

CommScope High Fiber Count Cables For Data Center Applications



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INTRODUCTION

This document contains application guidelines for CommScope high fiber count cable assemblies and bulk cables used in data centers. Included are both Intra Facility Cables (IFC) and Outside Plant (OSP) cables. The basis of organization for this guide is the “scenario.” A scenario is a typical situation in which a particular type of cable is used (for example, “double-ended IFC fiber cable assembly”). Six scenarios are presented. For each scenario, there is an illustration, a description, and information on related equipment. In addition, this guide has an ordering section containing ordering Bills of Materials (BOMs) for each scenario.

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Related Publications

Listed below are technical publications for products referred to in this application guide. These publications may be obtained at www.commscope.com/SupportCenter

Title/Description	Publication Number
CommScope MPO Trunk Cable Installation Instructions	TC-96247-IP
Enhanced High Density Panel Quick Start	TECP-91-007
Enhanced High Density Chassis User Manual	TECP-91-008
12-Fiber Ribbon EHD Splice Cassette Installation Instructions	TC-96217-IP
12-Fiber Stranded EHD Splice Cassette Installation Instructions	TC-96221-IP
EHD Blocking Kit Installation Instructions	TC-96226-IP
EHD Field-Terminated Module Installation Instructions	TC-96238-IP
Field Installed Fanout Kit for 144- & 288-Fiber Rollable Ribbon Cable	TC-96242-IP
Field Installed Fanout Kit for 432-, 576-, & 864-Fiber Rollable Ribbon Cable	TC-96243-IP
192- & 288-Fiber Trunk Cable Pulling Sock Removal Instructions	TC-96251-IP

Fiber Entrance Cabinet (FEC-10K) User ManualTECP-31-106
 OMX Splice Bay User ManualTECP-93-090

1 CABLE TYPES COVERED IN THIS DOCUMENT

This guide covers three types of structurally different high fiber count cables shown in Figure 1:

- Double-ended cable assemblies with MPO connectivity on both ends
- Single-ended cable assemblies with MPO connectivity on one end and a stub on the other end
- Bulk cables with stubs on both ends

Both IFC and OSP cables are included.

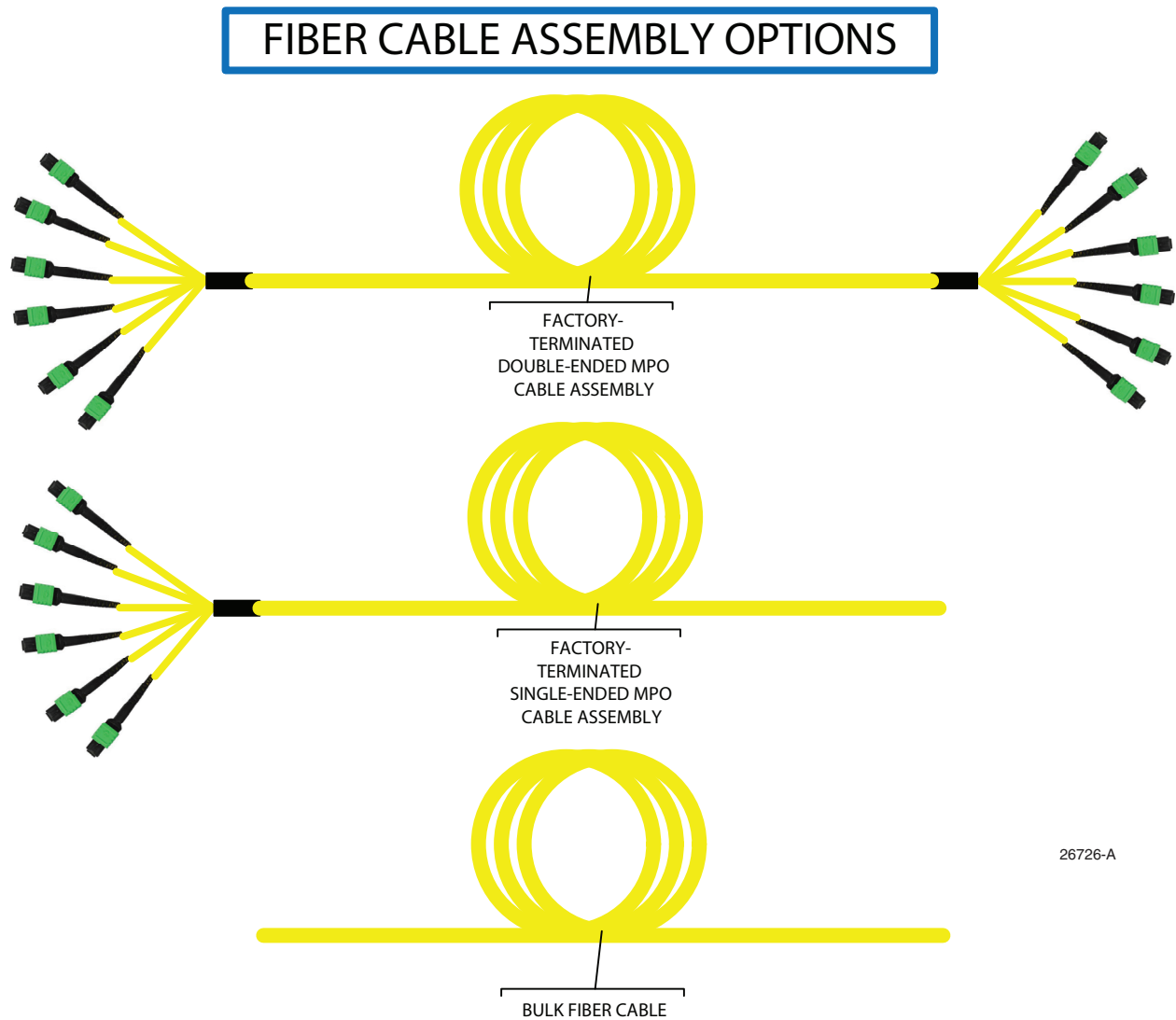


Figure 1. Cable Types Covered in This Guide

2 DESIGN PRINCIPLES AND PICTORIAL OVERVIEW

Modern data centers incorporating leaf-spine topology require an ever increasing number of fibers and connections and, therefore, require space-efficient use of conduits, compact connection panels, and time-efficient connection methods. CommScope's solution to these requirements has several key features including:

- **Use of high fiber count cable assemblies** -- because the amount of conduit space required per fiber decreases as fiber count increases.
- **Use of MPO connectivity where possible** -- because MPO connectors provide snap-in termination of 12 fibers at a time, a quicker method than connecting individual connectors.
- **Use of high density connection panels** -- because these panels allow high fiber count cable assemblies to be terminated at connector panels offering a like density in connection points. For example, a 576-fiber cable assembly can be connected at a single 4RU Enhanced High Density (EHD) panel.
- **Use of compact high density splice equipment** -- because, similar to connection panels, the desire here is for equipment where high fiber count cable assemblies or bulk cables can be efficiently secured and spliced. For example, the 10K Fiber Entrance Cabinet (FEC) is a wall-mount cabinet only five by three feet, approximately, in dimension, and capable of splicing up to 10,368 fibers.

Figure 2 shows how these items are typically deployed in the six scenarios presented in this application guide:

- **Scenario 1:** Double-ended IFC cable assemblies with MPO connectivity on both ends are used in a single data center when all of the fibers on each end are landed at the same connector panel. MPO connectivity allows terminations to be made 12 fibers at a time.
- **Scenario 2:** Single-ended IFC cable assemblies with MPO connectivity on one end are used within a single data center when constricted cable pathways prevents connectors from being pulled through. The stub end is field terminated or spliced.
- **Scenario 3:** Double-ended OSP cable assemblies with MPO connectivity on both ends are used when the cable pathways between two buildings are open enough to allow a pulling sock to be pulled through and the distance between the buildings is less than the maximum pre-terminated length of the cables.
- **Scenario 4:** Single-ended OSP cable assemblies with MPO connectivity on one end are accommodated at high fiber counts by splicing stub ends at high density Fiber Entrance Cabinets (FECs) or OMX Splice Cabinets.
- **Scenario 5:** Outdoor closures are used to splice the stub ends of single-ended OSP cable assemblies terminated on the MPO end at connection panels. This is done when the length of the cable pathway between buildings is too great to be spanned with a single cable.
- **Scenario 6:** When distances between buildings and/or intermediate splice points are greater than the maximum length of pre-terminated single-ended cable assemblies, bulk cable is used. These cables are spliced or field terminated on both ends.

Front side connection options allow the high fiber count cable assemblies terminated at EHD connection panels to be transitioned to equipment with a range of physical interface requirements. Options include MPO-MPO jumpers, LC-LC jumpers, and MPO-LC Array cables.

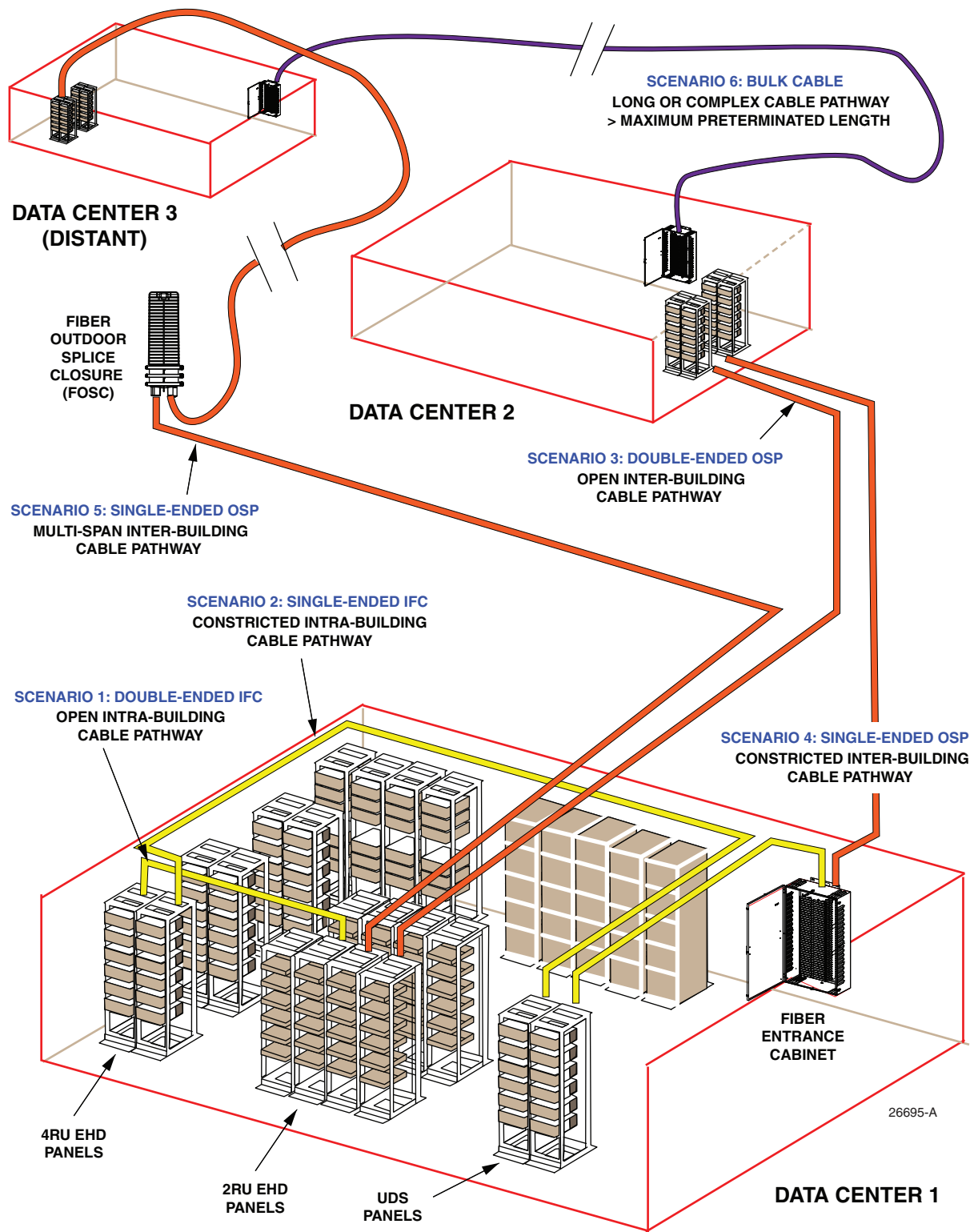


Figure 2. Pictorial View of Cable Use Scenarios

3 CABLE USE SCENARIOS AND OPTIONS

3.1 Scenario 1: Double-Ended IFC Fiber Cable Assembly

IFC double-ended fiber cable assemblies are used within a single data center between the Main Distribution Area (MDA) and Horizontal Distribution Area (HDA) or between the HDA and Equipment Distribution Area (EDA), as shown in Figure 3. These cable assemblies are pre-terminated with MPO connectors and are terminated on both ends at EHD panels where they are mated with MPO-LC distribution modules or MPO mating adapters.

Note: For ordering BOM, refer to Topic 4.1 on Page 18.

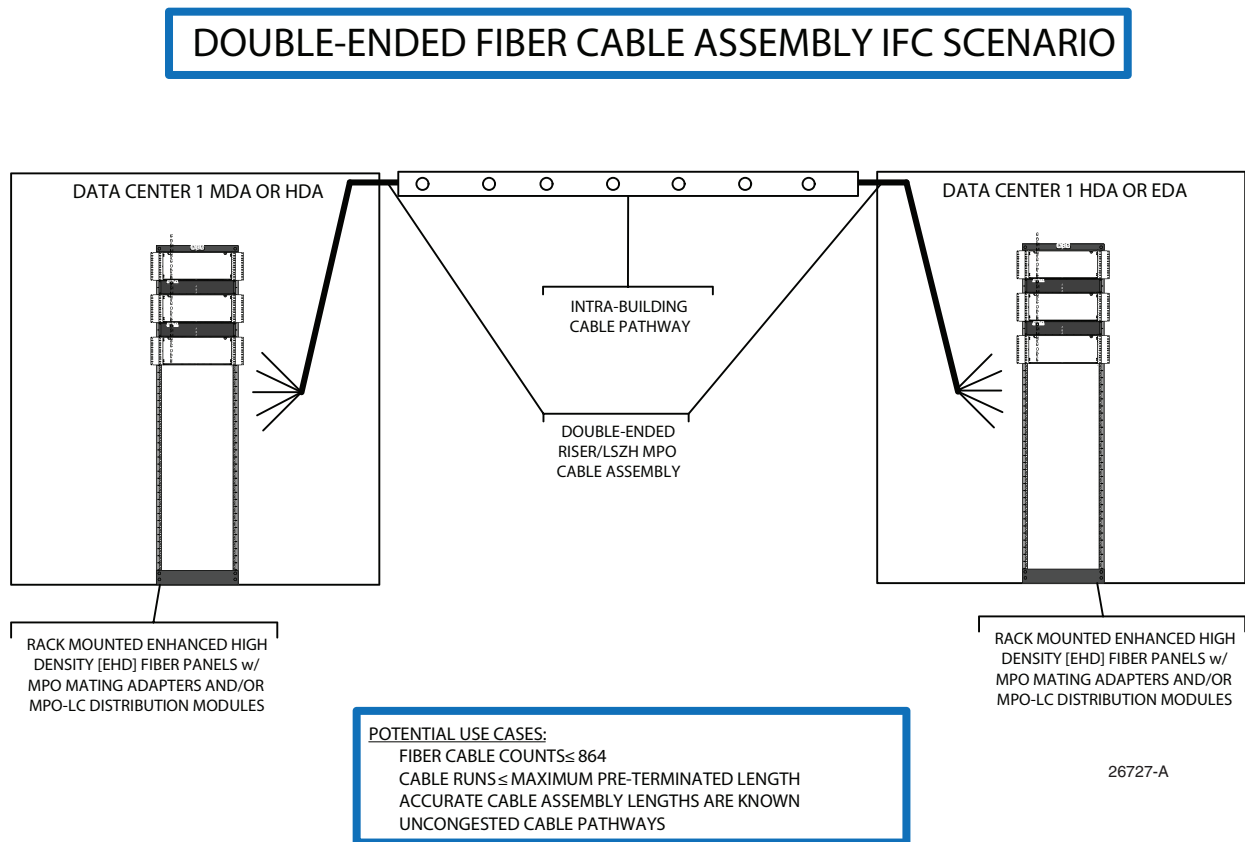


Figure 3. Double-Ended IFC Fiber Cable Assembly Scenario

Enhanced High Density (EHD) panels (such as shown in Figure 4) are used in this scenario because they have a high connection density compatible with the high fiber count of the cable assemblies being terminated at the rack. When the panel is equipped with MPO-LC distribution modules, up to 144 connections can be made per 1RU of rack space. Each 4RU panel provides for the termination and connection of one 576-fiber cable assembly.

The EHD panel mounts in a 19-inch (48.26 cm) equipment rack with a 3-inch or 6-inch channel. It will also mount in a 19-inch cabinet. The EHD panel is available in 1RU, 2RU, or 4RU size. The panel features slide out blades (three per rack unit) accessible from front or rear and providing full

hand access to adapters and connectors. Each blade can accommodate two adapter packs or modules. Accessories are available for mounting and protection of the high fiber count cable assemblies terminated at EHD panels. [Figure 5](#) is a front view of an EHD panel.

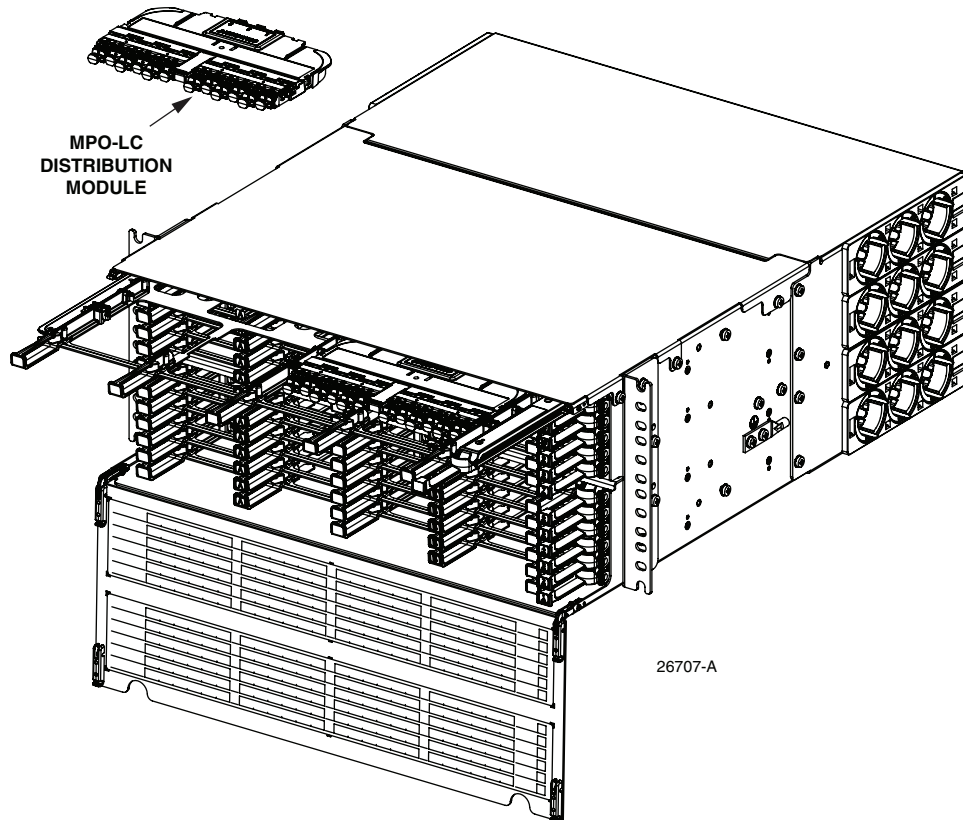


Figure 4. 4RU EHD Panel With MPO-LC Distribution Module, One Blade Pulled Out



Figure 5. Front View of EHD Panel With MPO Mating Adapters, One Blade Pulled Out

3.2 Scenario 2: Single-Ended IFC Fiber Cable Assembly

IFC single-ended fiber cable assemblies are used within a single data center between the MDA and HDA or between the HDA and EDA, as shown in Figure 6. The primary reason for using a single-ended cable assembly rather than a double-ended cable assembly in this situation is because constricted cable pathways make it unfeasible to pull through a pre-terminated end from location to location within the facility.

In this scenario, the pre-terminated end of the cable assembly is connected at an EHD panel with an MPO-LC distribution module or MPO mating adapter. The stub end either is terminated with a field installed ribbon cable fanout kit (if required) and splice on MPO connectors; or else it is spliced to EHD 24-fiber LC splice cassettes.

Note: For ordering BOM, refer to Topic 4.2 on Page 19.

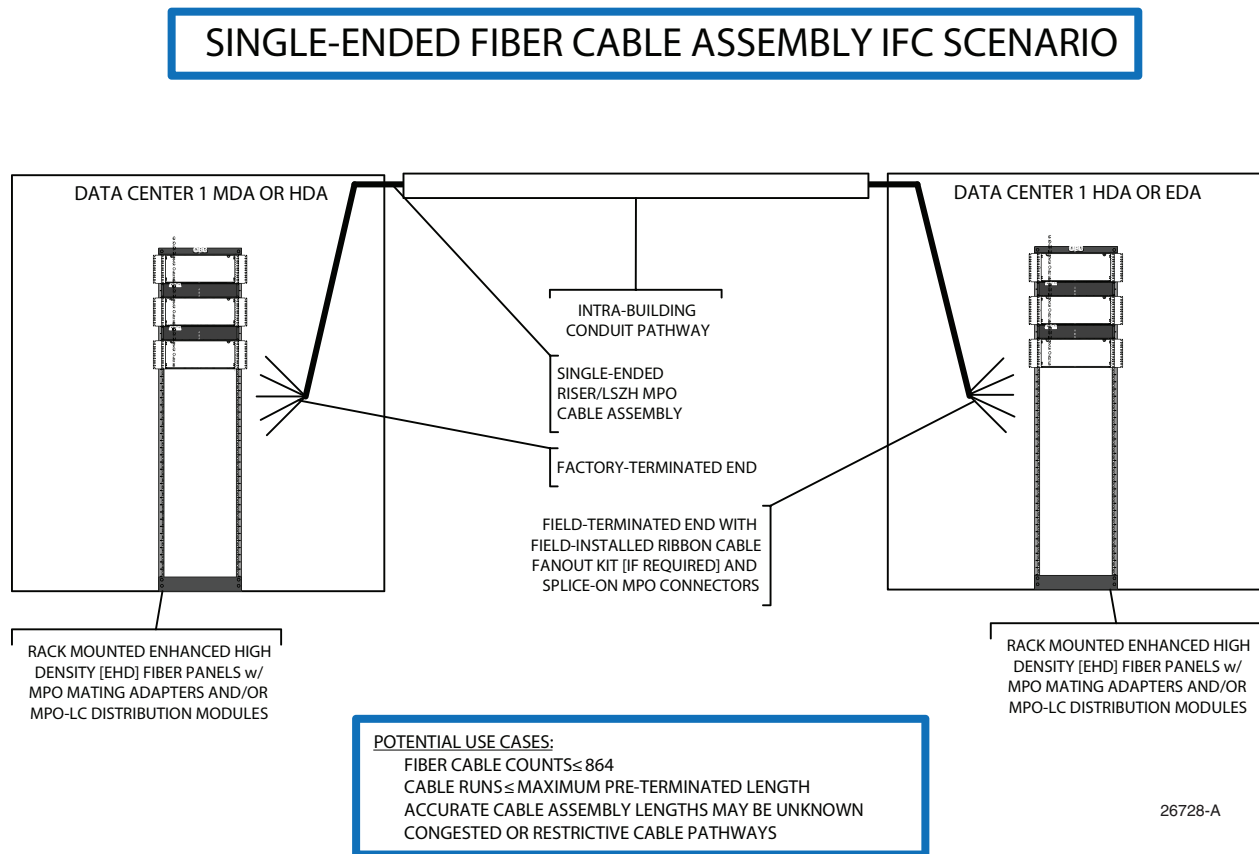


Figure 6. Single-Ended IFC Fiber Cable Assembly Scenario

Field-installable fanout kits are available for use with 144-, 288-, 432-, 576-, or 864-fiber rollable ribbon cable. Contents are such as shown in Figure 7. Figure 8 through Figure 11 show some of the steps in installing the kit. Figure 12 shows the kit installed.



Figure 7. Typical Kit Components



Figure 8. Stripping the Cable

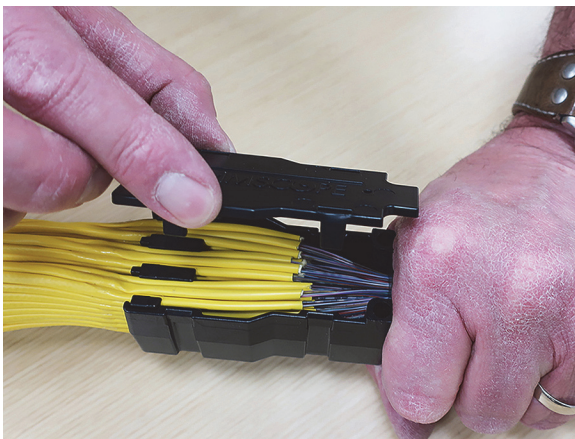


Figure 9. Installing a Fanout Kit

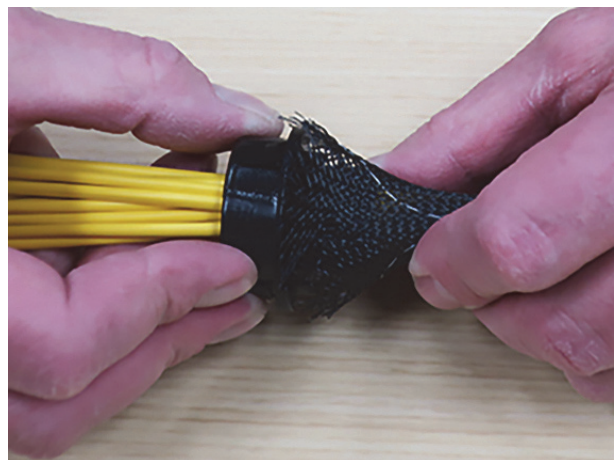


Figure 10. Installing Protective Mesh



Figure 11. Installing the Cable Gland



Figure 12. Kit Installed

3.3 Scenario 3: Double-Ended OSP Fiber Cable Assembly

Figure 13 shows the configuration used for routing OSP double-ended fiber cable assemblies between two data centers. These cables assemblies are pre-terminated with MPO connectors on both ends, with one end enclosed within a pulling sock.

Note: For ordering BOM, refer to Topic 4.3 on Page 20.

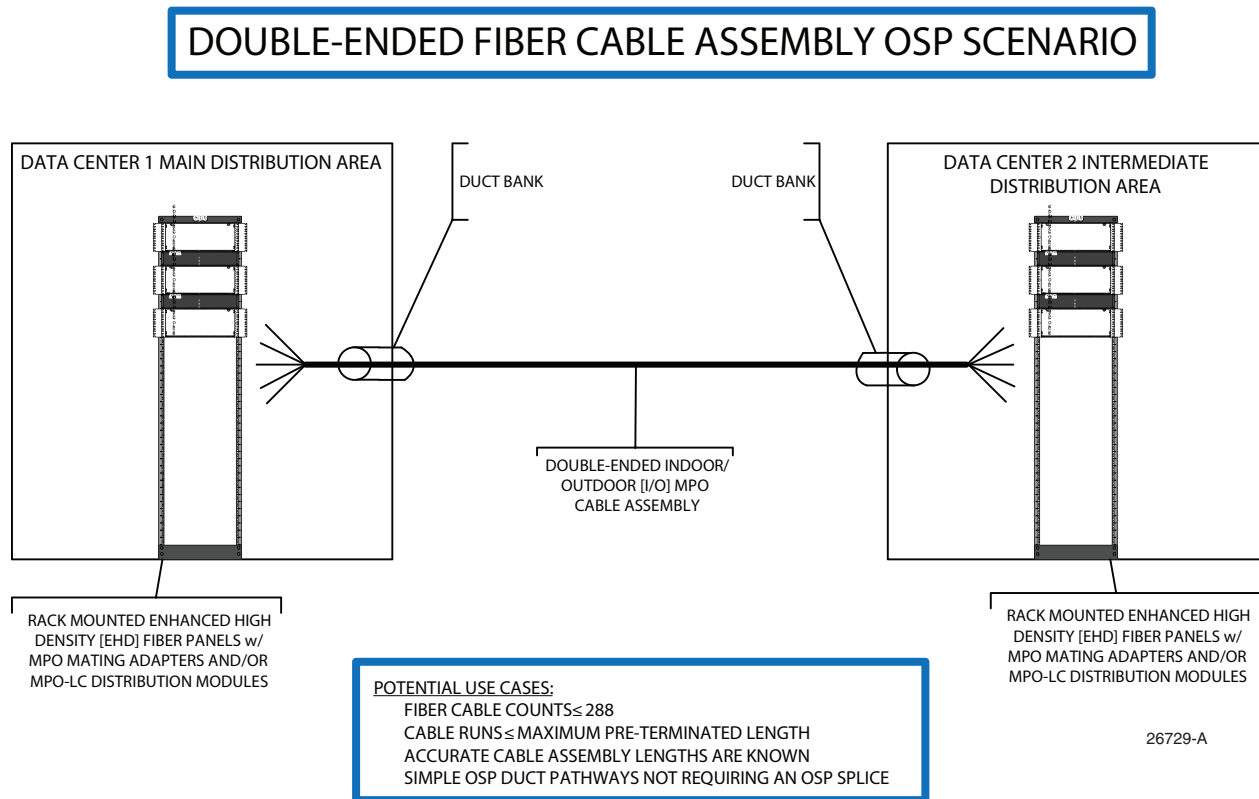


Figure 13. Double-Ended OSP Fiber Cable Assembly Scenario

In a typical application, the end of the cable assembly without the pulling sock is terminated in one data center at an EHD panel, and the other end, with the pulling sock, is pulled to the second building. This scenario can only be used when the OSP conduit is large and open enough for one end of the cable assembly to be pulled through from one building to another.

Figure 14 shows a 144-fiber double-ended cable assembly with one end enclosed within a pulling sock. Figure 15 through Figure 18 show the pulling sock being removed and routed to the EHD panel. In this case, there are 12 sub-units, each with one 12-fiber MPO connector. Figure 19 shows the cable assembly installed in the EHD panel.

A typical 144-fiber application is to mount 11 MPO connectors in an MPO mating adapter and the 12th MPO connector in an MPO-LC distribution module within the EHD panel. These connections occur within one blade, which occupies 1/3 of 1RU of the EHD panel.



Figure 14. Cable Assembly as Shipped



Figure 15. Pulling Sock



Figure 16. Removing the Pulling Sock

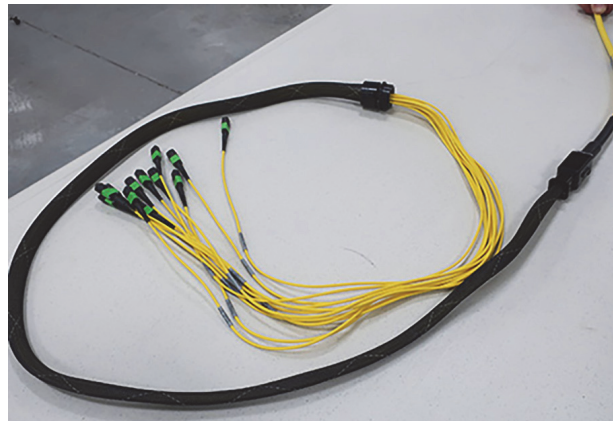


Figure 17. MPO Connectors Unpacked

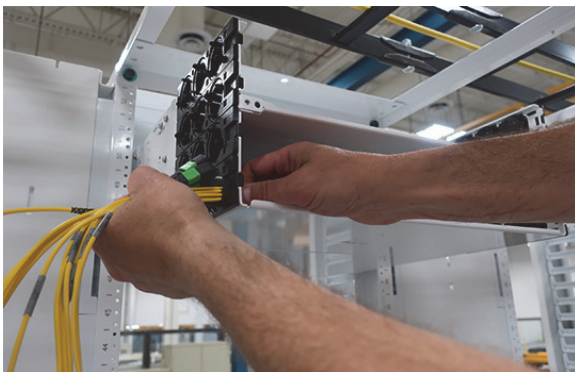


Figure 18. Routing Connectors Into Rear of Panel



Figure 19. Connectors Installed

3.4 Scenario 4: Single-Ended OSP Fiber Cable Assembly With Splice Cabinet

OSP single-ended fiber cable assemblies are used between data centers in a scenario such as illustrated in Figure 20. A determining feature of this scenario is that the cable pathway between the buildings is too narrow or constricted to allow a pulling sock to be pulled through. A stub end is pulled through and spliced on the far end.

Also, the far end facility in this scenario is a high capacity facility requiring an orderly means of securing and splicing a high number of fibers. This requirement is met by use of a high capacity splice cabinet.

Note: For ordering BOM, refer to Topic 4.4 on Page 21.

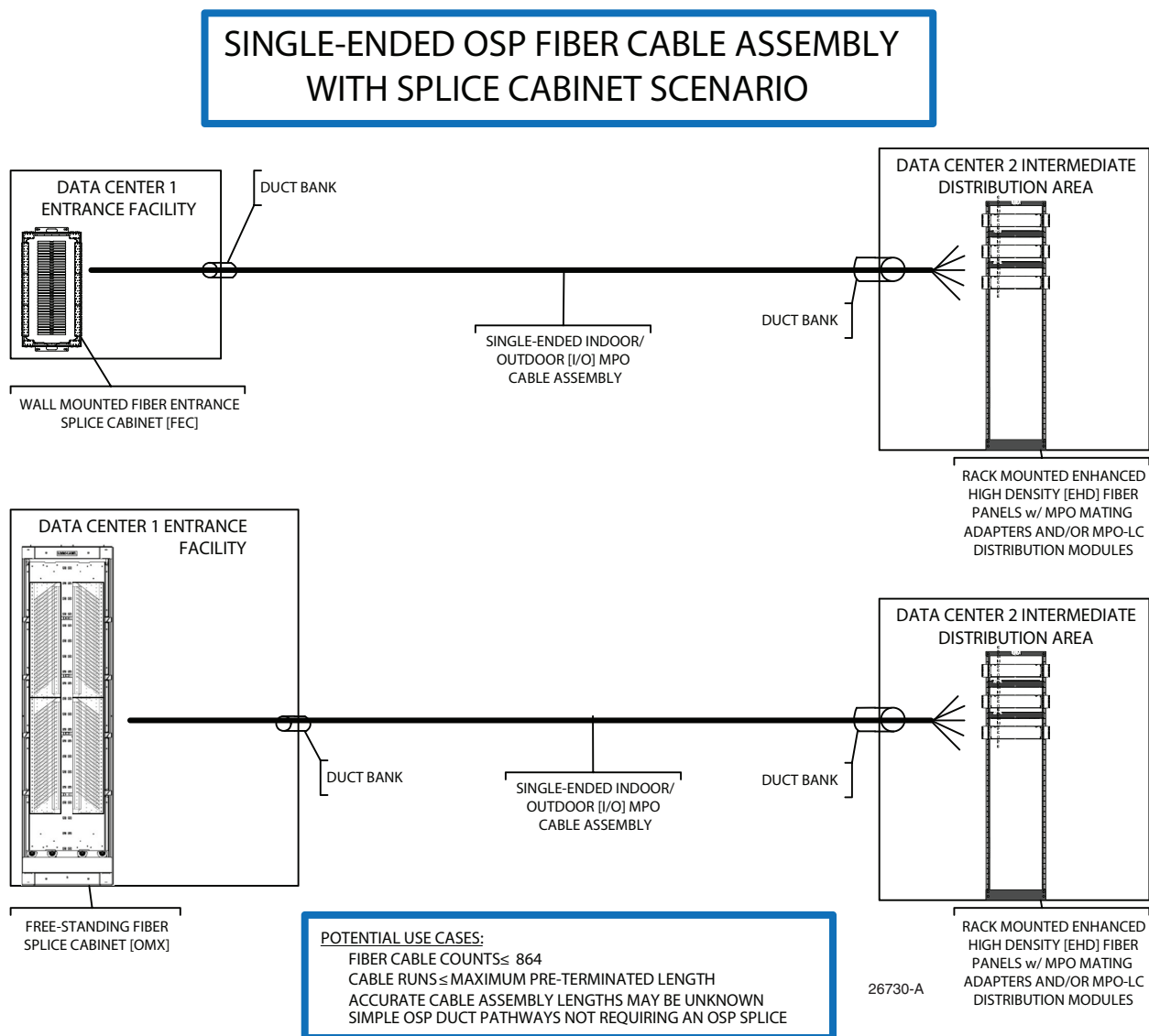


Figure 20. Single Ended OSP Fiber Cable Assembly Routed to Splice Cabinet

Two high capacity splice cabinets are recommended for use in this scenario:

- The **Fiber Entrance Cabinet (FEC) 10K**, shown in [Figure 21](#), is a wall- or strut-mounted cabinet that provides storage and protection in addition to splicing. The conventional splice drawer employed in the FEC-10K provides service loop storage, which allows splicing away from the FEC. Cable access ports are located at the top, bottom, and both sides of the cabinet. The total maximum capacity for mass fusion splicing of ribbon fibers is 10,368 fibers. This correlates to (24) 12-fiber mass fusion splices - 288 fibers - per splice tray.
- The **OMX Splice Cabinet**, shown in [Figure 22](#), provides a splicing location for OSP and IFC cables and can accommodate up to 120 round splice trays. The round splice trays provide cable management, storage, and splicing. The total maximum capacity for mass fusion splicing of ribbon fibers is 11,520 fibers. This correlates to (8) 12-fiber mass fusion splices - 96 fibers - per splice wheel.



**Figure 21. 10K Fiber Entrance Cabinet (FEC)
With Compact Interior Drawers for Splices**



**Figure 22. OMX Splice Cabinet
With Slanted Shelves for Round Splice Trays**

3.5 Scenario 5: Single-Ended OSP Fiber Cable Assembly With Fiber Optic Splice Closure

A second scenario for OSP single-ended fiber cable assembly is encountered when the route between two buildings is too lengthy or complicated for use of a single cable. In this scenario, an outdoor Fiber Optic Splice Closure (FOSC) is placed at a midway point, as shown in Figure 23, providing a splicing and/or branching location.

Indoor/Outdoor fiber cable assemblies, spliced on one end at the FOSC, are pre-terminated at the other end with MPO connectors, which are connected at EHD panels in the data centers on either side of the span.

Note: For ordering BOM, refer to Topic 4.5 on Page 22.

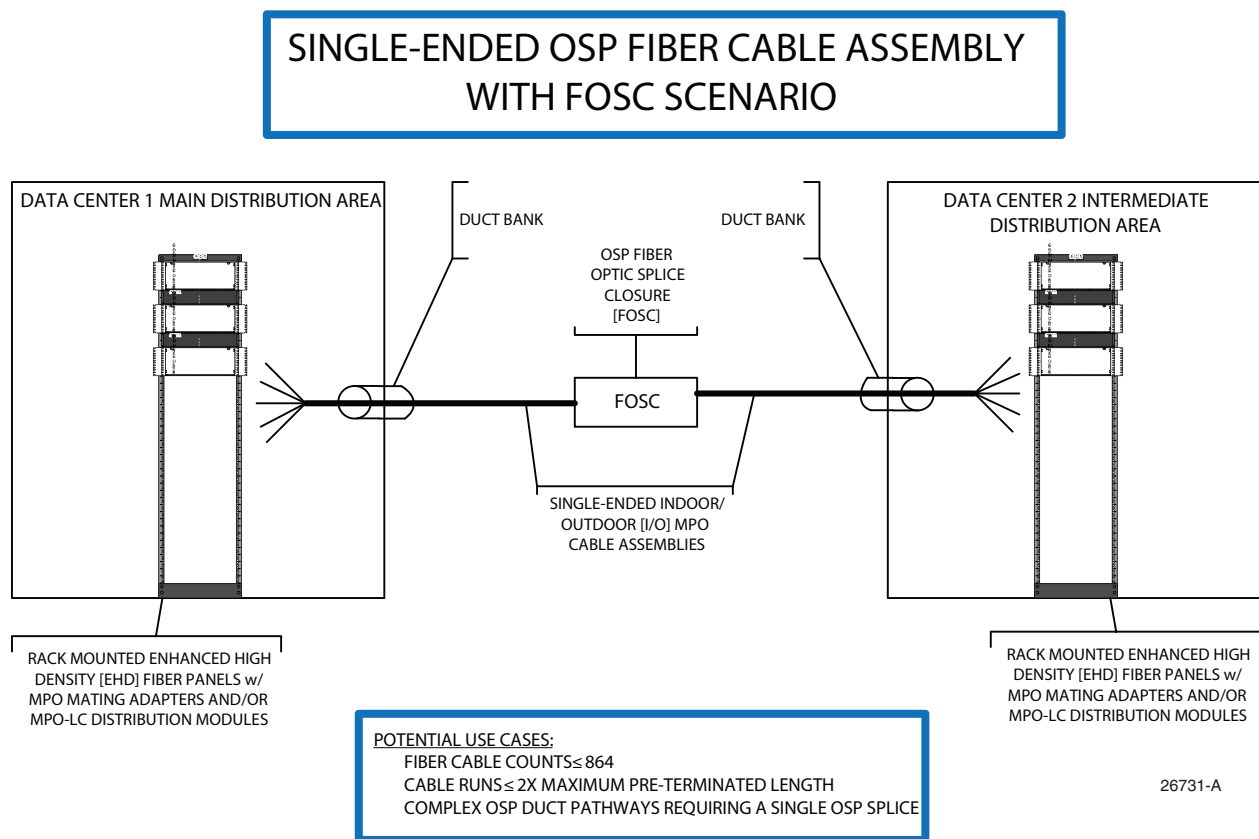


Figure 23. Single-Ended OSP Fiber Cable Assembly Routed to FOSC

3.6 Scenario 6: Bulk Fiber Cable

Bulk fiber cable is used when the distance between data centers or intermediate splice points is greater than the maximum pre-terminated length of single-ended or double-ended fiber cables, as shown in Figure 24.

The stub end of the bulk cables are spliced on both ends at a splice cabinet (FEC or OMX). If the distance between splice cabinets is greater than maximum length of the cable or if the cable pathways is branched, one or more intermediate splice points can be added using one or more FOSCs.

Note: For ordering BOM, refer to Topic 4.6 on Page 23.

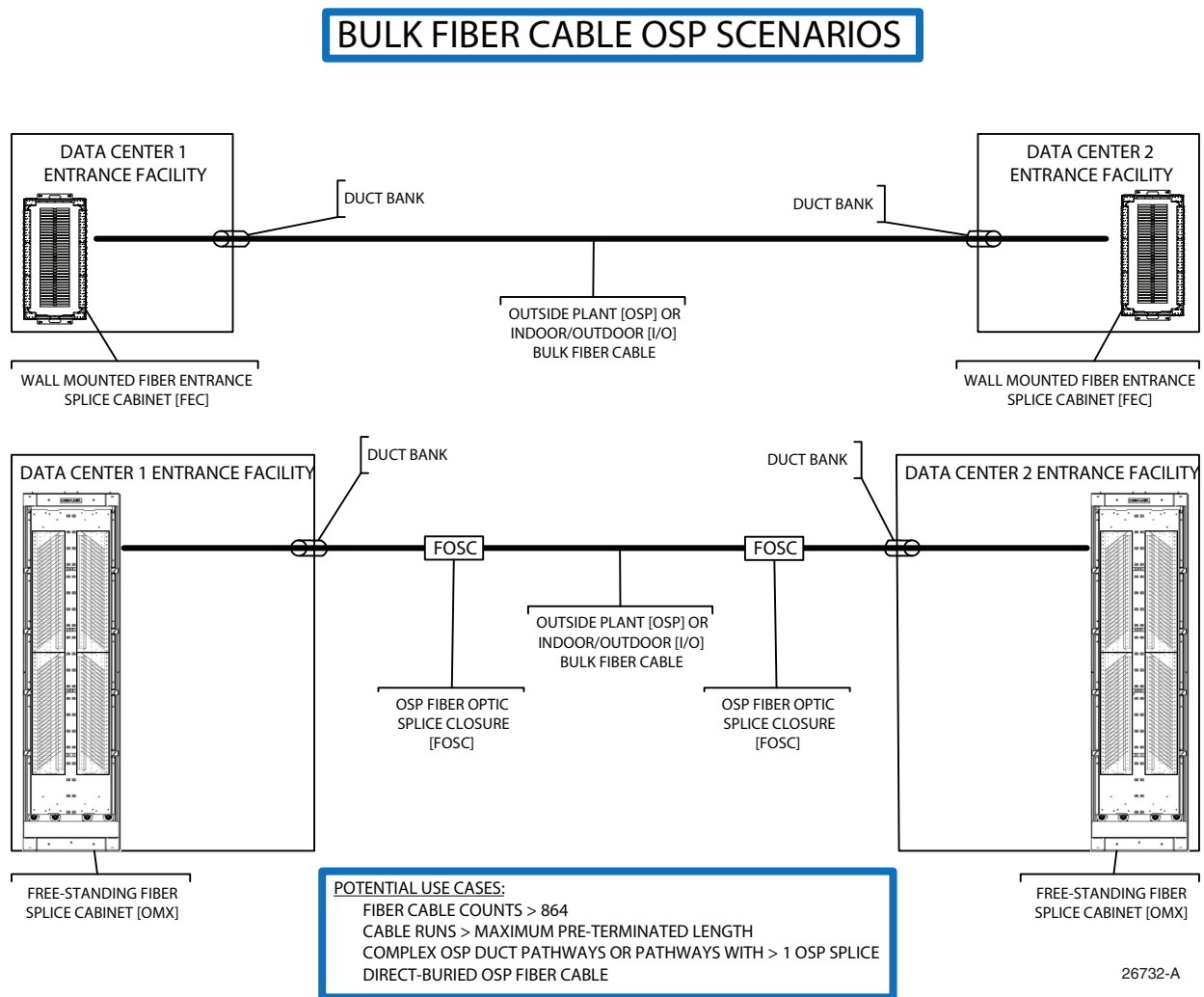


Figure 24. Bulk Fiber Cable Routed to Splice Cabinets and/or FOSC(s)

3.7 Stub End Termination Options

Figure 25 summarizes the termination options available for the stub end of high fiber count cable assemblies or bulk cables.

Note: For ordering BOM, refer to Topic 4.7 on Page 24.

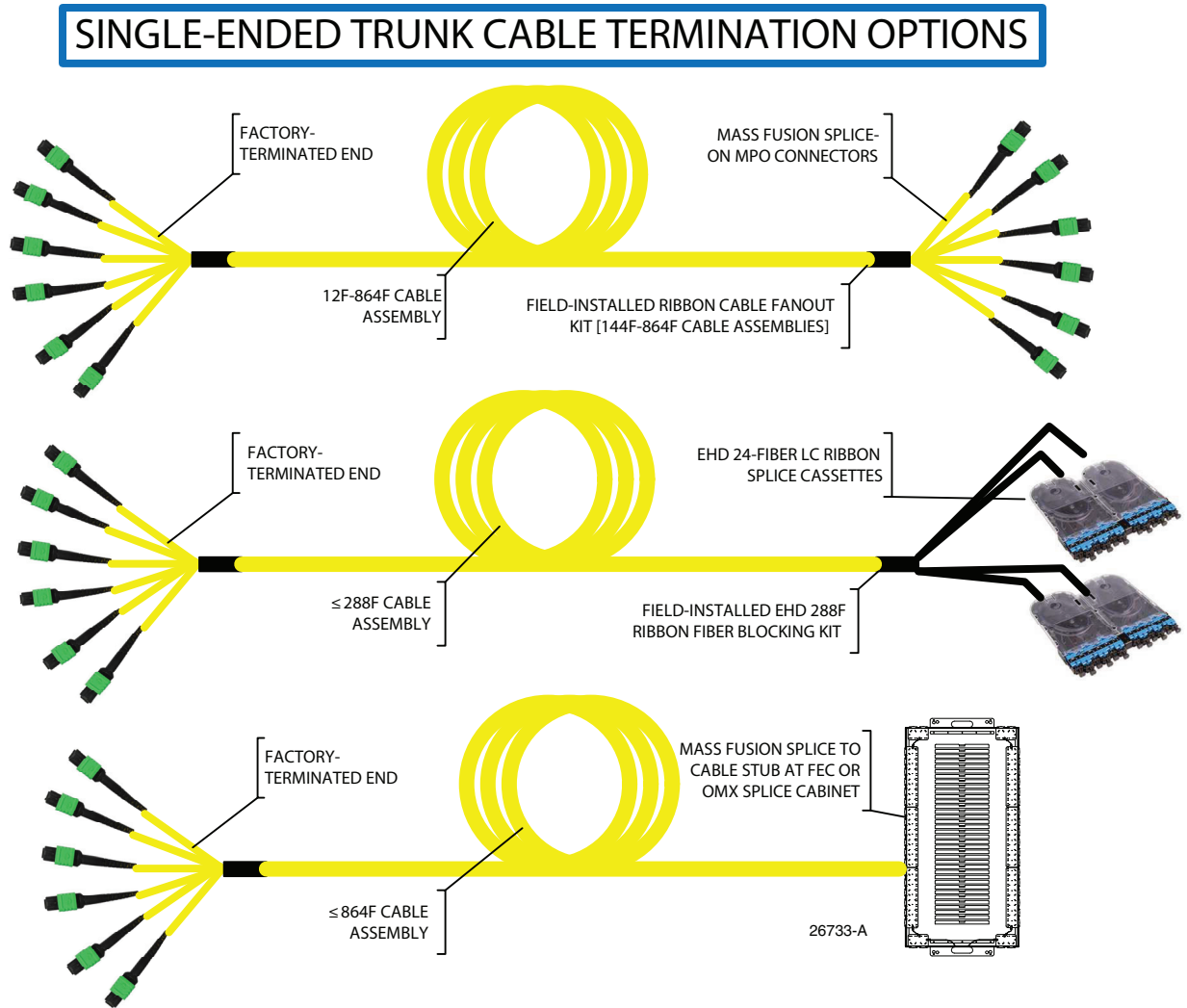


Figure 25. Termination Options for Stub End of High Fiber Count Cable Assemblies or Bulk Cables

3.8 Front End Connection Options

Cables assemblies or bulk cables terminated at an EHD panel can be transitioned to meet the physical interface requirements of different kinds of equipment. This is done using adapter packs and distribution modules of different kinds. Figure 26 shows how adapters packs or modules are installed and how they transition in an orderly manner to jumpers installed on the front of the panel.

Note: For ordering BOM, refer to [Topic 4.8 on Page 25](#).

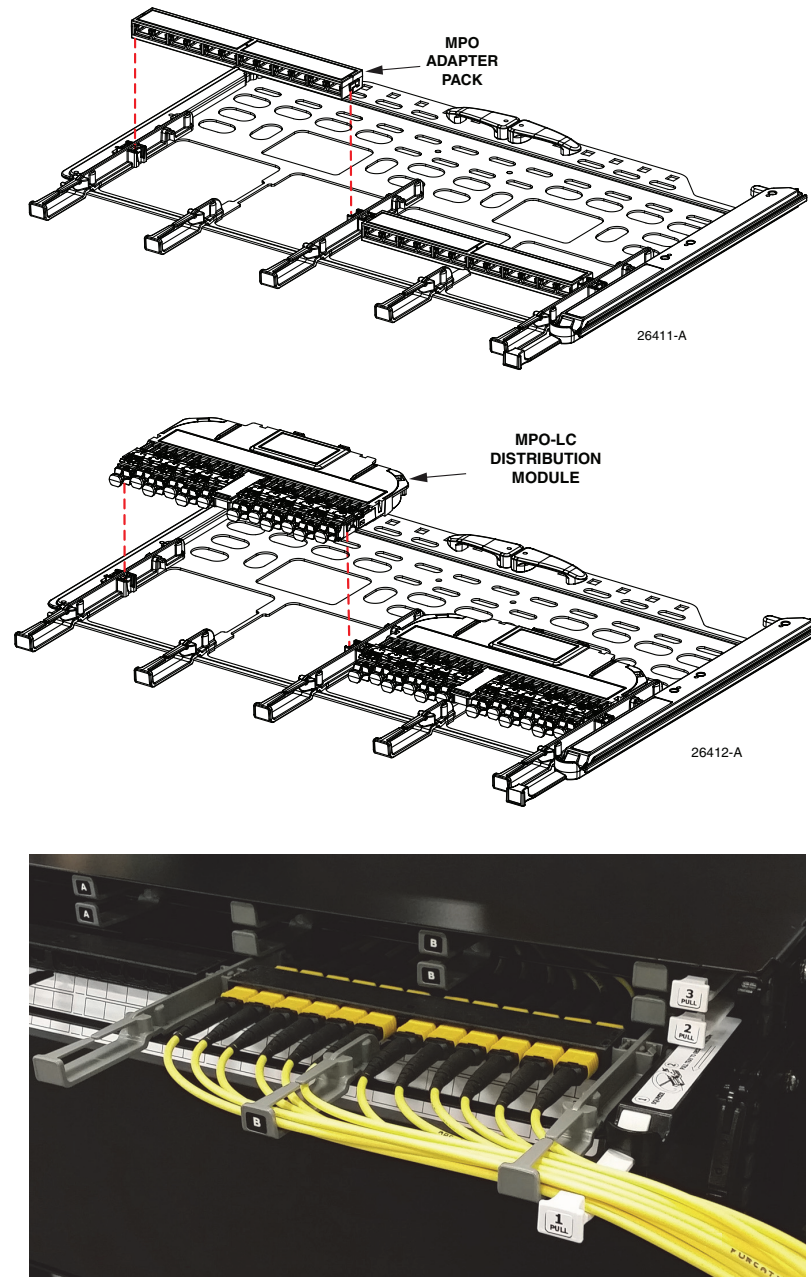


Figure 26. EHD Panel Adapter Packs and Front End Jumpers Example

4 ORDERING GUIDELINES

This section contains an ordering Bill of Material (BOM) for each scenario presented in Section 3 of this Application Guide.

Note: Contact your CommScope Field Applications Engineer for design assistance.

4.1 Scenario 1: Double-Ended IFC Cable Assembly Ordering BOM

Table 1 lists the items to order for Scenario 1. This BOM is for one cable span linking two EHD panels as shown in [Topic 3.1 on Page 6](#).

Note: This BOM represents a 144-fiber singlemode cable assembly and associated modules being terminated at 4RU EHD panels. Other options are available. Work with your Field Application Engineer to define your requirements.

Table 1. Scenario 1 Double-Ended IFC Cable Assembly Ordering BOM

Product Name	Qty	Catalog Number
4RU EHD Panel	2	EHD-4U-W
144-fiber MPO-MPO trunk, LSZH/Riser, Indoor	1	UJGMPMPRM-JBMxxx
EHD MPO-LC Distribution Module	2	EHD12-DM-24LC-SM-B-ULLM
EHD MPO Mating Adapter	2	EHD-DP-12MPO-ALL-A

4.2 Scenario 2: Single-Ended IFC Cable Assembly Ordering BOM

Table 2 lists the items to order for Scenario 2. This BOM is for one cable span linking two EHD panels as shown in Topic 3.2 on Page 8.

Note: This BOM represents a 144-fiber singlemode cable assembly and associated modules being terminated at 4RU EHD panels. Other options are available. Work with your Field Application Engineer to define your requirements.

Table 2. Scenario 2 Single-Ended IFC Cable Assembly Ordering BOM

Product Name	Qty	Catalog Number
4RU EHD Panel	2	EHD-4U-W
144-fiber MPO-stub trunk, LSZH/Riser, Indoor	1	UJGMPUCRM-JBMxxx
EHD MPO-LC Distribution Module	2	EHD12-DM-24LC-SM-B-ULLM
EHD MPO Mating Adapter	2	EHD-DP-12MPO-ALL-A
Field Terminated Fanout Kit	1	BLK-ROLB-A12-144
Splice on MPO connectors	12	SFC-12MP-8SP-30-GR

4.3 Scenario 3: Double-Ended OSP Cable Assembly Ordering BOM

Table 3 lists the items to order for Scenario 3. This BOM is for one cable span linking two EHD panels as shown in [Topic 3.3 on Page 10](#).

Note: This BOM represents a 144-fiber singlemode cable assembly and associated modules being terminated at 4RU EHD panels. Other options are available. Work with your Field Application Engineer to define your requirements.

Table 3. Scenario 3 Double-Ended OSP Cable Assembly Ordering BOM

Product Name	Qty	Catalog Number
4RU EHD Panel	2	EHD-4U-W
144-fiber MPO-MPO trunk, LSZH/Riser, Indoor/ Outdoor	1	UJGMPMPM-JBMxxx
EHD MPO-LC Distribution Module	2	EHD12-DM-24LC-SM-B-ULLM
EHD MPO Mating Adapter	2	EHD-DP-12MPO-ALL-A

4.4 Scenario 4: Single-Ended OSP Cable Assembly With Splice Cabinet Ordering BOM

Table 4 lists the items to order for Scenario 4 when using an FEC. Table 5 lists the items to order for Scenario 4 when using an OMX Splice Cabinet. These BOMs are each for one cable span linking an EHD panel located in one building with a splice cabinet located in a second building as shown in Topic 3.4 on Page 12.

Note: This BOM represents a 144-fiber singlemode cable assembly and associated modules being terminated at 4RU EHD panels. Other options are available. Work with your Field Application Engineer to define your requirements.

Table 4. Scenario 4 Single-Ended OSP Cable Assembly With FEC Ordering BOM

Product Name	Qty	Catalog Number
4RU EHD Panel	1	EHD-4U-W
144-fiber MPO-stub trunk, LSZH/Riser, Indoor/ Outdoor	1	UJGMPUCSM-JBMxxx
EHD MPO-LC Distribution Module	1	EHD12-DM-24LC-SM-B-ULLM
EHD MPO Mating Adapter	1	EHD-DP-12MPO-ALL-A
Fiber Optic Entrance Cabinet, Wall Mount (FEC)	1	FEC-10K
Splice Tray*	1	FOSC-ACC-C-TRAY-RIBN-24
Splice Protector, Mass Fusion**	1	SMOUV-1120-R2/12-02-100
Breakout Kit	1	NG4-CBOUT-288

* 288 fiber capacity - mass fusion

** pack of 100

Table 5. Scenario 4 Single-Ended OSP Cable Assembly With OMX Ordering BOM

Product Name	Qty	Catalog Number
4RU EHD Panel	1	EHD-4U-W
144-fiber MPO-stub trunk, LSZH/Riser, Indoor/ Outdoor	1	UJGMPUCSM-JBMxxx
EHD MPO-LC Distribution Module	1	EHD12-DM-24LC-SM-B-ULLM
EHD MPO Mating Adapter	1	EHD-DP-12MPO-ALL-A
Fiber Optic Entrance Cabinet, Floor Mount (OMX)	1	MX6-BSPL-1440-U7
Splice Wheel*	2	FST-DRSHD-MF
Splice Protector, Mass Fusion**	12	SMOUV-1120-R2/12-02-100
Breakout Kit	1	NG4-CBOUT-288

* 96 fiber capacity each - mass fusion

** pack of 100

4.5 Scenario 5: Single-Ended OSP Cable Assembly With Splice Closure (FOSC) Ordering BOM

Table 6 lists the items to order for Scenario 5. This BOM is for two cable spans linking a 4RU EHD panel located in one building with a second 4RU EHD located in a second building, by way of an intermediate connection made in a FOSC located outdoors, as shown in Topic 3.5 on Page 14.

Note: This BOM represents two 144-fiber singlemode cable assemblies and associated modules as described above. Other options are available. Work with your Field Application Engineer to define your requirements.

Table 6. Scenario 5 Single-Ended OSP Cable Assembly With Splice Closure (FOSC) Ordering BOM

Product Name	Qty	Catalog Number
4RU EHD Panel	2	EHD-4U-W
144-fiber MPO-stub trunk, LSZH/Riser, Indoor/Outdoor	2	UJGMPUCSM-JBMxxx
EHD MPO-LC Distribution Module	2	EHD12-DM-24LC-SM-B-ULLM
EHD MPO Mating Adapter	2	EHD-DP-12MPO-ALL-A
Splice Closure, 864 Fiber Splice Capacity	1	FOSC450-B6-6-NT-0-B3V
Splice Tray, 144 Fiber Splice Capacity	1	FOSC-ACC-A/B-TRAY-12-RBN
Splice Protector, Mass Fusion*	1	SMOUV-1120-R2/12-02-100

* pack of 100

4.6 Scenario 6: Bulk Fiber Cable Ordering BOM

Table 7 lists the items to order for Scenario 6 with an FEC cabinet. Table 8 lists the items to order for Scenario 6 with an OMX cabinet. These BOMs are each for one cable span of bulk cable linking two splice cabinets as shown in Topic 3.6 on Page 15, with one or more splice closures providing additional span between cabinets if needed.

Note: These BOMs each represent a 144-fiber singlemode bulk cable and associated items being terminated at splice cabinets. Other options are available. Work with your Field Application Engineer to define your requirements.

Table 7. Scenario 6 Bulk Fiber Cable Assembly With FEC Ordering BOM

Product Name	Qty	Catalog Number
Outdoor Non-armored, Gel-Free, Loose Tube Rollable Ribbon Cable	length in feet	D-1728-LN-RR-F12NS/8Z/99H
Fiber Optic Entrance Cabinet, Wall Mount (FEC)	2	FEC-10K
Splice Tray*	12	FOSC-ACC-C-TRAY-RIBN-24
Splice Protector, Mass Fusion**	3	SMOUV-1120-R2/12-02-100
Breakout Kit	2	NG4-CBOUT-1728

* 288 fiber capacity - mass fusion

** pack of 100

Table 8. Scenario 6 Bulk Fiber Cable Assembly With OMX Ordering BOM

Product Name	Qty	Catalog Number
Outdoor Non-armored, Gel-Free, Loose Tube Rollable Ribbon Cable	length in feet	D-1728-LN-RR-F12NS/8Z/99H
Fiber Optic Entrance Cabinet, Floor Mount (OMX)	2	MX6-BSPL-1440-U7
Splice Wheel*	36	FST-DRSHD-MF
Breakout Kit	2	NG4-CBOUT-1728
Splice Closure, 3456 Fiber Splice Capacity	2	FOSC600-D8B-NT-0-X2VXL
Splice Tray**	12	FOSC-ACC-D-TRAY-RIBN-24
Splice Protector, Mass Fusion***	6	SMOUV-1120-R2/12-02-100

* 96 fiber capacity- mass fusion

** 288 fiber capacity - mass fusion

*** pack of 100

4.7 Stub End Termination Ordering Numbers

Table 9 through Table 12 list the items available for stub end termination as described in Figure 3.7 on Page 16.

Note: These BOMs each represent a 144-fiber singlemode bulk cable and associated items being terminated at splice cabinets or at a splice cassette. Other options are available. Work with your Field Application Engineer to define your requirements.

Table 9. Splice On Connectors Ordering BOM

Product Name	Qty	Catalog Number
144-fiber MPO-stub trunk, LSZH/Riser, Indoor/Outdoor	1	UJGMPUCSM-JBMxxx
Field Terminated Fanout Kit	1	BLK-ROLB-A12-144
Splice on MPO connectors	12	SFC-12MP-8SP-30-GR

Table 10. Stub End Termination at EHD Splice Cassette Ordering BOM

Product Name	Qty	Catalog Number
144-fiber MPO-stub trunk, LSZH/Riser, Indoor/Outdoor	1	UJGMPUCSM-JBMxxx
EHD 24-fiber SM LC/UPC Ribbon Fiber Splice Cassette, Enhanced Method B	6	EHD-SP-24LC-SMR-B-ULL
EHD 2RU Blocking Kit	1	EHD-BK-2U

Table 11. Stub End Termination at OMX Cabinet Ordering BOM

Product Name	Qty	Catalog Number
144-fiber MPO-stub trunk, LSZH/Riser, Indoor/Outdoor	1	UJGMPUCSM-JBMxxx
Fiber Optic Entrance Cabinet, Floor Mount (OMX)	1	MX6-BSPL-1440-U7
Splice Wheel, 96 Fiber Splice Capacity	1	FST-DRSHD-MF
Splice Protector, Mass Fusion*	1	SMOUV-1120-R2/12-02-100
Breakout Kit	1	NG4-CBOUT-288

* pack of 100

4.8 Front End Connection Ordering Numbers

Table 12. Stub End Termination at FEC Ordering BOM

Product Name	Qty	Catalog Number
144-fiber MPO-stub trunk, LSZH/Riser, Indoor/Outdoor	1	UJGMPUCSM-JBMxxx
Fiber Optic Entrance Cabinet. Wall Mount (FEC)	1	FEC-10K
Splice Tray	1	FOSC-ACC-C-TRAY-RIBN-24
Splice Protector, Mass Fusion*	1	SMOUV-1120-R2/12-02-100
Breakout Kit	1	NG4-CBOUT-288

* pack of 100

Table 13 lists the items available for front end connections as shown in Figure 26 on Page 17.

Table 13. Front End Connection Ordering BOM

Product Name	Catalog Number
MPO-MPO Jumpers	MS-12F-MTP-FM-SM-A-xxM
LC-LC Jumpers	CEX-LULUSM-RL20-xxM
MPO-LC Arrays	MS-12F-MPOM-LCU-A-SM-xxM

5 TECHNICAL ASSISTANCE

For technical assistance, customer service, or to report any missing/damaged parts, visit us at <http://www.commscope.com/SupportCenter>

