COMMSCOPE®

High speed migration SYSTIMAX®InstaPATCH® 360 and SYSTIMAX Ultra-Low-Loss configuration guideline

Contents

SYSTIMAX® preterminated fiber-optic cabling systems configuration guide

Introduction

SYSTIMAX® InstaPATCH® 360 and SYSTIMAX Ultra-Low-Loss (ULL) factory-terminated cabling systems provide high-performance, rapid installation and agile configuration utilizing MPO array fiber connectivity. Both systems utilize Method B trunk polarity, enabling flexible implementation of array fiber connectivity. Network designers have complete design freedom for many common topology requirements with an extensive array of fiber types, MPO fiber counts and module configurations.

This application guide provides information explaining the common items and differences between InstaPATCH 360 and SYSTIMAX ULL. Detailed instructions outline the design and deployment of SYSTIMAX preterminated fiber infrastructure systems.

Polarity control

SYSTIMAX preterminated systems provide polarity control mechanisms that ensure signals are correctly routed through array fiber modules, trunks and fanout cables. Both SYSTIMAX ULL and SYSTIMAX InstaPATCH 360 use Method B trunks and aligned-key adapters.

InstaPATCH 360 modules and fanout cables require ALPHA/BETA implementation—meaning components on End B of a fiber link need to be flipped upside-down relative to components on End A. Labeling systems identify port numbers according to the alpha or beta orientation.

The new SYSTIMAX ULL system uses the Enhanced Method B fiber routing within the modules and fanout cables, eliminating the ALPHA/BETA orientation and port labeling.

The MPO connector, MPO pins, keys and polarity

The MPO connector was developed by NTT-AT in the mid-1980s and is internationally standardized in IEC 61754-7 as well as TIA/EIA 604-5. Both InstaPATCH 360 and SYSTIMAX ULL connectors are factory terminated in pinned and unpinned versions, as shown in Figure 1.

Male MPO (pinned) "MX" "MP"   Female MPO (unpinned)

Figure 1. Pinned and unpinned MPO connectors

The pinned MPO is commonly referred to as male, or MPO(m), while the MPO without pins is referred to as female, or MPO(f). With the exception of the pins, the MPO connectors are identical. A pair of MPO connectors are mated by aligning the precision guide pins on the MPO(m) connector with the pin holes in the MPO(f) connector.

Depending on the application, MPO connectors are available in 8-fiber, 12-fiber or 24-fiber configurations. InstaPATCH 360 trunks and modules are available with 12-fiber MPO connectors (black boot). SYSTIMAX ULL MMF trunks and modules are available in 12-fiber as well as 8t-fiber (gray boot) and 24-fiber MPO connectors (red boot) SMF are available in 8- and 12-fiber; see Figure 2.

8-fiber   12-fiber   24-fiber

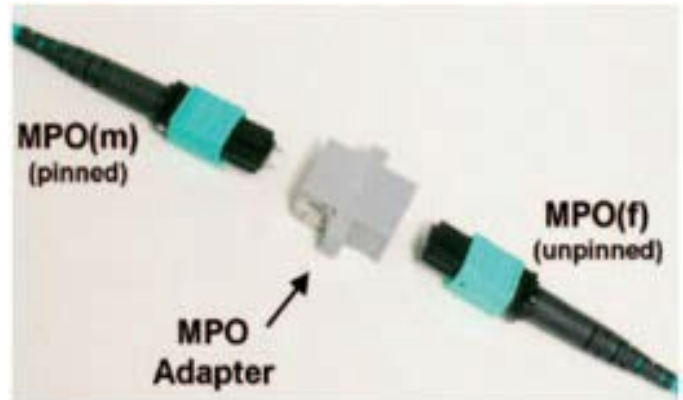Figure 2. MPO connector fiber counts

MPO connectors with aqua colored grips denote OM2, OM3 or OM4 fiber type, lime green denotes OM5, green denote SM for InstaPATCH 360 and SYSTIMAX ULL.

The MPO adapter provides coarse connector alignment and orientation, and includes retention features to secure the connectors. It is a passive device; it has no active components, no optical components and no precision alignment features (no pins, holes or sleeves).

Note that two female MPO connectors will insert and latch in an MPO adapter; however, due to the lack of the precision guide pins required for proper alignment, the two connectors will be misaligned—resulting in significant channel loss. Conversely, two male MPO connectors will not insert and latch in an adapter without inflicting permanent damage to one or both of the connectors.

MPO connectors and adapters have interlocking lugs and notches (commonly referred to as "keys") that ensure proper orientation of the mating connectors. MPO keys are critical components of both polarity management and singlemode angle management.

Figure 3. MPO connectors and MPO adapter

InstaPATCH® 360 and SYSTIMAX ULL systems assure correct system polarity regardless of the network design topology. Polarity refers to the basic fiber-optic design premise that every fiber must connect a signal source at one end to the proper signal receiver at the other end. Both systems utilize Method B polarity control, which uses "aligned key" MPO adapters. Key orientation on MPO connectors is established in the factory to implement specific polarity design criteria. Both InstaPATCH 360 and SYSTIMAX ULL take advantage of the TIA/EIA FOCIS 5 adapter keying option k=2; commonly referred to as "aligned keys" or "key-up to key-up." Therefore, an aligned-key adapter shall be present for each mated pair of MPO connectors in an InstaPATCH 360 or SYSTIMAX ULL link.

Aligned-key adapters are easily recognized by their light gray color; opposed-key adapters are black in color, as shown in Figure 4.

Key UP

Key UP

Key UP

Key UP

Key DOWN
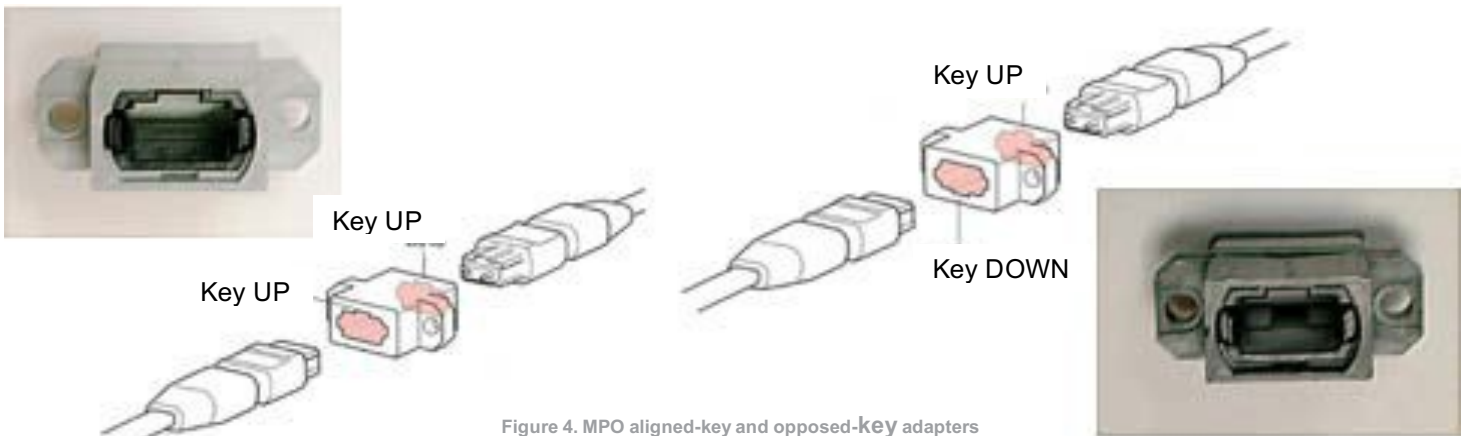
Figure 4. MPO aligned-key and opposed-key adapters

CommScope fiber-optic cable

InstaPATCH 360 products are available with CommScope LazrSPEED® 300 (OM3), LazrSPEED 550 (OM4), LazrSPEED 550 wideband (OM5), or TeraSPEED SM fiber. SYSTIMAX ULL products are available with LazrSPEED 550 (OM4) LazrSPEED 550 wideband (OM5) or TeraSPEED SM fiber.

LazrSPEED 300 and 550 products are identified with an aqua-color jacket and LazrSPEED 550 wideband jackets are lime green. InstaPATCH 360 and SYSTIMAX ULL SM products are identified with a yellow jacket.

InstaPATCH 360 cable assemblies are available in 12-fiber round (IPD) cordage types up to a total fiber count of 144 fibers.

SYSTIMAX ULL cable assemblies are available in 8-fiber, 12-fiber or 24-fiber round (IPD) cordage types up to a total of 144 fibers.

Product Descriptions

Data modules (DM)

Modules are self-contained cable assemblies, within a plastic housing, that transition MPO connectors on the back into duplex LC connectors on the front.

InstaPATCH 360 modules contain male MPO connectors and are intended to be used with InstaPATCH 360 trunk cables. SYSTIMAX ULL modules contain female MPO connectors and are intended to be used with SYSTIMAX ULL trunk cables.

InstaPATCH 360 modules use sequential fibers from the MPO to form duplex LC pairs. This fiber routing requires the modules to be marked with ALPHA and BETA port numbers. The same type of module is used on each end of a link, but one of the modules is in ALPHA position (right side up) and the module on the other end of the link is in BETA position (upside-down). Port 1 will appear at the bottom left position of the module on both ends of the link (see Figure 16).

The internal fiber routing of SYSTIMAX ULL Modules eliminates the need for ALPHA/BETA module marking. SYSTIMAX ULL systems use the same modules on both ends of the link in the same orientation, right side up (no need to flip).

Visual identification of DM modules

InstaPATCH 360 DM modules have a rounded housing with a small color icon on the back, which denotes fiber type. ALPHA/BETA labeling and may have either one or two MPO adapters on the back; see Figure 5. The aqua color denotes OM4 LazrSPEED 550 fiber, lime green color denotes OM5 WB fiber and blue denotes SM.

Figure 5. InstaPATCH 360 DM module

SYSTIMAX ULL DM modules have a squared-off housing with a large, colored bulkhead on the back that denotes fiber type and may have 1, 2 or 3 MPO adapters on the back.
SYSTIMAX ULL DM modules may also be identified by gray-colored latch assists on the front; see Figure 6.

Figure 6. SYSTIMAX ULL DM module

SYSTIMAX ULL module variations

In addition to multiple fiber types, SYSTIMAX ULL modules are also available with one 24-fiber(MMF), two 12-fiber, or three 8-fiber MPOs on the back—and all SYSTIMAX ULL DM modules have 24 LCs on the front, arranged in 12 duplex LC ports differently based on MPO type.

SYSTIMAX ULL modules with two 12-fiber MPOs are similar to InstaPATCH 360 modules with two 12-fiber MPO adapters on the back, but due to internal fiber routing changes that eliminate the need for ALPHA/BETA, port labeling has changed on the front and the rear. The MPO ports are simply numbered 1 and 2 and the duplex LC ports are numbered 1-12 starting in the lower left corner. Fibers in MPO port 1 correspond to duplex LC ports 1-6 (bottom row), whereas fibers in MPO port 2 correspond to duplex LC ports 7-12 (top row); see Figure 7.

DM12-24LC-LS-UL

Figure 7. SYSTIMAX ULL 12-fiber MPO module

SYSTIMAX MMF ULL modules are also available with a single 24-fiber MPO on the back. The duplex LC ports are numbered 1-12 starting in the lower left corner (same as 12-fiber MPO version); see Figure 8.

DM24-24LC-WB-ULL

Figure 8. SYSTIMAX ULL 24-fiber MPO module

SYSTIMAX ULL modules are also available with three 8-fiber MPOs on the back. In this version, the duplex LC ports are arranged differently. They are arranged in three groups of four, identified by the color of the LC doors. The duplex LC ports within each group are numbered 1-4, starting in the upper left corner and ending in the lower right. Each group of LC ports corresponds to one of the 8-fiber MPOs on the back. Starting on the left, the first group of LC ports correspond to MPO 1; the middle group to MPO 2; and the last to MPO 3; see Figure 9.

DM08-24LC-WB-ULL

Figure 9. SYSTIMAX ULL eight-fiber MPO module

MPO adapter panels (pass-through panels)

MPO adapter panels are panels that mount into shelves—similarly to modules—and contain up to eight aligned-key MPO adapters. These are used to connect trunk cables to equipment cords, fanout cables and trunk extensions. InstaPATCH 360 and SYSTIMAX ULL use the same MPO adapter panels; see Figure 10.

360DP-8MPO

Figure 10. MPO adapter panel

MPO-MPO trunk cables

Trunk cables are high-density ruggedized fiber cables used to distribute large numbers of fiber from one area of installation to another. Trunk cables have between one and 12 subunits surrounded by a ruggedized over-jacket. Subunits can contain 8, 12 or 24 fibers. InstaPATCH 360 has fiber counts in multiples of 12, up to a total of 144 fibers, whereas SYSTIMAX ULL trunks are available in multiples of 8, 12 or 24 fibers, up to a total of 144 fibers.

All InstaPATCH 360 and SYSTIMAX ULL trunk cables follow Type B polarity. InstaPATCH 360 trunks are low-loss, whereas SYSTIMAX ULL trunks are ultra-low-loss performance.

> InstaPATCH 360 trunks have *female unpinned* MPO connectors on both ends for connection to InstaPATCH 360 modules or MPO adapter pass-through panels.
>
> SYSTIMAX ULL trunks have *male pinned* MPO connectors on both ends for connection to SYSTIMAX ULL modules or MPO adapter pass-through panels.

MPO(f)-MPO(m) trunk extension cables

Extension cables are used to extend the reach of a 24-fiber MMF trunk cable. Extension cables share the same construction as MPO-to-MPO trunk cables; however, trunk extensions must have female MPOs on one end and male MPOs on the other to mate with the trunk that is being extended. One end will be mated to a trunk and the other end will be mated to a module, fanout or equipment cord.

All extension cords also use Type B polarity, except those with 24-fiber MPOs. The 24-fiber versions are "straight-through" cables that do not alter fiber polarity from one end to the other; see Figure 11.
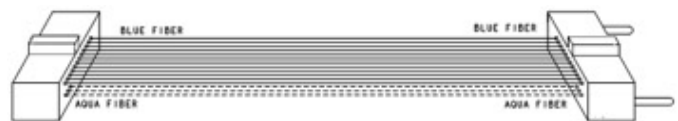

Figure 11. 24-fiber trunk extension fiber polarity

EHD Modules

Figure 12. SYSTIMAX EHD EHD08-DM-24LC-LS-B-ULL

Two EHD distribution modules fit into one EHD blade. Cassettes are available in LazrSPEED 550, LazrSPEED 550 WB and TeraSPEED fiber.

Figure 14. SYSTIMAX EHD 24-DM-24LC-WB-B_ULL

EHD TeraSPEED modules are available in 2X12f to 24LC and 3X8f to 24LC. EHD LazrSPEED 550 and 550 WB are available in 1X24f to 24LC, 2X12f to 24LC and 3X8f to 24LC.
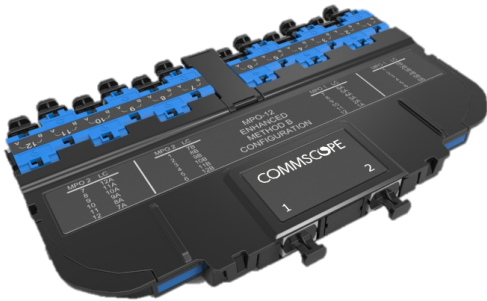

Figure 13. SYSTIMAX EHD12-DM-24LC-SM-B-ULL

Figure 15. SYSTIMAX Splice module

EHD Splice modules are available in LazrSPEED OM4 and TeraSPEED SM with stranded and ribbon fiber options.

MPO-MPO cross-connect cables

Cross-connect cables serve the function of an array "jumper" between two MPO trunks terminated in MPO adapter panels. Cross- connect cables share the same construction and are available with the same options as trunk and extension cables.

> InstaPATCH 360 cross-connects have male pinned MPO connectors on both ends for patching between InstaPATCH 360 trunks.
>
> SYSTIMAX ULL trunks have female unpinned MPO connectors on both ends for connection to SYSTIMAX ULL modules' trunks.

Ruggedized fanout cables

Ruggedized fanout cables—also known as hydra cables, direct attach or breakout cables—are used to transition MPO connectors into simplex or duplex connectors for direct connection to electronic equipment. Depending on application, fanout cables can be configured with either a male or female MPO. Care must be taken to order the correct fanout type or an incompatible mating will result. Ruggedized fanout cables use the same cable and construction as trunks' cables, but the total fiber count is limited to 96. These cables are typically used when cable routing exits the cabinet or rack.

> InstaPATCH 360 ruggedized fanout cables are available with LC, SC or ST connectors; SYSTIMAX ULL ruggedized fanouts are available only with LC connectors.

Array/equipment cables

Array cables, also known as equipment cables, are light-duty, single- subunit cables used to connect trunks or modules to electronic equipment. Array cables can be configured with MPO connectors on both ends—or on just one end with simplex or duplex connectors on the other.

SYSTIMAX InstaPATCH array cables are available with either 12-fiber or 24-fiber MPO connectors. SYSTIMAX ULL array cords are available with 8-fiber (gray), 12-fiber (black) or 24-fiber (red) MPO connectors. 8-fiber and 12-fiber cords are 3.0 millimeters in diameter and 24-fiber cords are 3.6 millimeters. These cables are used typically when cable routing remains within the rack or cabinet.

> InstaPATCH 360 array fanout cables are available with LC, SC or ST connectors, SYSTIMAX ULL array fanout cables are available only with LC connectors.
>
> SYSTIMAX ULL MPO-MPO array cables have female MPO connectors on each end, thus eliminating the possibility of plugging a male MPO into and damaging electronic equipment.

Comparison of Method B polarity to enhanced Method B

Due to its topology independence and ease of implementation, CommScope has long been an advocate of Method B polarity for MPO-based systems. InstaPATCH 360 requires the use of ALPHA/ BETA modules. ALPHA/BETA is describing the flippable orientation of the modules when they are installed in a shelf or panel. One module is in ALPHA orientation and the other module is in BETA. Flipping modules keeps like-numbered ports in the same place on both ends of a channel; see Figures 16 and 17. (Port 1 will always be bottom left on the module.)

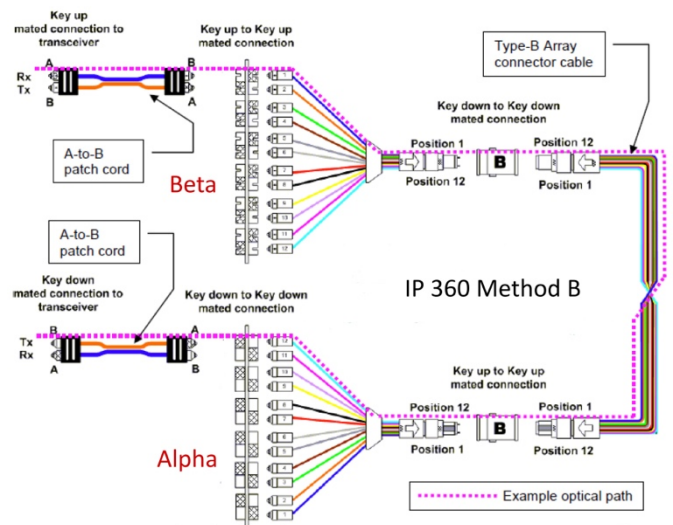Figure 16. ALPHA/BETA modules used in InstaPATCH 360

Figure 17. InstaPATCH 360 Method B

SYSTIMAX ULL uses Enhanced Method B polarity, which still uses Method B trunks and aligned key adapters, but the fiber routing within the modules is different eliminating the requirement for ALPHA/BETA labeling and flipping of modules; see Figures 18 and 19.

Figure 18. Modules used in SYSTIMAX ULL

Figure 19. SYSTIMAX ULL enhanced Method B

SM ferrule angle and InstaPATCH 360 Method B

SM MPO connectors are polished with an 8-degree angle on the connector ferrule. This angle is there to improve return loss (RL) performance, giving RL measurements of -55 decibels or better. Since Method B polarity requires the use of aligned-key MPO adapters, male and female MPO connectors used in InstaPATCH 360 cable assemblies are angled in opposite directions. Male MPO connectors (MX) are angled down relative to the key and female connectors (MP) are angled up, as illustrated in Figure 20.
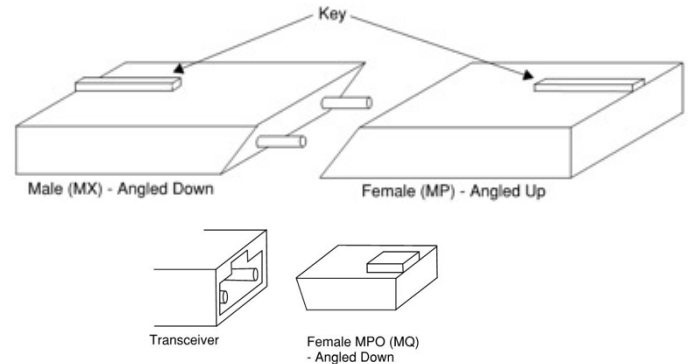

Figure 20. InstaPATCH 360 SM MPO angle orientation

These opposing angles ensure physical contact between fibers when the connectors are mated together; however, when an equipment connection is required, the female MPO connector must match the angle of the electronic equipment. All SM MPO-based transceivers are designed to accept female MPO connectors with down angles. As a result, a third MPO variant was introduced for InstaPATCH 360 SM MPO equipment cables. This down-angled female MPO connector is identified in InstaPATCH 360 systems with the code "MQ." MQ connectors are identical in every respect to MP connectors except for the direction of the angle—making them compatible with SM transceivers but incompatible with MX connectors.

SM InstaPATCH 360 array/equipment cables must be ordered with an MQ connector on one end.
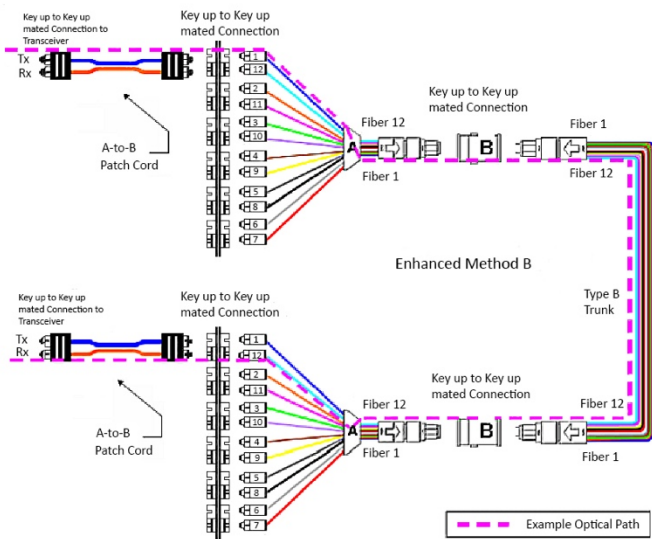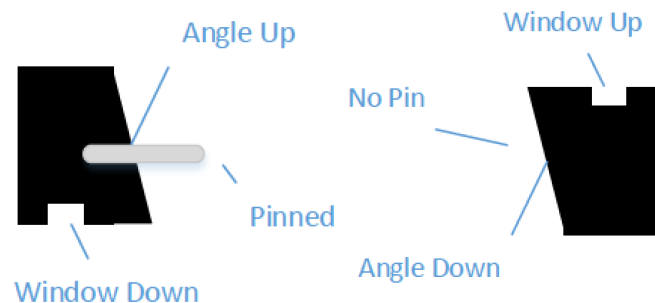
SM ferrule angle and SYSTIMAX ULL Enhanced Method B

For Enhanced Method B the angles on SM MPO connectors have been reversed. Male connectors are angle up relative to the key and female connectors are angled down. This eliminates the need for special MPO connectors to interface with electronics.

Conversion Modules (CM)

Conversion Modules are modules that have pinned MPO connectors on the front and unpinned MPO connectors on the rear. The purpose of a conversion module is to convert from an 8-fiber system to a 12-fiber system. This allows for 100% fiber utilization when sending signals from 8-fiber transceivers, such as QSFP, over 12-fiber trunks. A CM module allows for three 8-fiber transceivers to use two 12 fiber trunks without any dark fiber.

InstaPATCH 360 CM modules must be used in pairs in an ALPH/BETA configuration.

InstaPATCH 360 CM modules come in both SM and OM4 MM. They are both available in a 2x3 or double density 4x6 configurations.

SYSTIMAX ULL CM modules use the same square back housing as the InstaPATCH CM modules. The SYSTIMAX ULL version can be visually identified by gray-colored latch assists on the front and they do not have ALPA/BETA port labelling. They have pinned MPO connectors on the front and unpinned MPO connectors on the rear.

SYSTIMAX ULL CM modules are available in OM4 (Aqua), OM5 (Lime Green in color) and SM (Blue in color)
SYSTIMAX ULL CM Modules are available with either two 12-fiber MPOs or a single 24-fiber MPO on the back.
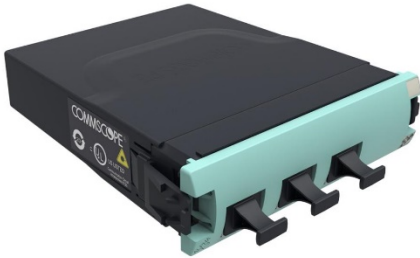
360CM12-2x3-LS Front View

CM12-2x3-LSOM4 ULL Front View

360CM-2x3-LS Rear View

CM12-4X6-SM ULL Front View

360CM12-4X6-TS Front View

CM12-4X6-SM ULL Rear View

360CM12-4X6-TS Rear View

SYSTIMAX ULL CM module variations

Specialty 24-fiber Cable Assemblies
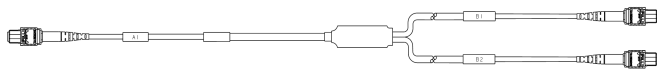
IP360 1X2 Bi-furcated Fanouts

1x2 Bi-furcated Fanouts uses a 24-fiber cable that has a single 24-fiber MPO connector on End A. End B is furcated out to two 12-fiber MPO connectors.

This cable allows 24-fiber transceivers to work with two 12-fiber trunks. The 24-fiber MPO connector is always female (connector code 2P), but the 12-fiber MPO connectors may be either male or female, depending on the application. Connector code CP or CX are used for IP360 assemblies.

SYSTIMAX ULL 1X2 Bi-Furcated Fanouts
The ULL 24-fiber MPO connector is always female (connector code 2C) with the 12-fiber connectors male or female (connector codes MP and MX).

1X2 Bi-furcated fanouts with OM4 fiber are available in both InstaPATCH and SYSTIMAX ULL. OM5 versions are only available in SYSTIMAX ULL.

1X3 Tri-furcated Fanouts

Similar to the 1X2 Bi-furcated fanout, the 1X3 Tri-furcated Fanout uses a 24-fiber cable and a 24-fiber MPO connector on End A (connector code 2P or 2X), but End B is furcated out to three 8-fiber MPO connectors which may be either male or female, depending on the application (connector code QP or QX).

1X3 Tri-furcated fanouts with OM4 and SM fiber are available in both InstaPATCH. OM5 is only available in SYSTIMAX ULL.
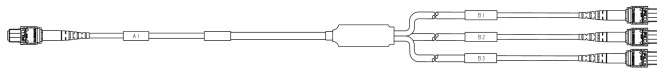
2x3 Fanouts

2X3 Fanouts serve much the same purpose as CM Modules in that they allow three 8-fiber transceivers to be used with two 12-fiber trunks with 100% fiber utilization.

2X3 fanouts use a 24-fiber cable that is furcated out to three female 8-fiber MPO connectors.

	End A MM	End B MM	End A SM	End B SM
IP360	QP	PP, PX	QQ	PP, PX
ULL	QP	MP, MX	QP	MP, MX

2X3Fanouts with OM4 and SM fiber are available in InstaPATCH. OM4, OM5 and SM versions are available in SYSTIMAX ULL.

24f 2C- CXP/CFP Equipment Cables

2C-CP Equipment Cables are 24-fiber cables with one 24-fiber MPO 2C connector on end "A" connecting a CXP/CFP transceiver to the back of an MPO24 CM module or breakout array. "B" end connectors are 2P or 2X.

Labeling of duplex ends of rugged and array fanout cables

The duplex connector ends of InstaPATCH 360 rugged or array fanout cables are identified with both "ALPHA" and "BETA" labels to maintain correct port mapping, depending on which end of a link they are installed; see Figure 21.
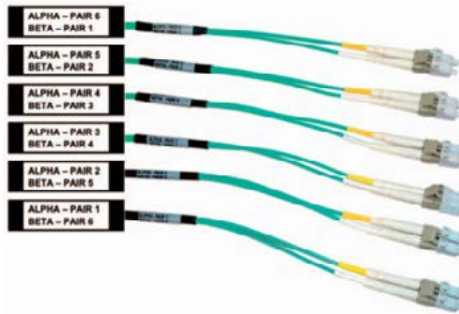
Figure 21. Labeling of duplex end of InstaPATCH 360 fanout cables

SYSTIMAX ULL fanout cables do not have ALPHA/BETA labeling; they are simply labeled as Pair 1, Pair 2, Pair 3, etc.

When an InstaPATCH 360 fanout cable is connected to an InstaPATCH 360 module that is in the "ALPHA" orientation, the duplex connector sequencing follows the "BETA" duplex labeling. Conversely, when the module is in "BETA" orientation, the duplex connectors follow the "ALPHA" labeling. Both configurations are illustrated in Figure 22.
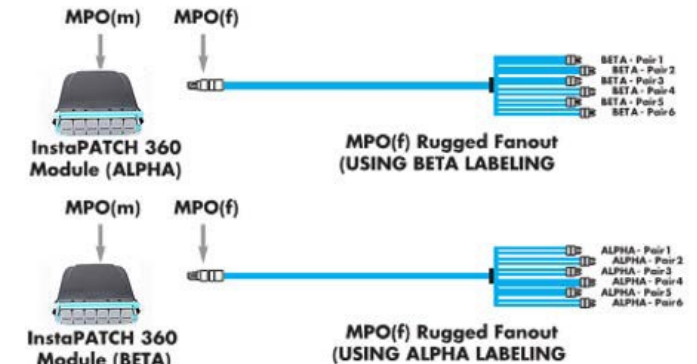
Figure 22. InstaPATCH 360 module orientation and use of ALPHA/BETA labeling in fanout cables.

Typical MPO configurations for InstaPATCH 360 systems

Using trunks to interconnect to modules

The simplest configuration connects two modules with a single trunk. InstaPATCH uses ALPHA/BETA modules and trunks with female MPO connectors.
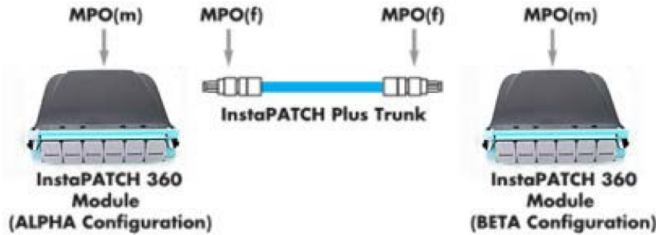

Figure 23. InstaPATCH 360 modules in ALPHA/BETA orientation

Using trunk extension cables

With use of an aligned-key MPO adapter, extension cables can be used to increase the reach of existing trunks.

Figure 24. InstaPATCH 360 extension cables

Using MPO-MPO array/equipment cables

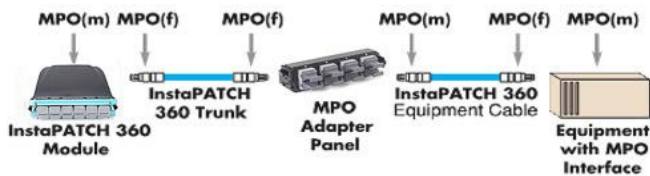Array/equipment cables connect trunks to electronic equipment through MPO adapter panels.

Figure 25. InstaPATCH 360 array/equipment cables

Note—for SM InstaPATCH applications, the MPO connector mating to equipment must have the "MQ" connector code.

Using cross-connect cables

Cross-connect cables serve the function of an array "jumper" between two MPO trunks terminated in MPO adapter panels, as illustrated in Figure 20.
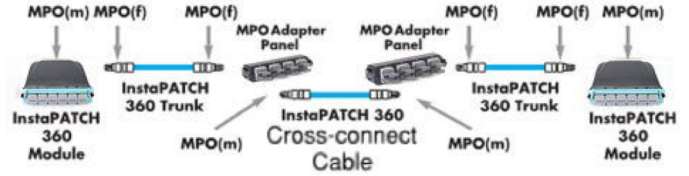

Figure 20. InstaPATCH 360 cross-connect cable

Using rugged or array fanout cables with modules

When fanout cables mate to InstaPATCH 360 modules, as illustrated in Figure 26, the fanout MPO must be female.

Figure 26. InstaPATCH 360 MPO(f) fanout cable

Using rugged or array fanout cables with trunks

Fanout cables are available with either male MPO or female MPO connectors for nearly unlimited network design possibilities. The network designer must correctly specify the MPO pin configuration.

When fanout cables mate to InstaPATCH 360 trunks through an MPO adapter panel, the fanout must have a male MPO connector; see Figure 27.
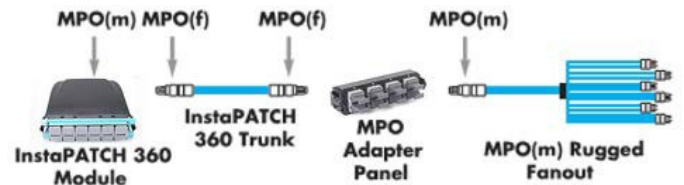
Figure 27. InstaPATCH 360 MPO(m) fanout cable

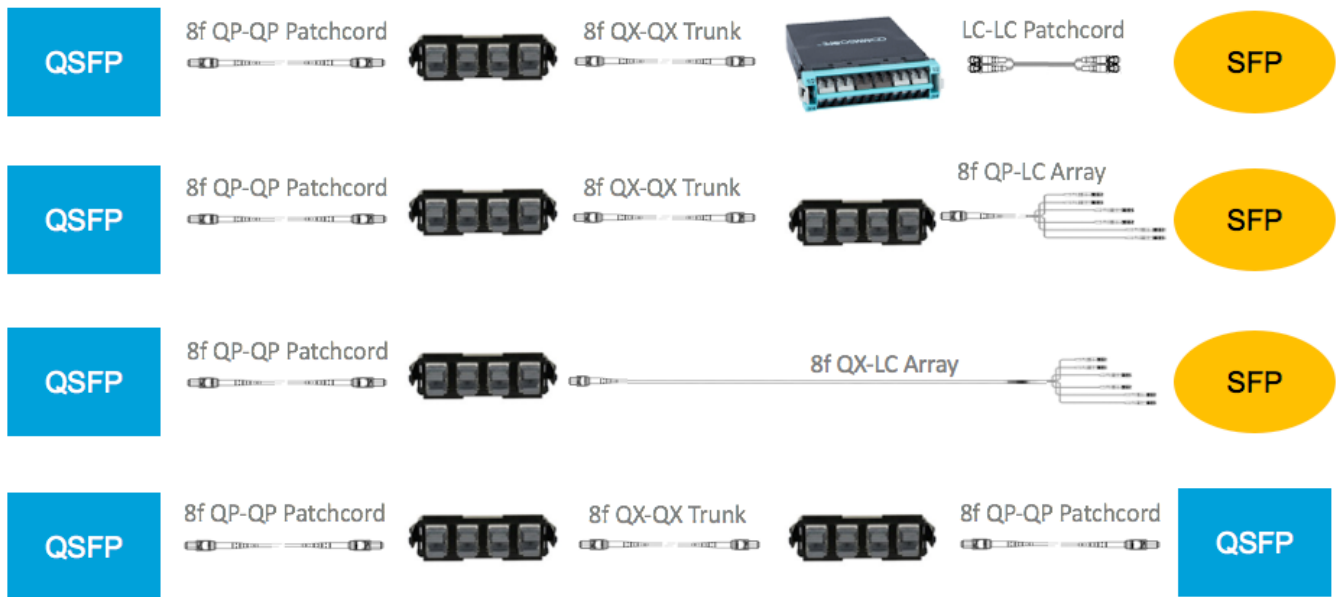# SYSTIMAX ULL Enhanced Method B MPO Configurations

SYSTIMAX ULL Distribution Modules (DM), Conversion Modules (CM), Ruggedized Array and Array cables in 8f- and 12f configuration utilize Enhanced Method B. These components may be configured together in many combinations. Polarity management is designed in for all multimode and singlemode components.

MPO8 Duplex configurations
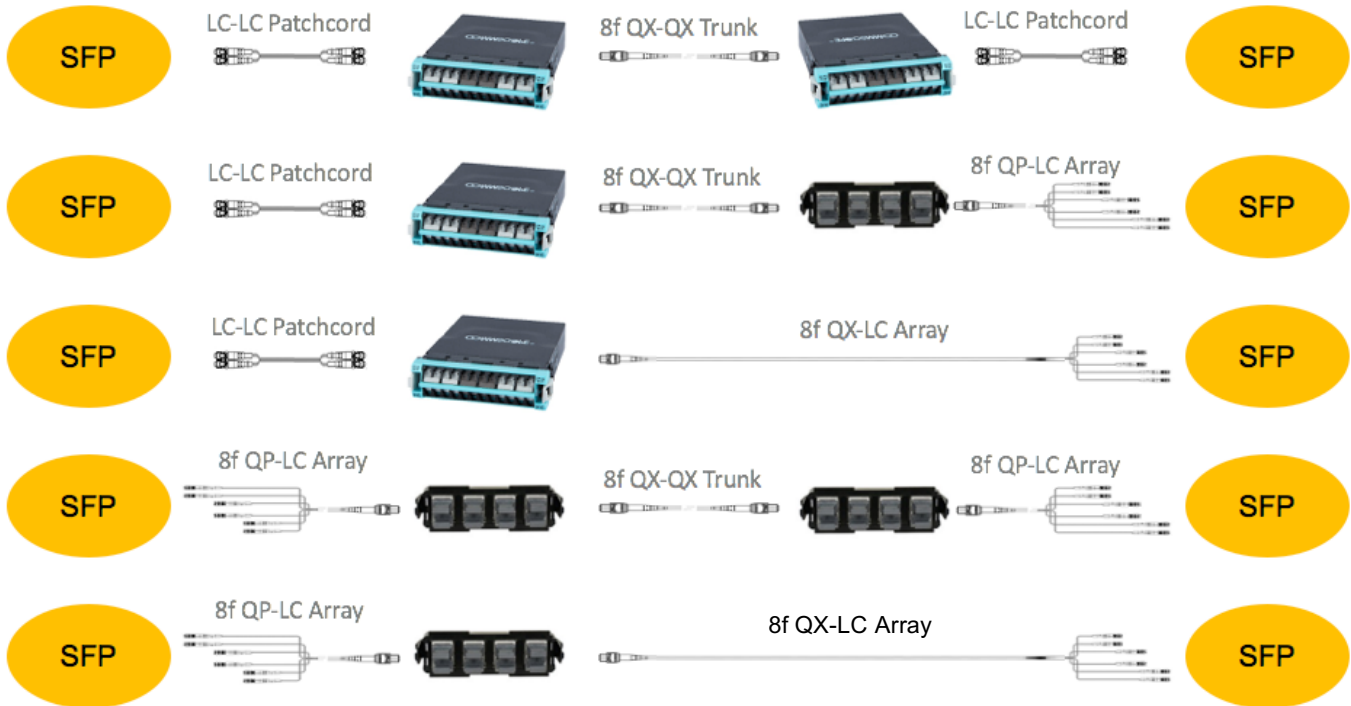
MPO8 QSFP Configurations

MPO12 Duplex Configurations

SFP	LC-LC Patchcord	12f MX-MX Trunk		LC-LC Patchcord	SFP
SFP	LC-LC Patchcord	12f MX-MX Trunk		12f MP-LC Array	SFP
SFP	LC-LC Patchcord	12f MX-LC Array			SFP
QSFP	8f QP-QP Patchcord	12f MX-MX Trunk		LC-LC Patchcord	SFP
QSFP	8f QP-QP Patchcord	12f MX-MX Trunk		12f MP-LC Array	SFP
QSFP	8f QP-QP Patchcord	12f MX-LC Array			SFP

MPO12 QSFP

QSFP	8f QP-QP Patchcord	12f MX-MX Trunk		8f QP-QP Patchcord	QSFP
QSFP	8f QP-QP Patchcord	12f MX-QP 2X3 Array			QSFP
QSFP	8f QP-QP Patchcord	12f MX-MX Trunk		12f MP-QP 2X3 Array	QSFP
QSFP	12f MP-QP 2X3 Array	12f MX-MX Trunk		12f MP-QP 2X3 Array	QSFP
QSFP	12f MP-QP 2X3 Array	12f MX-QP 2X3 Array			QSFP

MPO24 Duplex

SFP	LC-LC Patchcord		24f 2X-2X Trunk		LC-LC Patchcord	SFP

SFP	LC-LC Patchcord		24f 2X-2X Trunk	24f 2P-LC Array SFP

SFP	LC-LC Patchcord	24f 2X-LC Array	SFP

MPO24 QSFP/Duplex

QSFP	8f QP-QP Patchcord		24f 2X-2X Trunk		LC-LC Patchcord	SFP

QSFP	8f QP-QP Patchcord		24f 2X-2X Trunk	24f 2P-LC Array SFP

QSFP	8f QP-QP Patchcord	24f 2X-LC Array	SFP

MPO24 QSFP

QSFP	8f QP-QP Patchcord		24f 2X-2X Trunk		8f QP-QP Patchcord	QSFP

QSFP	8f QP-QP Patchcord		24f 2X-2X Trunk	24f 2P-QP 1X3 Array QSFP

QSFP	8f QP-QP Patchcord	24f 2X-QP 1X3 Array	QSFP

QSFP	24f 2P-QP 1X3 Array		24f 2X-2X Trunk	24f 2P-QP 1X3 Array	QSFP

QSFP	24f 2P-QP 1X3 Array	24f 2X-QP 1X3 Array	QSFP

MPO24 CXP/CFP

CXP	24f 2C-2X Patchcord		8f QP-QP Patchcord	QSFP

CXP	24f 2C-2X Patchcord		LC-LC Patchcord	SFP

CXP	24f 2C-2X Patchcord		8f QP-LC Array	SFP

CXP	24f ULL 2C-2C		CXP
	- OR -	24f LL 2P-2P	

Instapatch 360 Basic configuration rules

InstaPATCH® 360 Rule Number 1:
In each mated pair of MPO connectors there shall be an MPO(m) connector, an MPO(f) connector and an aligned-key MPO adapter (keying option k=2, key-up to key-up).

InstaPATCH® 360 Rule Number 2:
Adding or removing MPO pins in the field is not allowed.

InstaPATCH® 360 Rule Number 3:
Any direct connection to an InstaPATCH® 360 shelf or Module, or to an MPO optical array transceiver shall be made with an MPO(f) connector.

InstaPATCH® 360 Rule Number 4:
In order to maintain simple port management and mapping, all InstaPATCH® 360 links should consist of an "ALPHA" oriented module/shelf/fanout on one end of the link to a "BETA" oriented module/shelf/ fanout on the other end of the link.

InstaPATCH® 360 Rule Number 5:
Any InstaPATCH® 360 connection to traditional InstaPATCH® 360 trunks terminated in MPO Adapter panels shall be made with an MPO(m) connector.

InstaPATCH® 360 Rule Number 6:
When an InstaPATCH® 360 rugged Fanout is connected to a module or shelf that is in the "ALPHA" orientation, the duplex connector sequencing follows the "BETA" duplex labelling. Conversely, when an InstaPATCH® 360 rugged Fanout is connected to a module or shelf that is in the "BETA" orientation, the duplex connector sequencing follows the "ALPHA" duplex labelling.

InstaPATCH® 360 Rule Number 7:
Only SYSTIMAX solutions® factory-manufactured InstaPATCH® 360 components shall be used in an InstaPATCH® 360 channel or link.

SYSTIMAX ULL basic configuration rules

SYSTIMAX ULL Rule Number 1:
In each mated pair of MPO connectors there shall be an MPO(m) connector, an MPO(f) connector and an aligned-key MPO adapter (keying option k=2, key-up to key-up).

SYSTIMAX ULL Rule Number 2:
Adding or removing MPO pins in the field is not allowed.

SYSTIMAX ULL Rule Number 3:
Any SYSTIMAX ULL direct connection to an DM or CM or EHD Module, or to an MPO optical array transceiver shall be made with an MPO(f) connector.

SYSTIMAX ULL Rule Number 4:
Any connection to SYSTIMAX ULL trunks terminated in MPO Adapter panels shall be made with an MPO(f) connector.

SYSTIMAX ULL Rule Number 5:
Only SYSTIMAX solutions® factory-manufactured components shall be used in an SYSTIMAX ULL channel or link.

Everyone communicates. It's the essence of the human experience. *How* we communicate is evolving. Technology is reshaping the way we live, learn and thrive. The epicenter of this transformation is the network—our passion. Our experts are rethinking the purpose, role
and usage of networks to help our customers increase bandwidth, expand capacity, enhance efficiency, speed deployment and simplify migration. From remote cell sites to massive sports arenas, from busy airports to state-of-the-art data centers—we provide the essential expertise and vital infrastructure your business needs to succeed. The world's most advanced networks rely on CommScope connectivity.

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