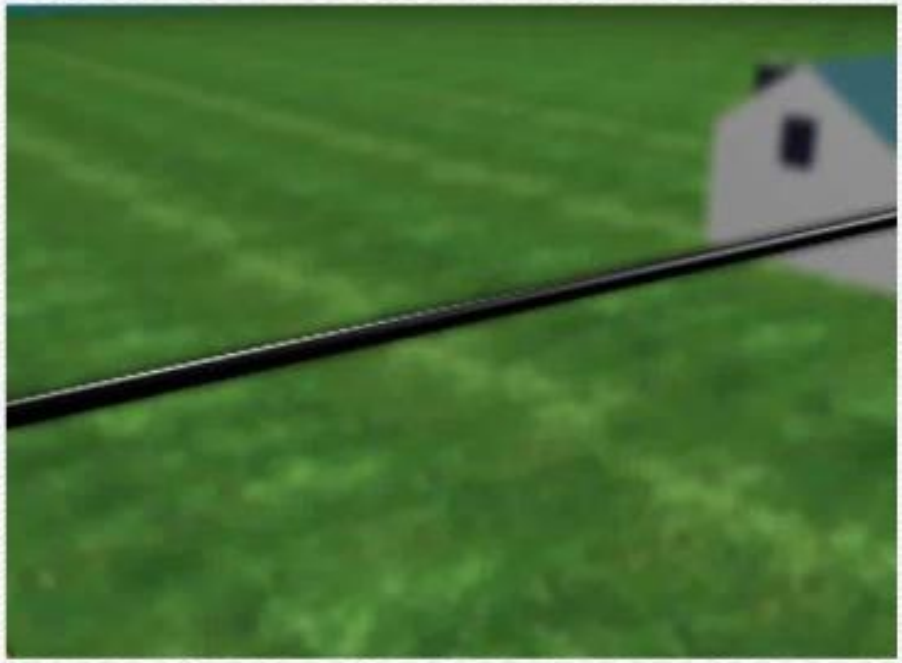
Multiport Service Terminals (MSTs)

- Designed for aerial and ducted terminations using hardened drop cables.
- Controlled bend radius
- Secure cable and dress slack during installation.
- Keep ports capped when not in use.



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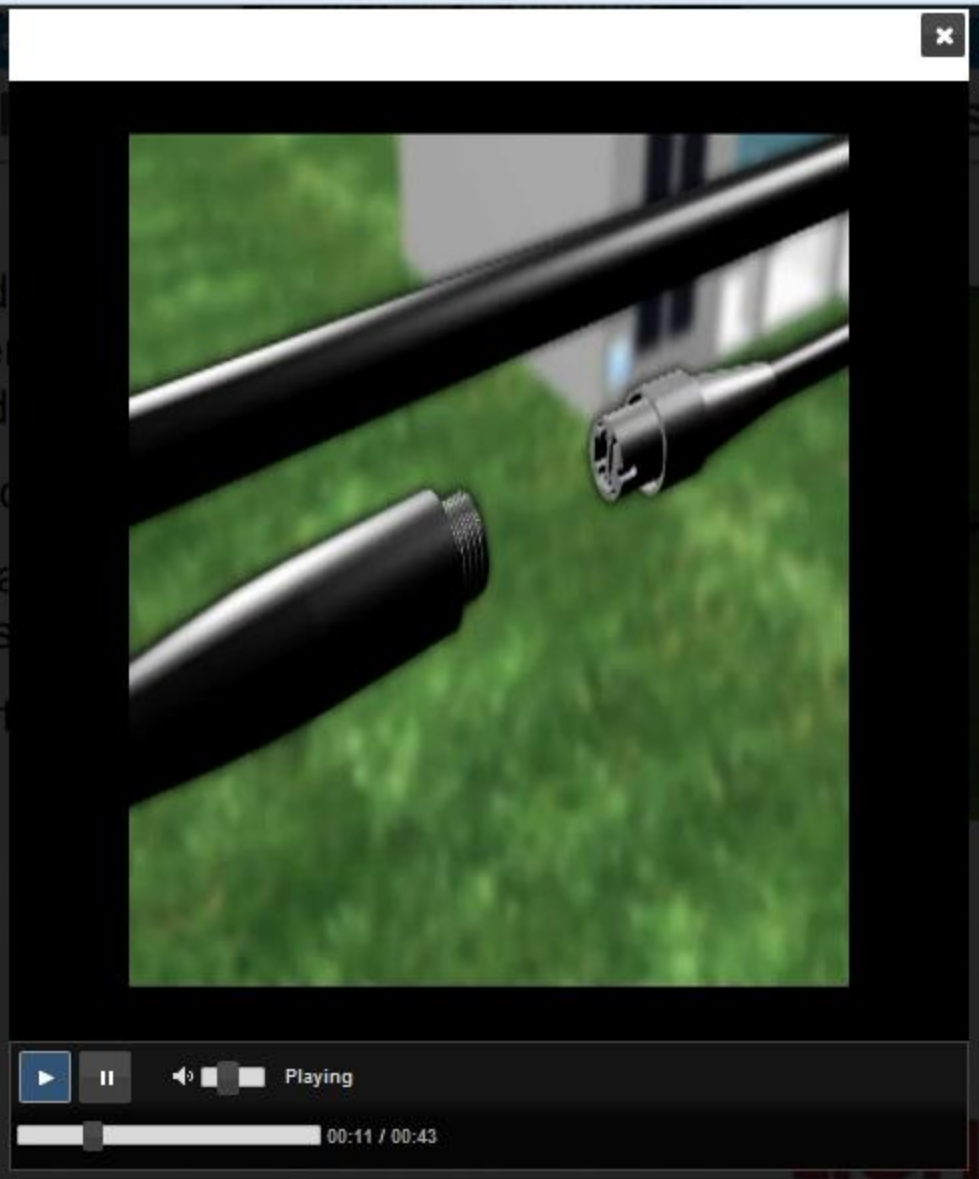

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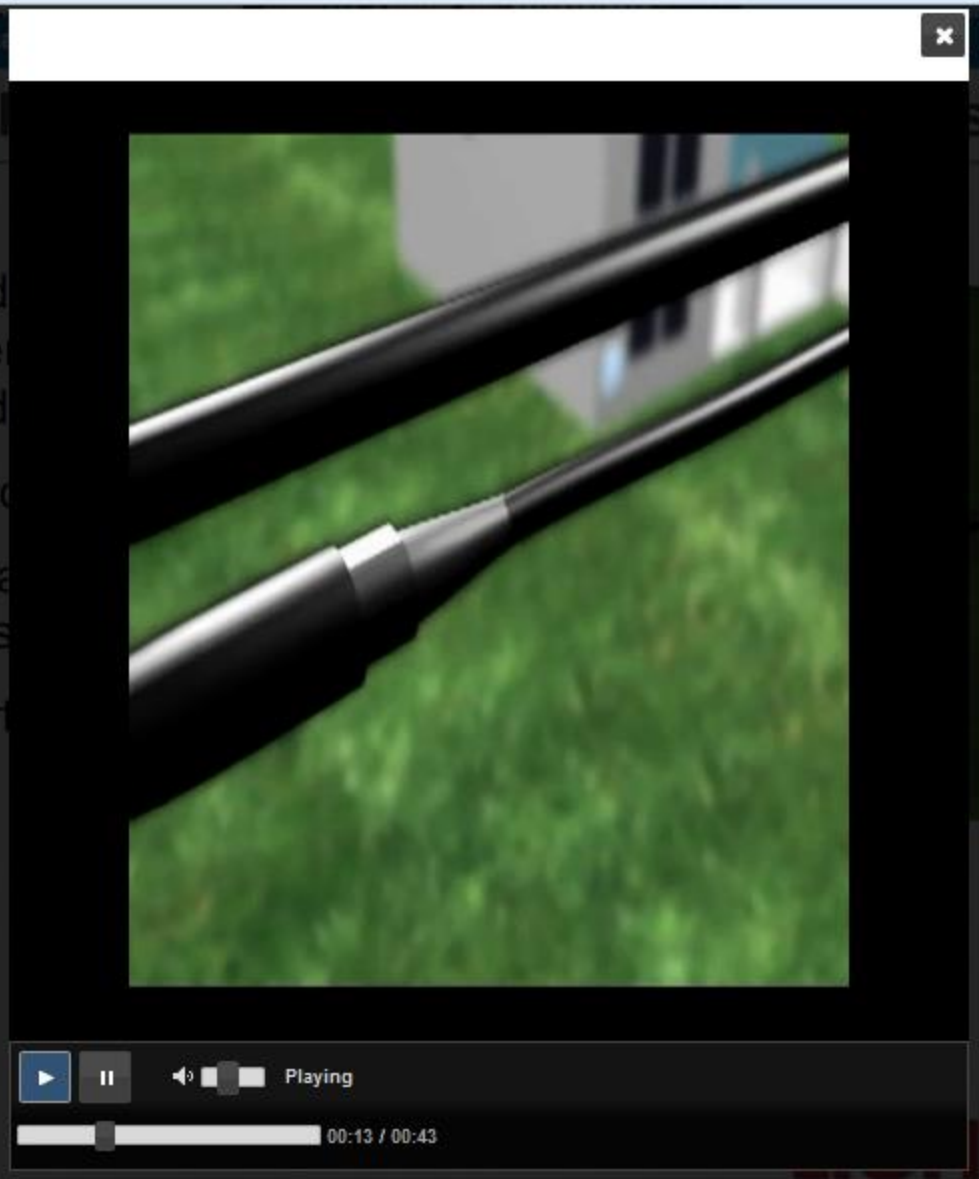

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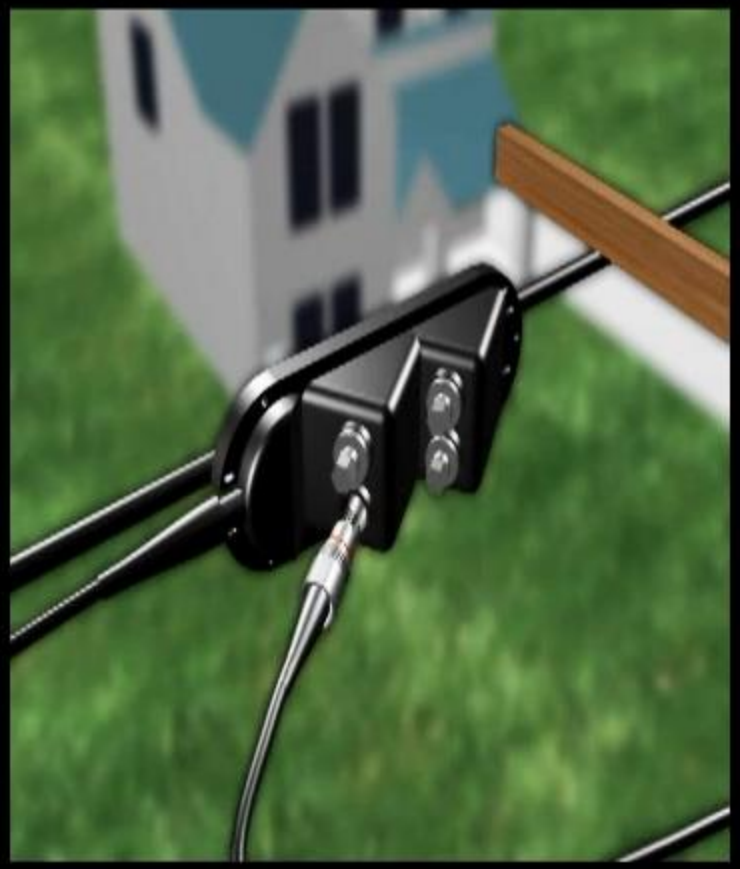

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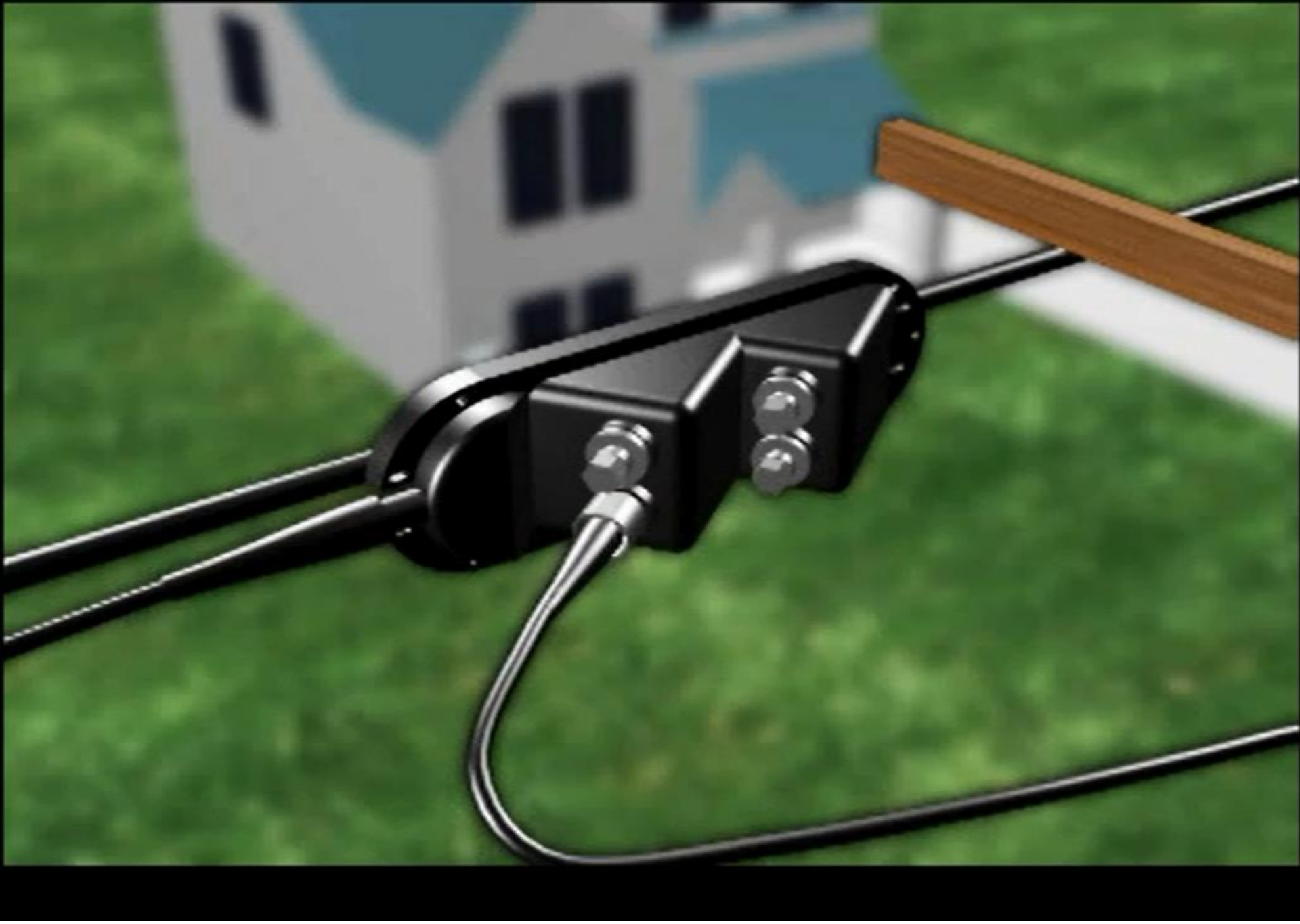
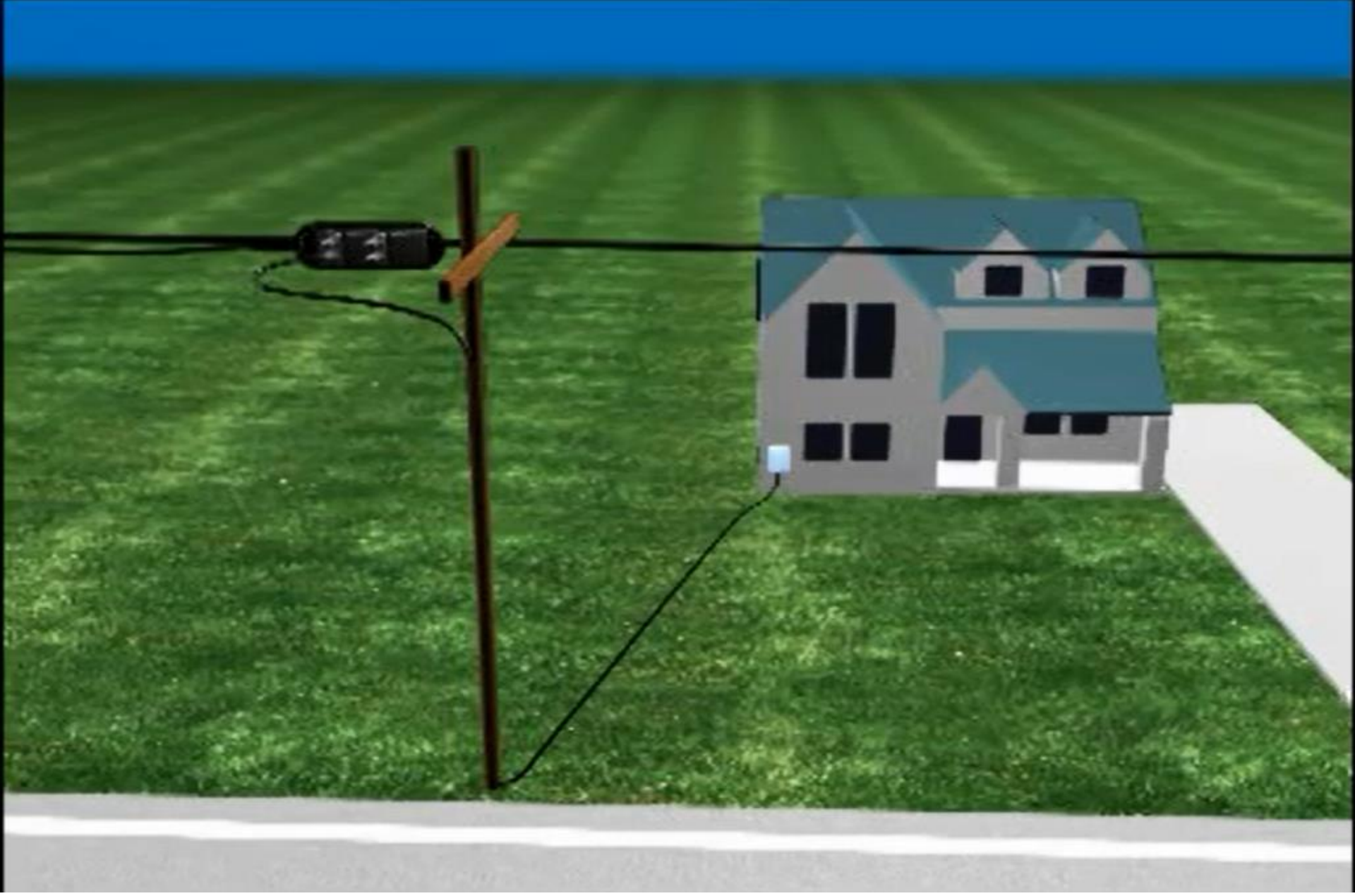
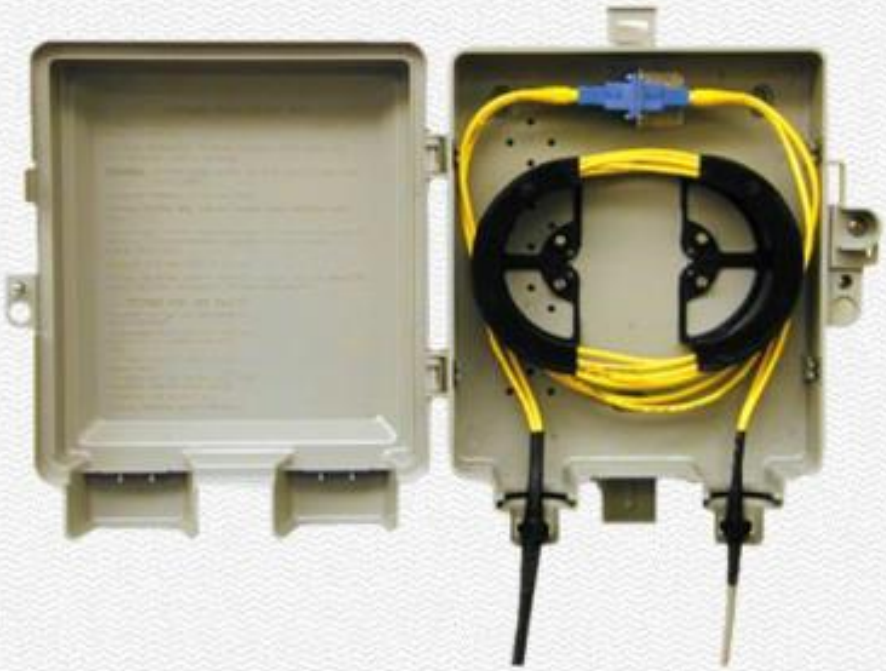




Fiber Transition Terminals

- Temporary slack fiber storage near ONT.
- Connector options.
- Splice tray options.
- Secure the cable.
- Controlled bend radius.



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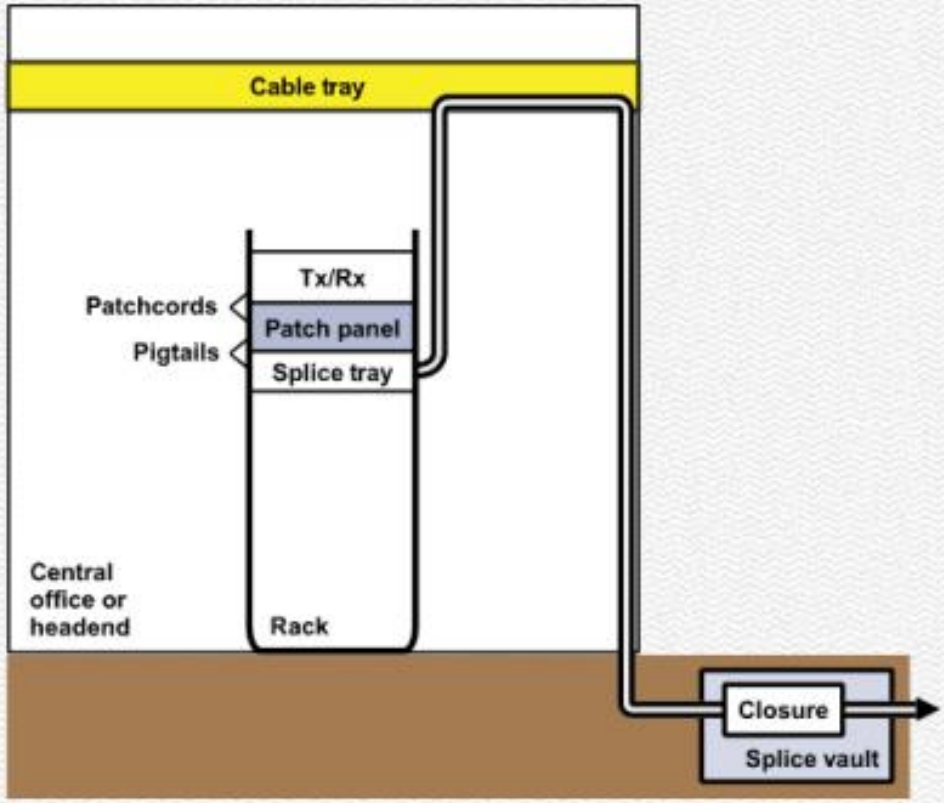
Fiber Management

Traditional Installation



- Loose tube cable is spliced at the outside cable vault and routed into the building.
- Cable is routed to the correct rack and then to the splice panel, where internal fibers are routed to the splice tray via buffer tubes or transition tubing.
- Pigtails are spliced to these fibers via the splice trays and connected to the patch panel.
- Patchcords and jumpers are used to link transmission equipment.

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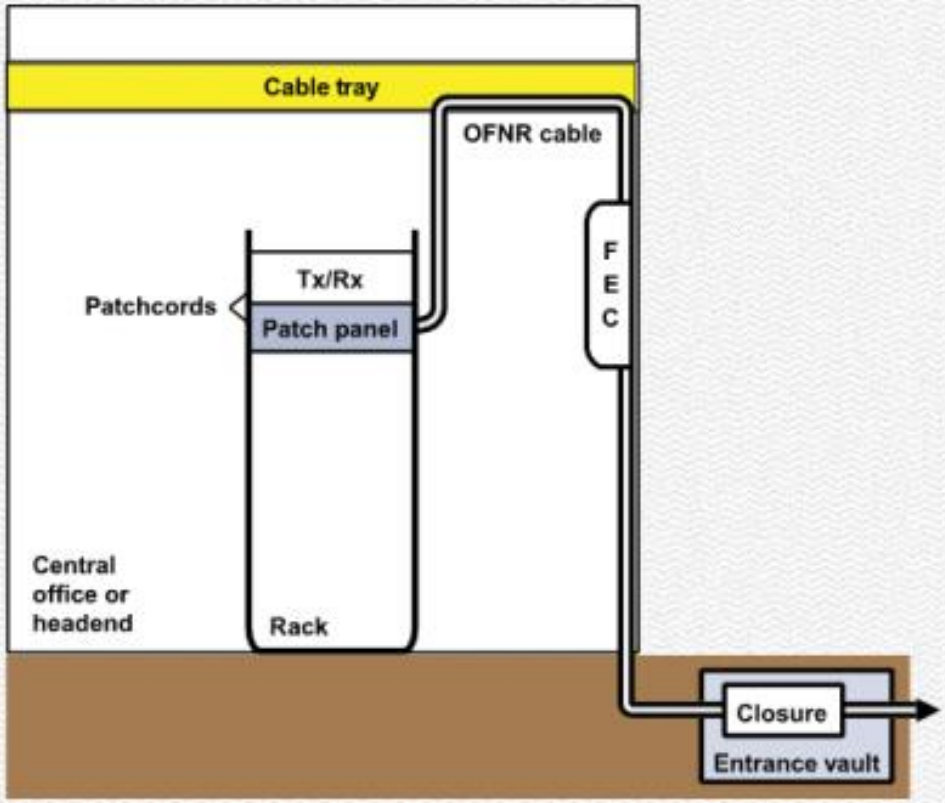
Fiber Management

Preterminated Patch Panels



- Loose tube cable is routed to a wall mount fiber entrance enclosure (FEC).
- Patch panel is mounted in a rack and the preterminated cable stub is routed to the FEC and then spliced to the incoming cable.
- Saves rack space, has a lower installed cost, and centralizes all splices in one convenient location.
- Eliminates NEC transition problems.

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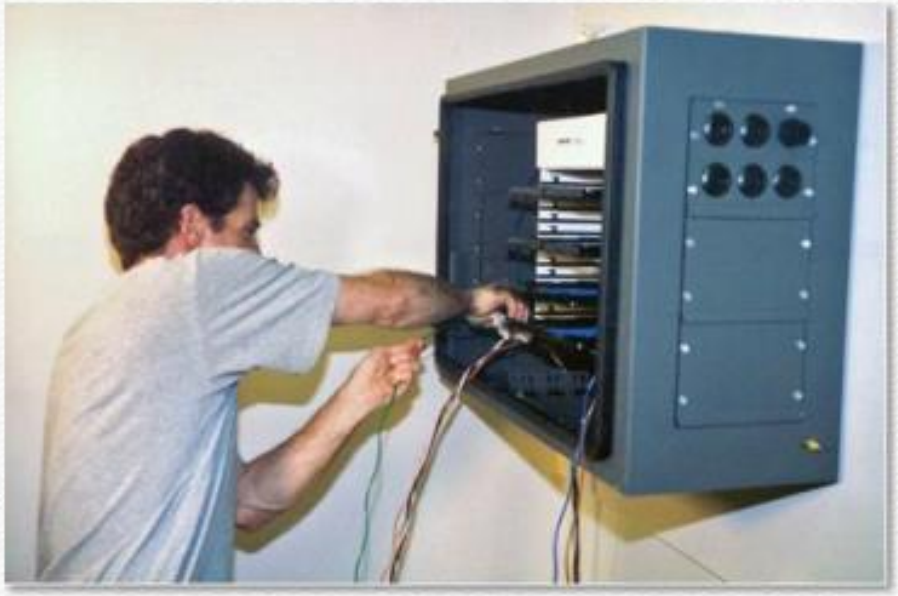
Optical Entrance Enclosures



- Optical entrance enclosures provide a transition point between the OSP and indoor cables.
- NEC transition point.
- Frees rack space.
- Consolidates splices.
- Wall mounted.

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Splice Panels

- Facilitate distribution of fibers and cables to various equipment rooms, buildings, or cross-connects.
- Must use appropriate splice holders and trays and accommodate proper bend radius.
- Watch for moving parts.
  - Macrobends.
  - Microbends.
- Ribbon trays.
- Securing buffer tubes.
- Routing fibers.
- Labelling.

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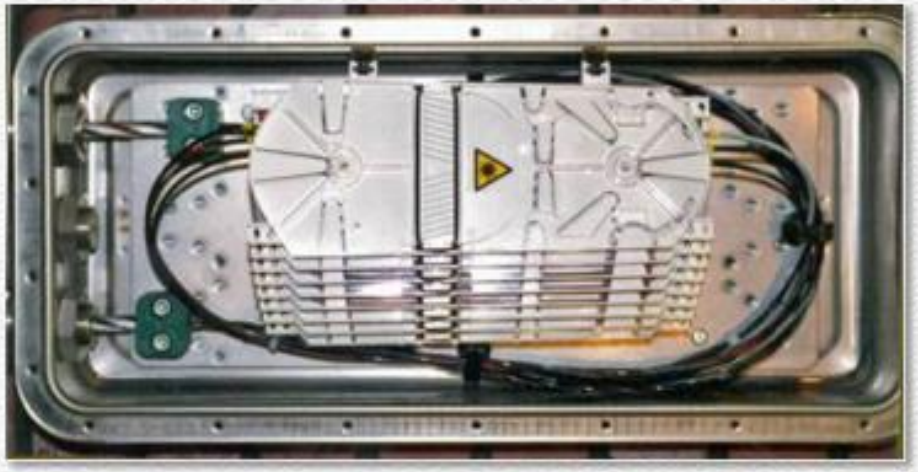
Splice Tray Recommendations

- Label fibers and splices.
- Take care routing the fibers and securing the tubes inside the closure.
- Block loose tube gel-filled cables.
- Protect the fibers.
- Properly secure buffer tubes.
  - Macrobends.
  - Microbends.
- Follow manufacturer recommendations.



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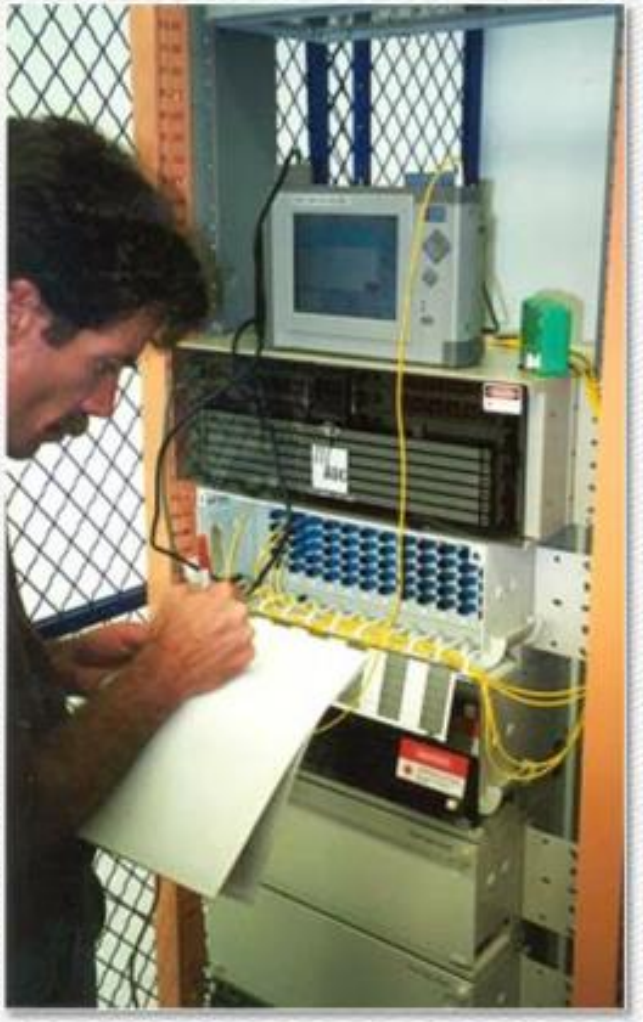
Patch Panels

- Centralized location for patching, testing, monitoring and restoration.
- For premises applications, the patch panel may be the main cross-connect (MC) or an intermediate cross-connect (IC) point.
- Secure the cable.
- Route internal buffer tubes and fibers.
- Labelling and color code management.
  - Fiber and buffer tubes.
- Increased density via LC and MPO/MTP connectors.
- Physical access.



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Premises Panels

- Cable management.
  - Controlled bend radius.
  - Grounding option.
  - Securing the cable.
- Fiber identification.
- Optional connector types.
  - Single-mode or multimode.
- Optional splice trays.
- Fanout kits for protection.
- Options for cable access.
- Flexibility for growth.
- Secured access.

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FTTB Panels

- Controlled bend radius.
- Watch for moving elements.
- Provides inbound splice capability.
- Routes drop cables to client's ONTs.
- Provides transition point per NEC.
- Secured access.
- Environmental sealing.
- G.657 BIF options.

Courtesy TE Connectivity

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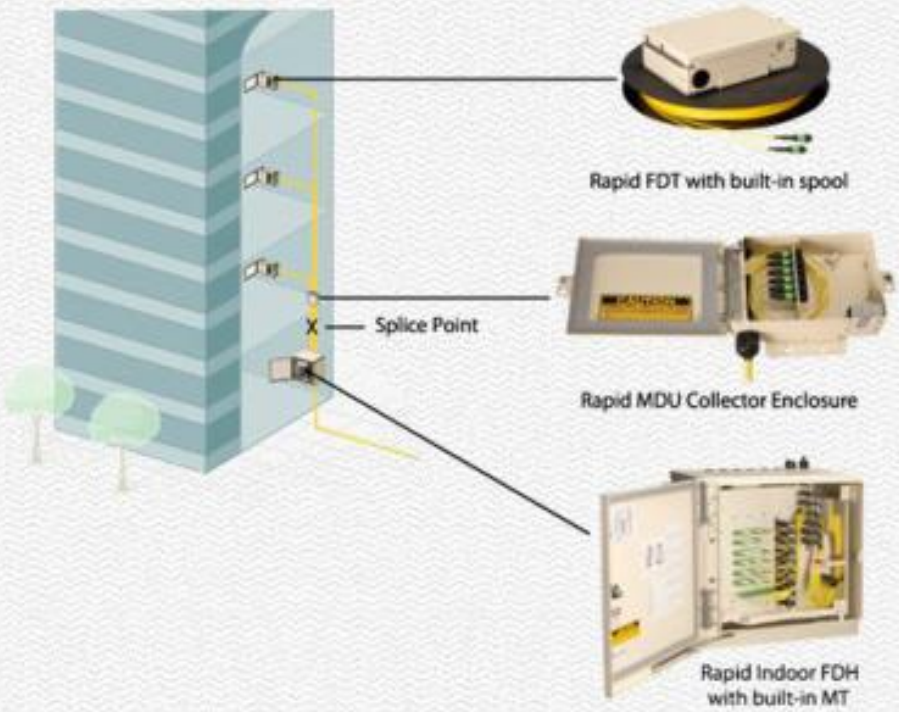
Fiber to the Building Installations

- Choices for designers.
  - Install using traditional termination and fiber management techniques.
  - Choose to implement newer technologies that may be easier and less costly
- One Pass™ solution – 3M.
- Invisilight™ solution – OFS.
- OmniReach™ solution – TE.



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Fiber Transition to the Network

- FBT style with 250-µm or 900-µm pigtails.
- Modular with 3-mm pigtails.
- Modules (micro/mini).
- Cassette.
- Patch panel modules.
  - Connectorized.
  - Modular.

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Work Area (WA) Media Outlets

- Provides protection, routing and flexibility for FTTD media applications.
- Designations:
  - Multi-user telecommunications outlet assembly (MUTOA).
  - Telecom outlets (TOs).
  - Equipment outlets (EOs).
- Always have adapters facing downwards.
- One meter of slack recommended.

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Question and Answer Period

- Learn more through our *Fiber Optic Patch Panels, Splice Closures, and Pedestals* DVD, which covers:
  - Patch Panels
  - Splice Panels
  - Distribution Panels
  - Entrance Cabinets
  - Premises Panels
  - Splice Closures for OSP
  - FTTx Splice Closures
  - Fiber Distribution Hubs
  - Fiber Optic Pedestals
  - Loose Tube Cable Preparation
  - Tight Tube Cable Preparation

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Our next webinar on
May 28, 2014
will address
Fundamentals of Fiber Optics