Application Note: Planning for slack and preparation length when splicing fiber

APPLICATION

Termination of fiber optic cabling via fusion splicing requires planning and coordination to successfully allow for acceptable performance, slack storage, transition from outer jacketing, grounding of armored cables and more.

Leviton has several product solutions to achieve fusion splicing including Splice Trays, Splice Modules (in SDX and HDX formats) and Splice only enclosures.

Each of these solutions allows fibers to be terminated from cable to cable or from cable to pigtail assemblies. This Applications Note will provide information about the preparation of bulk fiber or blunt ended, pre-terminated assemblies prior to the splicing process.

TYPES OF CABLE JACKET CONSTRUCTION

At the point of termination, fibers can be 900µm tight buffered, 250µm bare or loose tube or 250µm ribbonized. Depending on the outer jacket construction and fiber count, cables often need to exit the outer sheath or jacket and be presented to the splicing device at a sub-unitized level. This often also determines the options of where to place cable slack. Factors include:

- Outer Jacket or sheath construction (OSP, Foiled, Armored, Air Blown)
- Outside diameter of trunk cable or sub-unitized tubes and bend radius limitations
- Fiber count and sub-unitized configuration of bulk cable
- Maximum cable/tube diameter a splicing device can accept
- Maximum number of fibers each splicing device can support
- Amount of slack storage desired or required

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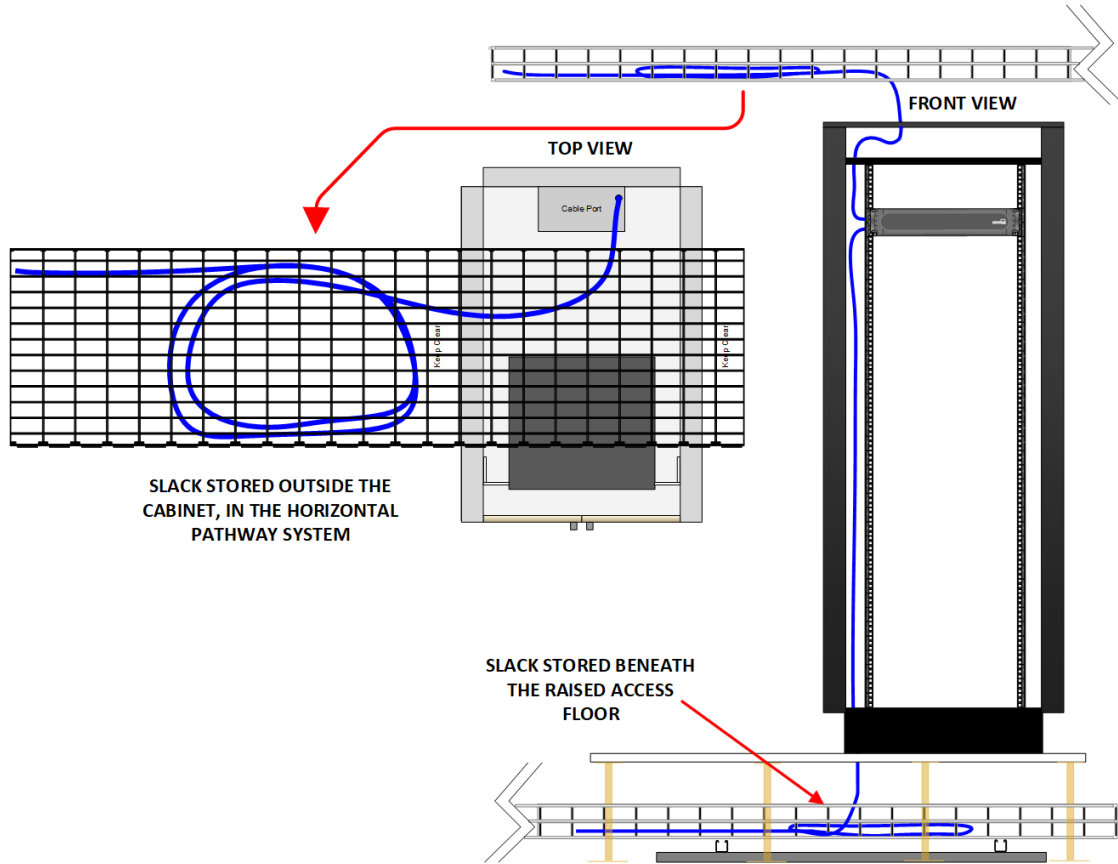| Product Line: |
| --- |
| Fiber Optics |

Part Numbers Affected:
HDX Fiber Distribution Frame HDX Enclosures HDX Patch Panels SDX Enclosures SDX and HDX Splice Modules Splice Trays

The goal in most fiber optic installations is to maintain the protective qualities within the cable's construction as close to the point of termination as possible. This usually includes having the overall cable enter an enclosure, patching frame or cable management feature or an open panel before individual or sub-unitized groups of fibers exit the cable jacket. Evaluating the required length to successfully terminate individual fibers is determined from this point. Attention needs to be made to allow for proper routing, bend radius control and exposure of fibers within a splice tray or module to successfully perform a fusion splice.

Minimum lengths for expose sub-units in Leviton products:

Leviton recommends a minimum of the following lengths required to perform terminations in Leviton SDX or HDX splicing products. Each termination scenario should be evaluated prior to cable preparation. Each measurement is from the exit point of the bulk fiber cable jacket to the end of the exposed sub-unitized tubing containing the individual fiber strands.

- SDX Enclosures – minimum of 60 inches / 152 cm for Splice modules
                            – minimum of 80 inches / 203 cm for Splice trays
- HDX Enclosures – minimum of 60 inches / 152 cm
- HDX Panels   – minimum of 60 inches / 152 cm
- HDX Frame   – minimum of 50 inches / 127 cm (from exit of trunk clamp)

This length does not factor in the following:

- Removal of additional length prior to beginning the termination process to eliminate any damage or stress associated with handling of the end of the cable during the pulling process.
- Required or desired overall slack storage (see references in this document)

Once cabling has entered the location where splicing occurs, required lengths of exposed fiber varies. Refer to the termination devices Instruction Sheet or User Guide for workable and exposed fiber required to successfully perform fusion splicing.
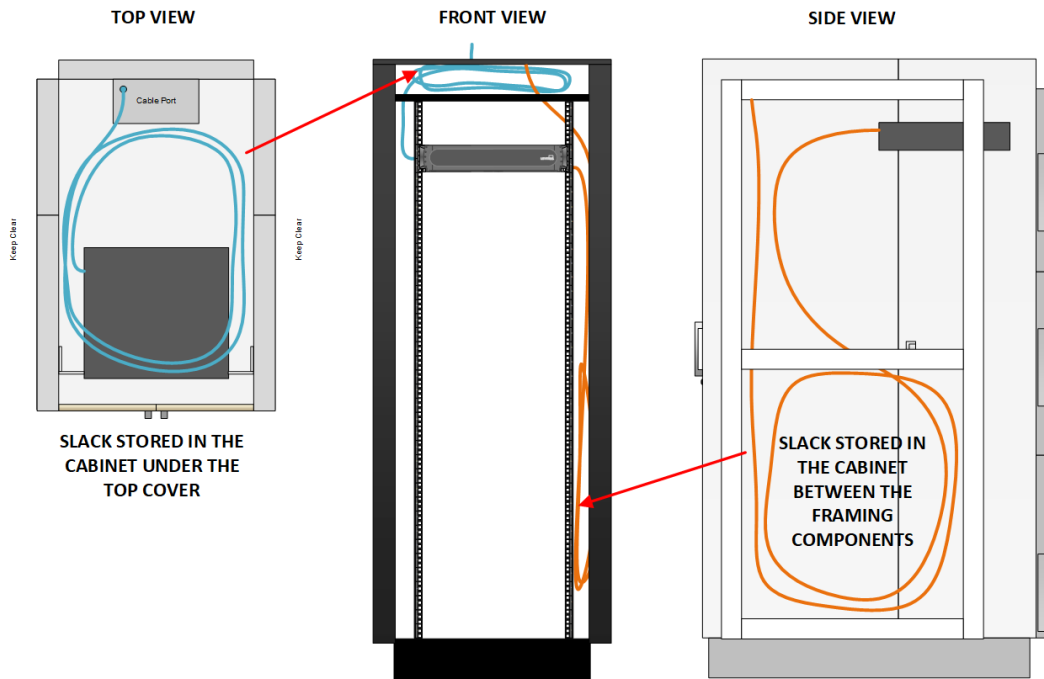
OVERALL SLACK STORAGE

It is good practice and often a project requirement to provide additionally stored fiber optic cable for re-termination or relocation. Several options are available when fiber is terminated in racks, cabinets or wall mounted devices:
- Above racks or below access flooring in horizontal pathway
- Attached to framework vertically in cabinets
- Suspended under the top cover of a cabinet
- Suspended vertically to a wall or in a ceiling space

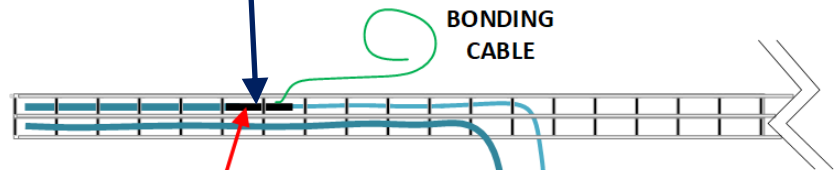## STORED ABOVE OR BELOW A RACK OR CABINET

FRONT VIEW

TOP VIEW

Cable Port

Keep Clear

Keep Clear

SLACK STORED OUTSIDE THE CABINET, IN THE HORIZONTAL PATHWAY SYSTEM

SLACK STORED BENEATH THE RAISED ACCESS FLOOR

STORED WITHIN A CABINET

TOP VIEW

FRONT VIEW

SIDE VIEW

Cable Port

Keep Clear

Keep Clear

SLACK STORED IN THE CABINET UNDER THE TOP COVER

SLACK STORED IN THE CABINET BETWEEN THE FRAMING COMPONENTS
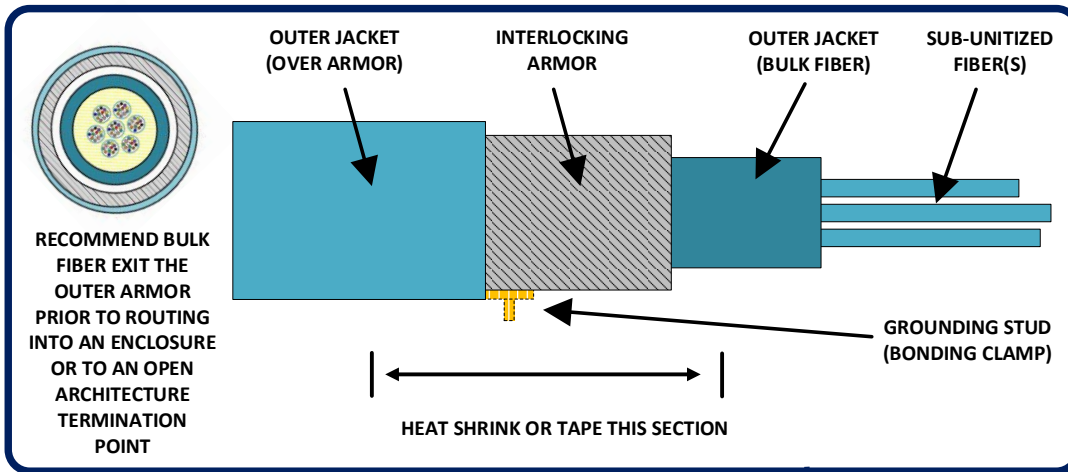
CONSIDERATIONS WITH ARMORED CABLE

Armored cables require additional consideration and labor steps prior to routing and termination

- Armored cable is considerably more rigid, typically larger diameter and can be difficult to route and manage
- Fiber Optic cable should exit the outer armored jacket at a point prior to slack storage
  - o Immediately after entering a cabinet
  - o In the horizontal pathway prior to entering a rack or cabinet
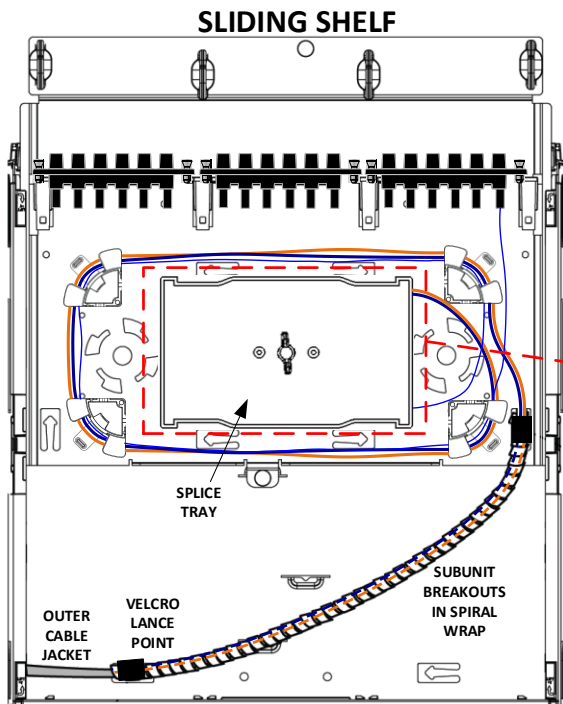- Be in proximity to a bonding source

OUTER JACKET (OVER ARMOR)

INTERLOCKING ARMOR

OUTER JACKET (BULK FIBER)

SUB-UNITIZED FIBER(S)

RECOMMEND BULK FIBER EXIT THE OUTER ARMOR PRIOR TO ROUTING INTO AN ENCLOSURE OR TO AN OPEN ARCHITECTURE TERMINATION POINT

GROUNDING STUD (BONDING CLAMP)

HEAT SHRINK OR TAPE THIS SECTION

BONDING CABLE

TRANSITION POINT OPTIONS FROM ARMORED CABLE OUTER JACKET

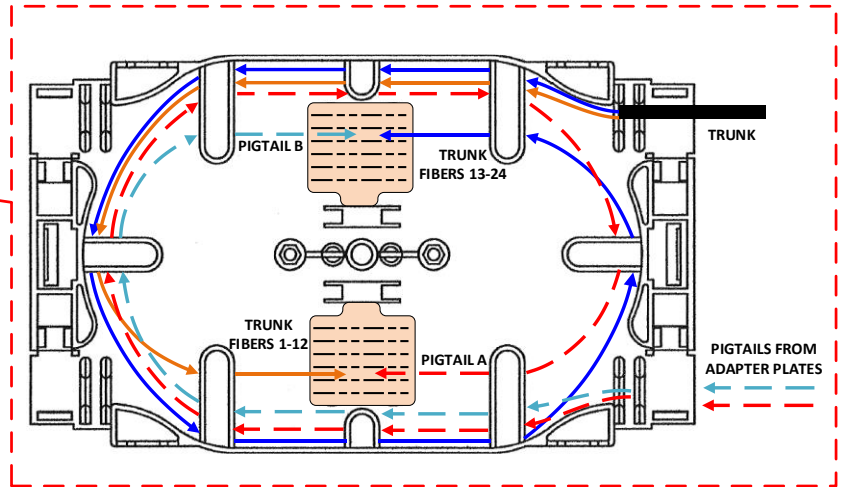**MAY REQUIRE SPECIAL BREAKOUT CONSIDERATIONS WHEN USING PRE-TERMINATED CABLES**

STORED SLACK

FRONT VIEW
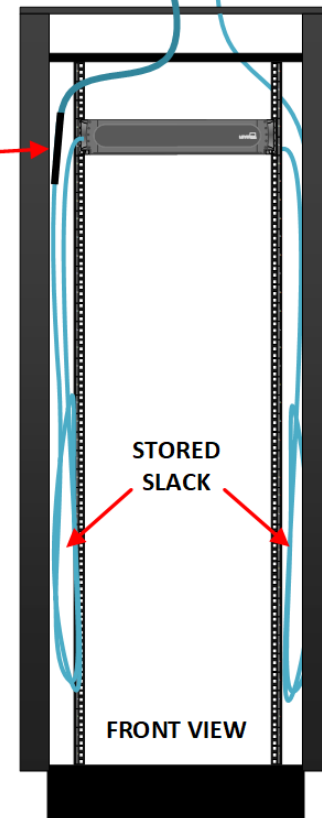
The following are examples of recommended routing methods for SDX splice trays and HDX splice modules.

SDX Splice Modules

SLIDING SHELF
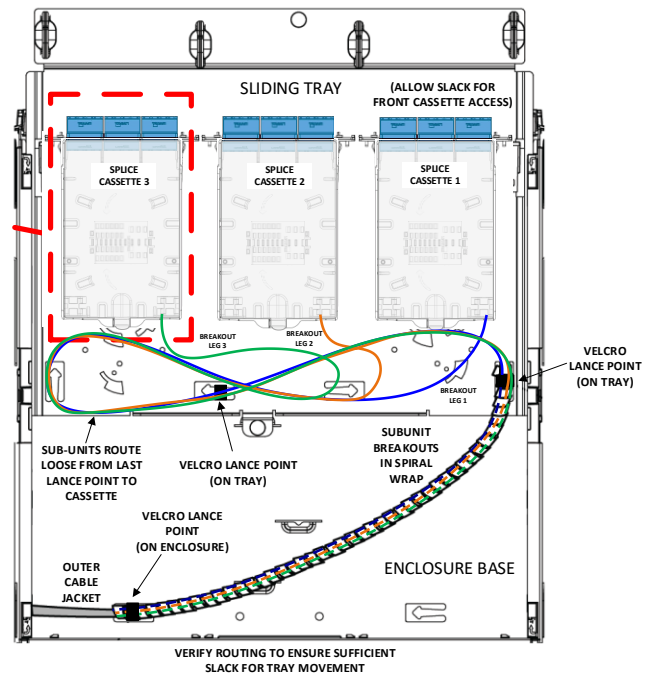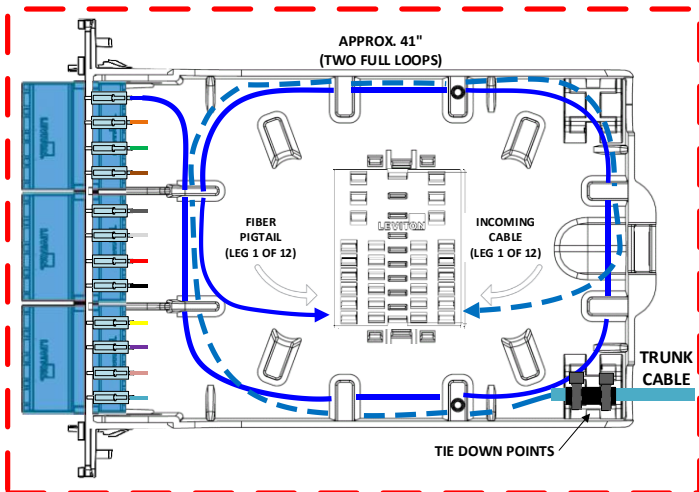
SDX SPLICE TRAY IN AN SDX ENCLOSURE

SPLICE TRAY

OUTER CABLE JACKET

VELCRO LANCE POINT

SUBUNIT BREAKOUTS IN SPIRAL WRAP

PIGTAIL B

TRUNK FIBERS 13-24

TRUNK

TRUNK FIBERS 1-12

PIGTAIL A

PIGTAILS FROM ADAPTER PLATES

*NOTE: SDX Splice Trays are accessible from the rear of a fixed or sliding tray enclosure. Sliding trays are removable from the front or rear.

SDX SPLICE MODULE IN AN SDX ENCLOSURE

APPROX. 41"
(TWO FULL LOOPS)

FIBER PIGTAIL
(LEG 1 OF 12)

INCOMING CABLE
(LEG 1 OF 12)

TRUNK CABLE

TIE DOWN POINTS

SLIDING TRAY

(ALLOW SLACK FOR FRONT CASSETTE ACCESS)

SPLICE CASSETTE 3

SPLICE CASSETTE 2

SPLICE CASSETTE 1

BREAKOUT LEG 3

BREAKOUT LEG 2

BREAKOUT LEG 1

VELCRO LANCE POINT
(ON TRAY)

SUB-UNITS ROUTE LOOSE FROM LAST LANCE POINT TO CASSETTE

VELCRO LANCE POINT
(ON TRAY)

SUBUNIT BREAKOUTS IN SPIRAL WRAP

VELCRO LANCE POINT
(ON ENCLOSURE)

OUTER CABLE JACKET

ENCLOSURE BASE

VERIFY ROUTING TO ENSURE SUFFICIENT SLACK FOR TRAY MOVEMENT

*NOTE: SDX Splice Modules are installed from the front side of an enclosure or panel only. SDX sliding trays can be removed rearward to perform terminations.
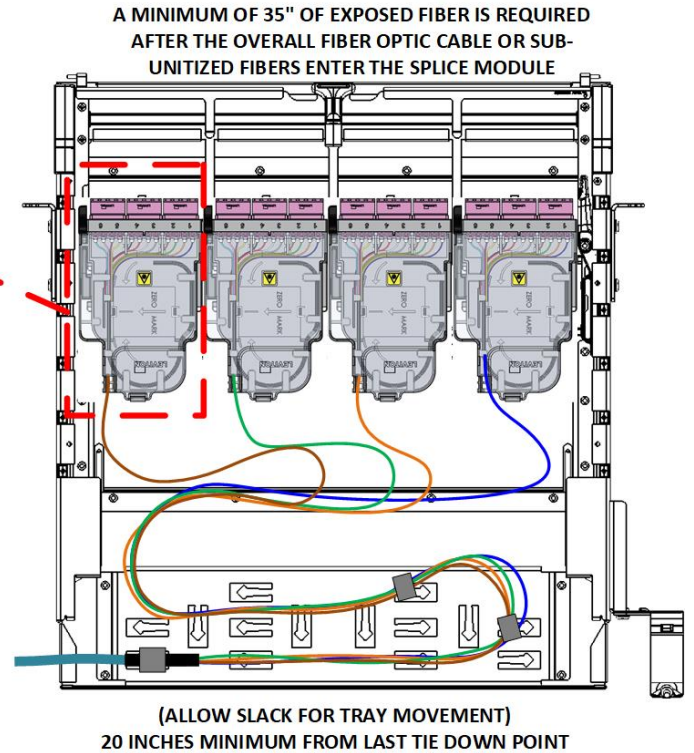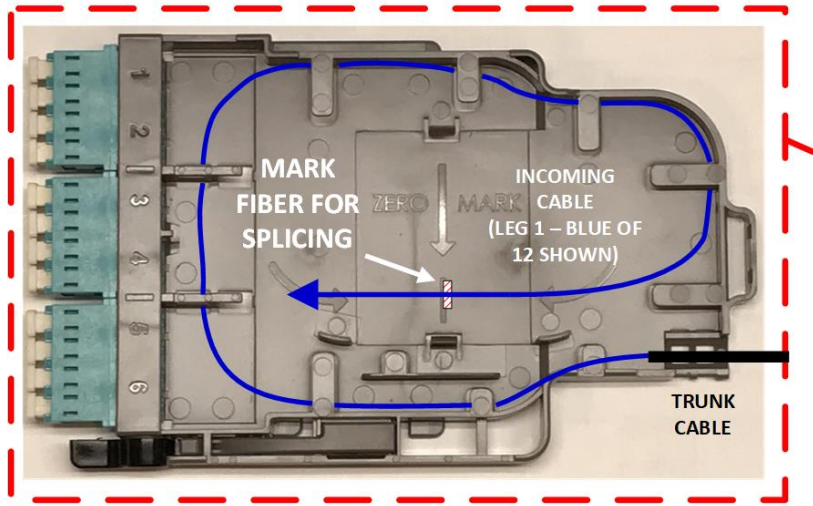
HDX Splice Modules

Preferred splicing process and adequate, accessible slack should be verified before terminating HDX splice modules.
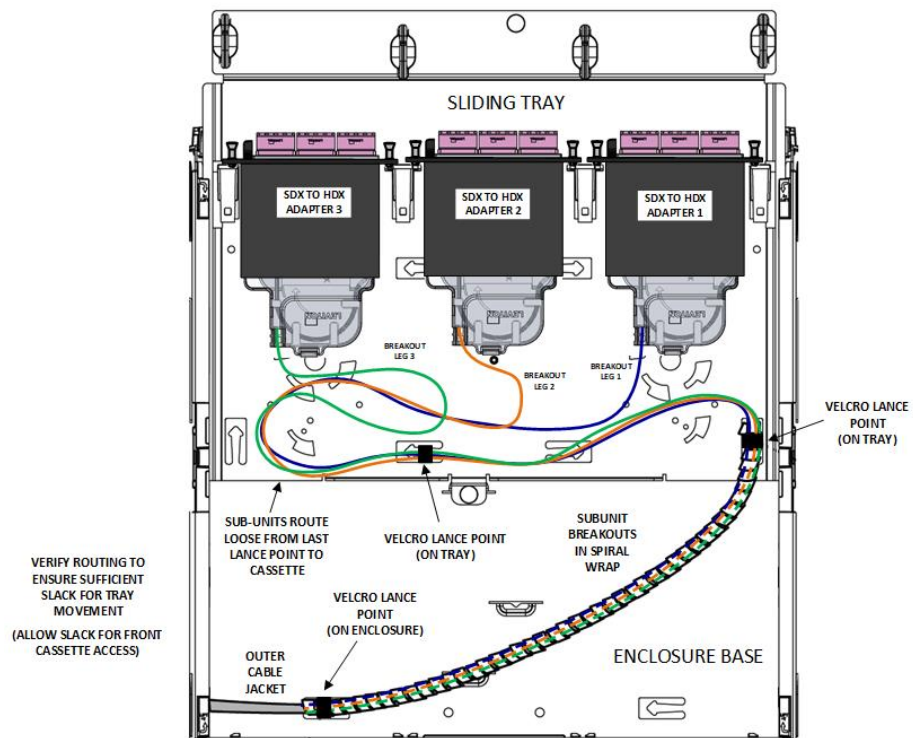
HDX Splice Modules are installed from the front side of an enclosure, patch deck or panel only. When using HDX enclosures all trays are forward sliding only. With accessible slack, splicing can occur at the front of the enclosure or all trays can be removed to allow rearward splicing.

In this scenario after termination, splice modules are passed to the front of the enclosure to be loaded by tray.
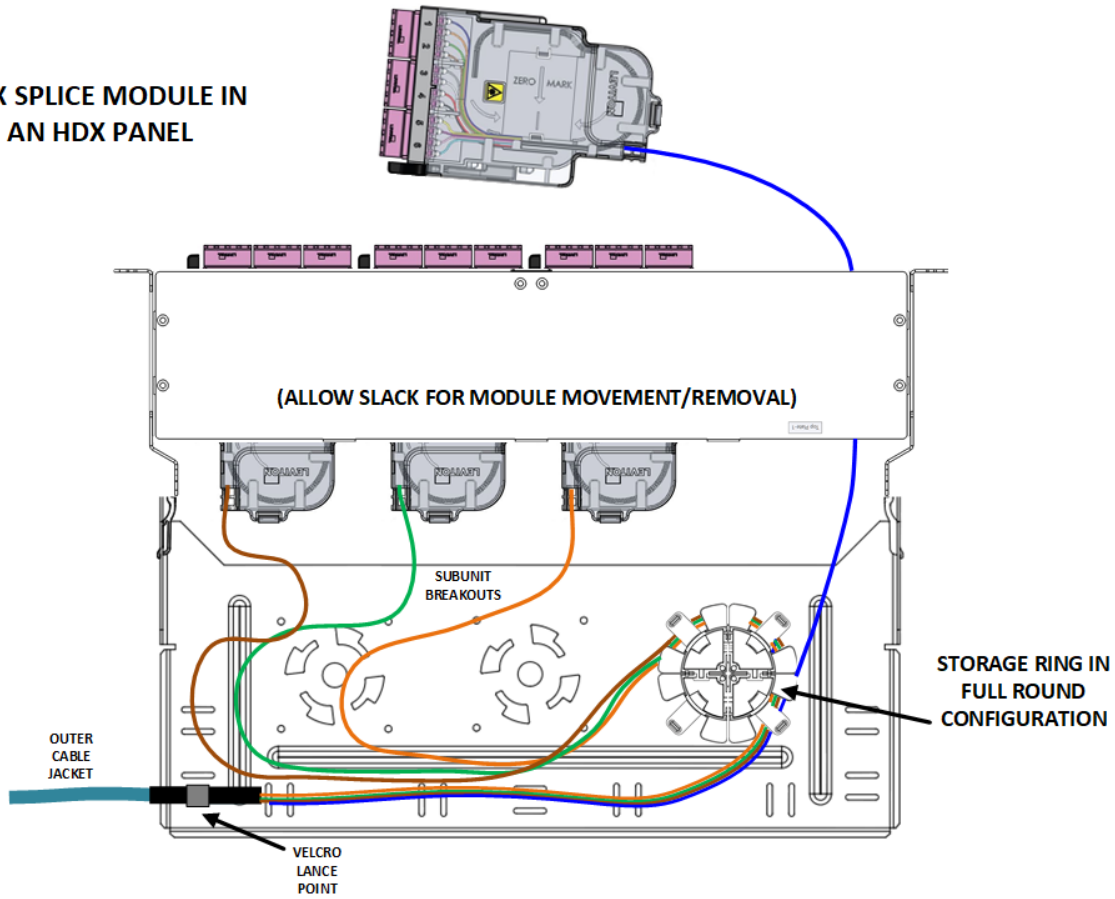
HDX SPLICE MODULE IN A UHDX ENCLOSURE

MARK FIBER FOR SPLICING

ZERO MARK

INCOMING CABLE (LEG 1 – BLUE OF 12 SHOWN)

TRUNK CABLE

A MINIMUM OF 35" OF EXPOSED FIBER IS REQUIRED AFTER THE OVERALL FIBER OPTIC CABLE OR SUB-UNITIZED FIBERS ENTER THE SPLICE MODULE

(ALLOW SLACK FOR TRAY MOVEMENT) 20 INCHES MINIMUM FROM LAST TIE DOWN POINT

When using an SDX to HDX adapter bracket (HDXAD-ACC), SDX sliding trays can be removed rearward to perform terminations.

SLIDING TRAY

SDX TO HDX ADAPTER 3

SDX TO HDX ADAPTER 2

SDX TO HDX ADAPTER 1

BREAKOUT LEG 3

BREAKOUT LEG 2

BREAKOUT LEG 1

VELCRO LANCE POINT (ON TRAY)

SUB-UNITS ROUTE LOOSE FROM LAST LANCE POINT TO CASSETTE

VELCRO LANCE POINT (ON TRAY)

SUBUNIT BREAKOUTS IN SPIRAL WRAP

VERIFY ROUTING TO ENSURE SUFFICIENT SLACK FOR TRAY MOVEMENT

(ALLOW SLACK FOR FRONT CASSETTE ACCESS)

VELCRO LANCE POINT (ON ENCLOSURE)

OUTER CABLE JACKET

ENCLOSURE BASE

When used in an HDX Patch Panel the modules install from the front side only. Cabling is dressed on a rear cable manager, passed through to the front side of the panel and splice modules are terminated.

HDX SPLICE MODULE IN AN HDX PANEL

(ALLOW SLACK FOR MODULE MOVEMENT/REMOVAL)

SUBUNIT BREAKOUTS

STORAGE RING IN FULL ROUND CONFIGURATION

OUTER CABLE JACKET

VELCRO LANCE POINT

When using an HDX patch deck, the modules are loaded from the front. The individual trays also slide rearward to perform terminations.

CABLE MNGT FINGERS

CABLE 1

CABLE 2

VERTICAL ROUTING TO DECK

TRUNK CLAMP
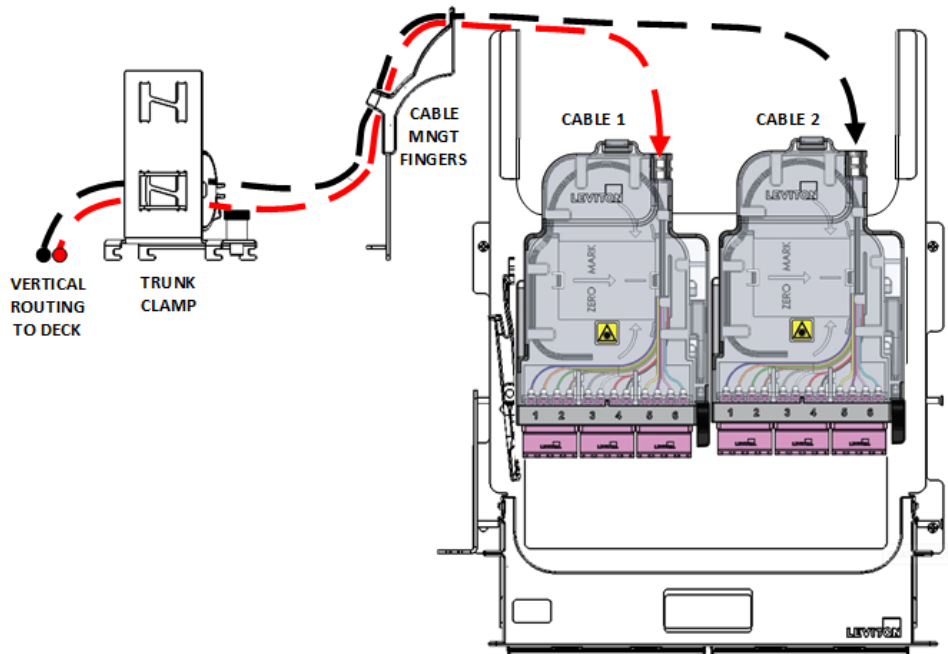
Summary

Careful evaluation and preparedness when transitioning from higher fiber count or multi-step jacketed cables and factoring recommended minimum working lengths will provide consistent and successful terminations. For more information visit: www.leviton.com