Application Note
ASCEND™ Connectivity Solutions — Polarity Method F

This Application Engineering Note will discuss several connectivity solutions utilizing AFL's ASCEND platform. This platform provides connectivity solutions where high density is required, including Base-8, Base-12, Base-24, and WDM applications. This note will specifically address the default polarity of the ASCEND platform, as well as basic architecture of systems with both SFP and QSFP transceivers.

Polarity

To ensure that a network functions properly, the transmit port on one end of the link must be connected to the receive port on the other. This can be accomplished through a variety of fiber polarity methods, such as the examples provided in the TIA standards—Method A, Method B, and Method C. The ASCEND platform features a unique polarity method, known as Method F.

Whereas most methods maintain polarity by configuring specific patch cords and/or trunks to accommodate pair flips, Method F polarity uses one type of patch cord, cassette, and trunk cable throughout the entire system to maintain polarity. The wiring within the cassette is managed to prevent the need for polarity-specific components, thus allowing for reduced complication in ordering, stocking, and installation.

TIA standards call out two types of patch cords—an A-to-A style and an A-to-B style. The Method F polarity scheme utilizes A-to-B type patch cords. This type of patch cord is depicted below in Figure 1 where the red arrow visualizes light traveling from point A to point B.

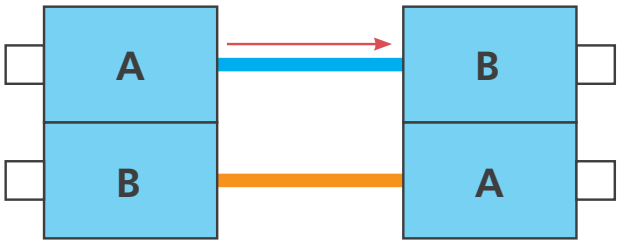

Figure 1—A-to-B Type Patch Cords

Method F polarity requires that each cassette be internally configured in a way that pairs the first and last fibers of the array together for Tx/Rx pairs. The sequence is as follows: 1, 12, 2, 11, 3, 10, 4, 9, 5, 8, 6, 7. In a practical sense, this can be imaged by taking a 12 fiber array, folding it in half, and pairing the fibers together. Figure 2 shows how the wiring is configured inside of cassettes to establish Method F polarity.

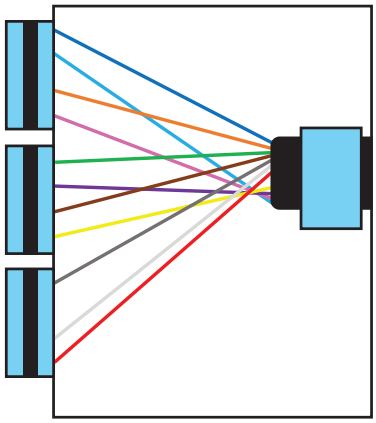

Figure 2—Method F Polarity Cassette Wiring

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All MPO to MPO connections in a Method F network are mated Key-Up to Key-Down, as shown in Figure 3. As a result of this mating requirement, all trunk cable assemblies are configured Key-Up to Key-Up. This understanding of polarity is used in the following section to discuss connectivity solutions with the ASCEND platform.

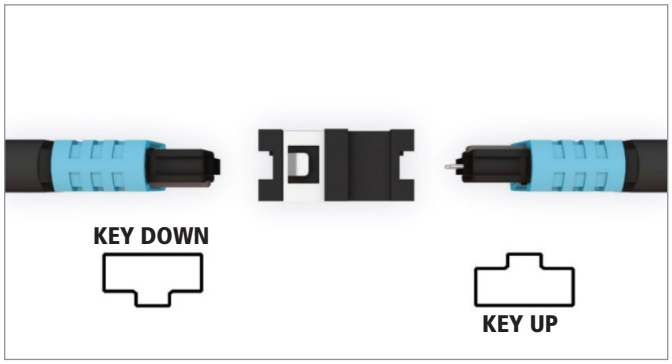

Figure 3—Key-Up to Key-Down Mating

Specific Connectivity Solutions

Two common applications of the ASCEND platform are implementing a network using SFP and QSFP transceivers. SFP (Small Form-Factor Pluggable) transceivers make use of duplex transmission links to connect the network. AFL's ASCEND platform offers patch cords terminated with Uniboot LC connectors on each end to make the connection between the SFP transceivers in a network. The configuration shown in Figure 4 represents two SFP transceivers connected by a single ASCEND patch cord assembly. Because the patch cord is made with interconnect style cable, this method of connection is only advised for short distances where the cable will not be placed in a tray or rack with larger, heavier cables.

Figure 4—Basic SFP to SFP Connection

For longer distance connections, such as those made between cages or distribution areas, pre-terminated trunk cables are used. Figure 5 represents a network that utilizes a trunk cable assembly to span the majority of the distance between the two transceivers.

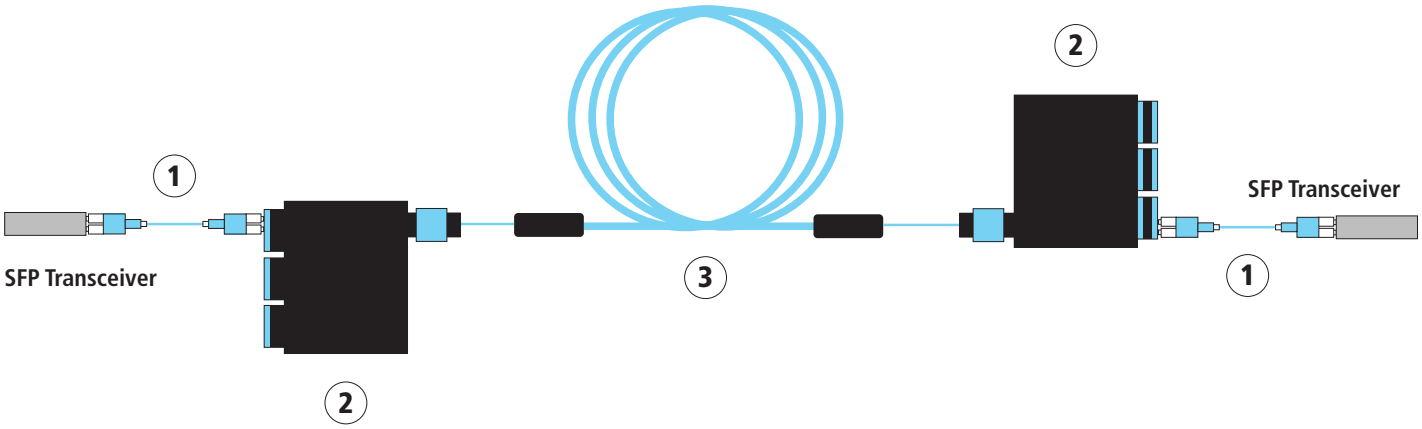

Figure 5—SFP to SFP Trunk Cable Connection

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Components of Figures 5 and 6

ITEM	PRODUCT
1	ASCEND Patch Cord
2	ASCEND Fanout Cassette
3	ASCEND Trunk Cable Assembly

The table corresponding to Figure 5 summarizes the numbered links in the connection. An ASCEND patch cord runs from the left-most SFP transceiver to an ASCEND Fanout Cassette, which features Method F polarity. This fanout cassette is designed to fit inside of a rack-mounted ASCEND housing. An ASCEND trunk cable assembly is then connected Key-Up to the MPO port of the cassette and is routed through to the next ASCEND housing where it connects Key-Up to another fanout cassette. A second patch cord is then used to complete the link from the cassette to the right-most SFP transceiver.

Figure 6 uses red arrows to assist in visualizing the path that light takes from the transceiver to the receiver in systems such as the one discussed above. The white squares on the trunk MPO connectors indicate that the connectors are plugged in Key-Up.

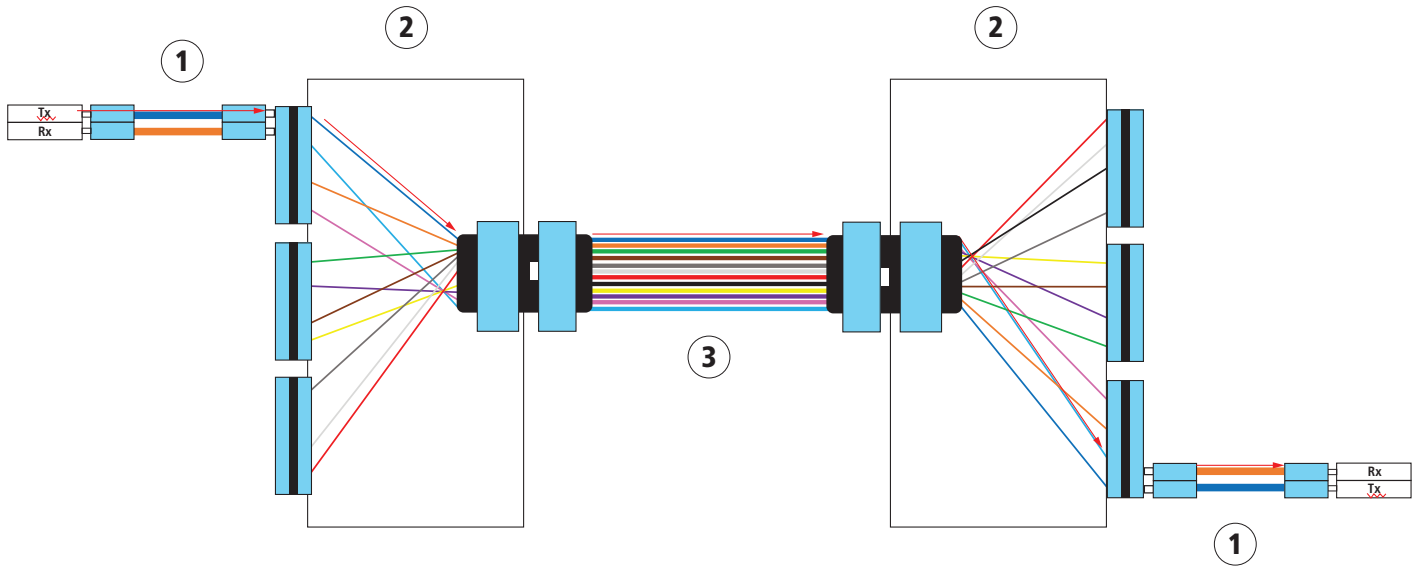

Figure 6—SFP to SFP Trunk Cable Connection Polarity

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QSFP (Quad Small Form-Factor Pluggable) transceivers follow similar logic to SFP transceivers with one major difference – rather than having a duplex transmission link between two transceivers, a parallel transmission link is introduced that allows for increased capacity of an SFP transceiver. Instead of connecting patch cords terminated with duplex LC connectors to the transceiver, MPO patch cords are used. Figure 7 depicts a QSFP to QSFP network that is connected using MPO patch cords, MPO patch modules, and a MPO trunk cable assembly. The table corresponding to Figure 7 summarizes the links in the QSFP to QSFP network.

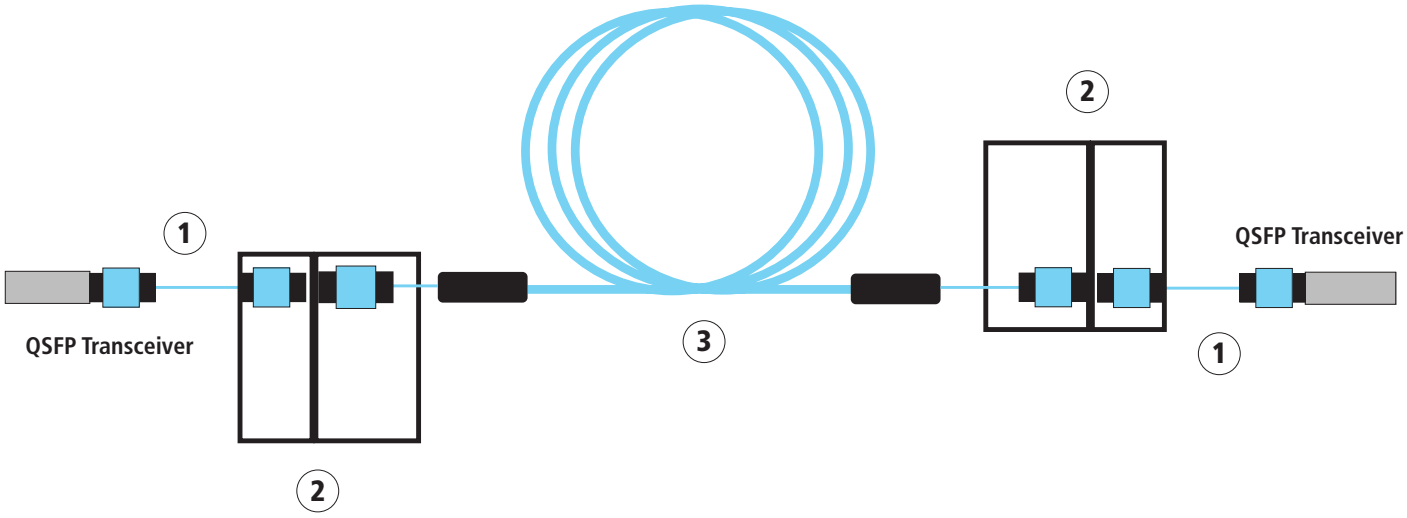

Figure 7—QSFP to QSFP Connectivity

Components of Figure 7

ITEM	PRODUCT
1	ASCEND MPO Patch Cord
2	ASCEND MPO Fanout Cassette
3	ASCEND Trunk Cable Assembly

Gender Compatibility

The ASCEND platform utilizes a specific gender configuration between the trunks and cassettes. When purchasing standard ASCEND products, all trunk cable assemblies will be unpinned (female) while the cassettes will be pinned (male). Multimode ASCEND trunk cable assemblies will utilize MTP® PRO* connectors that allow for the gender to be reversed in the field if needed.

*MTP® PRO Connectors are a trademark of US Conec.