

The migration path from 10G to 40G
and beyond for InstaPATCH® 360,
InstaPATCH® Plus and ReadyPATCH®
installations

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Introduction

CommScope® offers a variety of pre-terminated fiber solutions that utilize multi-fiber connectors to facilitate rapid deployment of fiber networks in data centers and other high-density environments. Within the SYSTIMAX® brand, these solutions are InstaPATCH 360 and InstaPATCH Plus. The Uniprise® solution is ReadyPATCH.

At the core of all of these solutions is the MPO (Multi-fiber Push On) connector. This connector is defined by IEC-61754-7, "Fiber-optic interconnecting devices and passive components — Fiber-optic connector interfaces — Part 7: Type MPO connector family"; and TIA-604-5-D, "Fiber-Optic Connector Intermateability Standard, Type MPO".

For Ethernet networking speeds up to 10GB/s, the most common transmission schemes for multimode fiber utilize serial transmission. A typical channel is made of two fibers, with one fiber to carry traffic in each direction. When using multi-fiber connectors, polarity management is necessary to maintain proper send/receive orientation and port numbering at each end of the channel. All of the CommScope solutions are designed around the polarity management method described in ANSI/TIA-568-C as Method B.

For Ethernet networking speeds above 10GB/s, the applications standards are specifying parallel optics for multimode fiber networks. IEEE 802.3ba defines the transmission schemes for 40GB/s and 100GB/s. The interfaces for these higher speeds are based on the MPO connector. As such, it is a relatively simple process to upgrade a CommScope pre-terminated solution from 10GB/s to 40GB/s or even 100GB/s.

CommScope solution overview

Within the SYSTIMAX brand, CommScope currently offers the InstaPATCH 360 fiber solution as the primary pre-terminated solution. From 2003 through 2009, the primary offering within the SYSTIMAX brand was InstaPATCH Plus.

There are two main differences in the InstaPATCH 360 and InstaPATCH Plus solutions. First, the size of the module was reduced with InstaPATCH 360 to improve the maximum fiber density in a given rack space. The other change for InstaPATCH 360 was an improvement in connection loss, which allows for longer application support and more flexible network designs.

Of particular note, the polarity management method was unchanged. As such, with proper mounting hardware to address the module size difference, the InstaPATCH 360 and InstaPATCH Plus components can be installed in the same channels without polarity concerns. The only impact to the system would be found in the channel loss expectations. If it is necessary to mix the solutions within an installation, performance would be dictated by the lower solution support limits.

The ReadyPATCH solution was introduced into the Uniprise brand in 2008. This solution was identical to the InstaPATCH Plus solution except for some variations in performance and some aesthetic features. In 2011, the ReadyPATCH solution was upgraded to be identical to the InstaPATCH Plus offering. This was done as part of the end-of-life strategy for InstaPATCH Plus. As such, the current CommScope solution offering only includes SYSTIMAX InstaPATCH 360 and Uniprise ReadyPATCH. For legacy installations with InstaPATCH Plus components, the ReadyPATCH components can be used to support the existing footprint. Optionally, InstaPATCH 360 components can be used with appropriate mounting hardware.

InstaPATCH 360: The traditional two-fiber application channel

In its basic form, a traditional two-fiber application pre-terminated channel is made up in the following way:

- MPO trunk cables make up the permanent link portion of the channel. This trunk cable may include fiber counts from 12 to 144 fibers in 12-fiber increments.
- At each end of the trunk, modules are used to convert the MPO connection on the trunk into multiple two-fiber appearances at the patch panel. These modules can have LC (most common), SC or ST connectors for the duplex channel support.
- Two-fiber patch cords are plugged into the modules to connect devices or perform a cross-connect in a patching field.

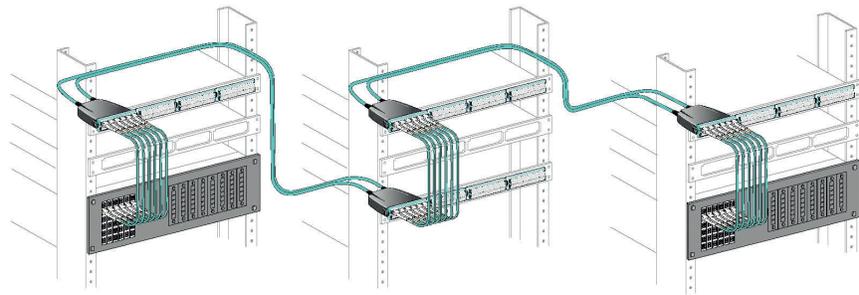


Figure 1: This is the traditional two-fiber application channel with InstaPATCH 360.

In Figure 1:

The trunk cables are LazrSPEED® 550 InstaPATCH 360 trunk cables with 24 fibers (FGXMPMPAF).

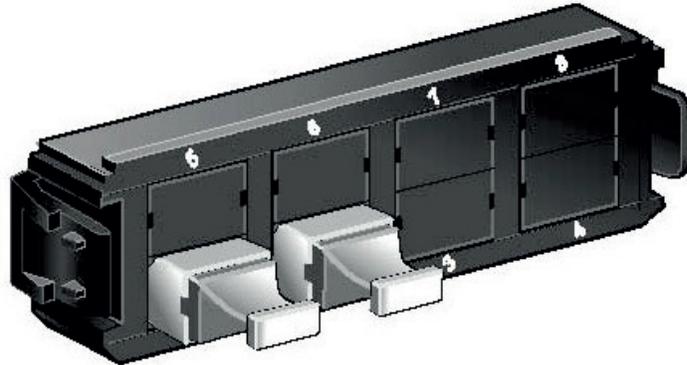
The modules are InstaPATCH 360 LazrSPEED standard modules with 24 LC ports (360DM-24LC-LS).

The patch cords are LazrSPEED 550 LC to LC, fiber patch cord, 1.6mm duplex, plenum (FDXLCLC42)

Regarding polarity considerations, the TIA Method B system does not require different cords within the channel. With other polarity management methods, it may be necessary to specify different cords at each end of the channel.

InstaPATCH 360: The basic parallel transmission channel

When migrating to 40GB/s, the trunk cables can be re-purposed to carry the parallel optics traffic by removal of the modules and patch cords, replacing them with MPO pass-through panels and MPO equipment cords.



The MPO pass-through panels (shown above) are InstaPATCH 360 Distribution Panel, 360DP-2MPO, 2xMPO (360DP-2MPO).

The equipment cords are LazrSPEED 550 InstaPATCH 360 array cord, MPO (female) to MPO (male) 12-fiber (FQXMPMXGD).

Regarding polarity considerations, the TIA Method B system does not require different cords at each end of the channel. With other polarity management methods, it may be necessary to specify different cords at each end of the channel.

The other consideration that requires attention is the gender of the MPO connector. Specify the equipment cords with one end as an un-pinned MPO (female) and the other end as a pinned MPO (male) connector. The female end will plug into the active equipment. The male end will plug into the pass-through panel adapter.

In the event that the channel contains a cross-connect, specify the array patch cord with pinned MPO (male) connectors on both ends:

The cross-connect cords are LazrSPEED 550 InstaPATCH 360 array cord, MPO (male) to MPO (male), 12-fiber (FQXMXMXGD).

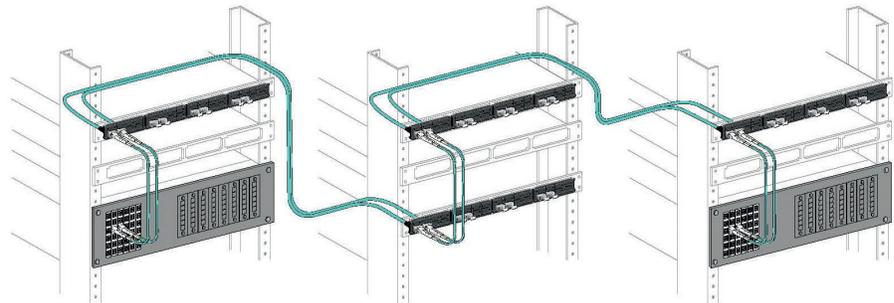


Figure 2: This is the basic parallel transmission channel with InstaPATCH 360.

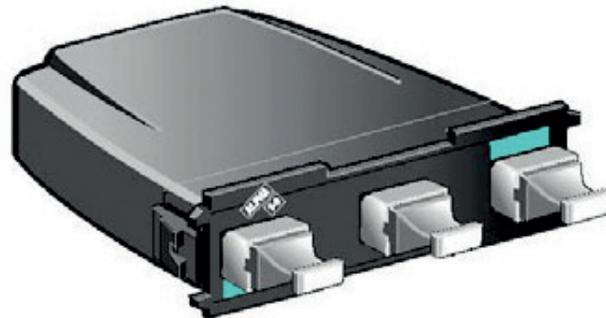
InstaPATCH 360: The optimized parallel transmission channel

The IEEE 802.3an application standards for 40GB/s utilize a 4x4 parallel transmission scheme. This application uses eight fibers (four for transmit and four for receive), but is designed to run on 12-fiber channels.

If the basic parallel transmission channel previously discussed is deployed, it is important to realize that four of 12 fibers (33 percent) will remain dark while supporting 40GB/s channels. In an optimized parallel transmission channel, the fibers in the trunk cable can be fully utilized through the use of the 4x4 parallel modules. These modules are used in place of the MPO pass-through panels on each end of the trunk cable.

The module is designed to receive three MPO equipment (or cross-connect) cords on the front side. The dark fibers are dropped from use, resulting in full utilization of the fibers in the two MPO trunk connectors on the rear of the module.

Replace the 360DP-2MPO pass-through panels with the MPO 4x4 parallel module:



The MPO 4x4 Parallel module is the InstaPATCH 360 4x4 LazrSPEED standard parallel module (360DM-4X4P-LS) (shown above).

In this configuration, the equipment cord should be specified with both ends having un-pinned MPO (female) connectors. The female end will plug into the active equipment and into the module.

The equipment cords are LazrSPEED 550 InstaPATCH 360 array cord, MPO (female) to MPO (female) 12-fiber (FQXMPMPGD).

If a cross-connect is incorporated in the channel, consideration should be given to the functionality of the cross-connect. If it is desirable to be able to administer the 40G circuits independently, install the 4x4 parallel modules on the ends of the trunks at the cross-connect. In this case, the cross-connect cords would be the same gender as the equipment cords in this section (female to female). If 4x4 parallel modules are not installed, the three 40G circuits can only be administered as a collective group to a common set of two other trunks.

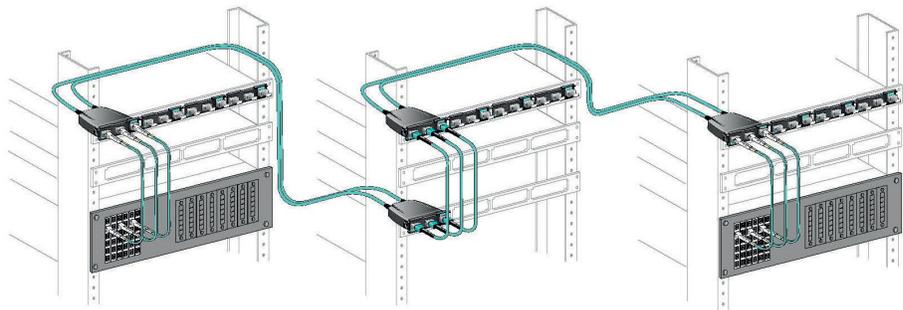


Figure 3: Here is an optimized parallel transmission channel with InstaPATCH 360.

InstaPATCH 360: The two-fiber fan-out channel implementation

Under certain conditions some two-fiber pre-terminated cabling may be deployed without the modules at the ends of the channel. This scenario works best when all of the fibers will be immediately placed into service and when they all serve equipment ports that are in close proximity to each other. One example where this occurs is in support of blade servers where each blade or rack of blades may have multiple fiber ports. Upon initial installation, it is likely that all fibers will be placed into service immediately and all fiber ports will be within a single shelf or rack. In this case, the modules and patch cords can be replaced with a fan-out cable assembly. The channel is made up in the following way:

- MPO trunk cables make up the permanent link portion of the channel. This trunk cable may include fiber counts from 12 to 144 fibers in 12-fiber increments.
- At one (or both) ends of the trunk, fan-out cable assemblies are used to convert the channel from MPO connections into duplex connections (LC, SC or ST).

If the fan-out cable assemblies are not used on both ends of the channel, it is necessary to use the modules and patch cords where the fan-out cables are not used. Additionally, if a cross-connect is included in the channel, it is most common to use the modules and patch cords from the traditional network.

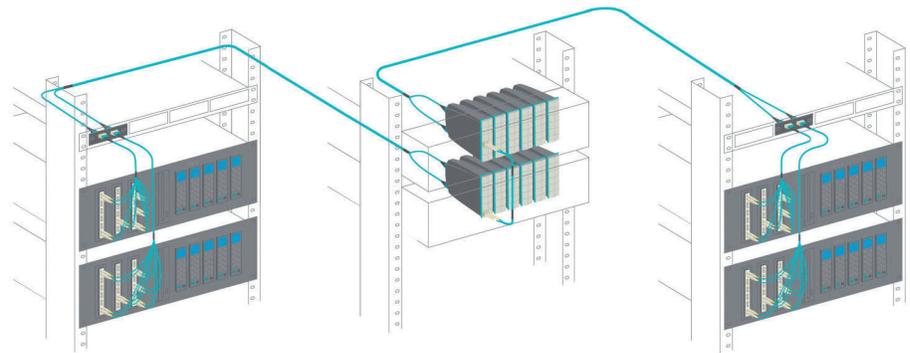


Figure 4: Here is an example of a two-fiber fan-out channel with InstaPATCH 360 fan-out cables.

In Figure 4:

The trunk cables are LazrSPEED 550 InstaPATCH 360 trunk cables with 24 fibers (FGXMPMPAF).

The modules are InstaPATCH 360 LazrSPEED standard modules with 24 LC ports (360DM-24LC-LS).

The patch cords are LazrSPEED 550 LC to LC, fiber patch cord, 1.6mm duplex, plenum (FDXLCLC42).

The MPO pass-through panels are InstaPATCH 360 distribution panel, 360DP-2MPO, 2xMPO (360DP-2MPO)

The fan-out cables are LazrSPEED 550 MPO (female) to LC, InstaPATCH 360 array cord, 12-fiber, plenum (FQXMPLCGD). One is needed for each 12-fiber increment.

Migration of this implementation to 40GB/s can be accomplished by replacing the fan-out cables, modules and patch cords with the components from the Basic Parallel or Optimized Parallel transmission channels.

InstaPATCH Plus/ReadyPATCH: The traditional two-fiber application channel

Utilizing InstaPATCH Plus or ReadyPATCH modules and trunk cables, the traditional two-fiber application channel is shown in Figure 3.

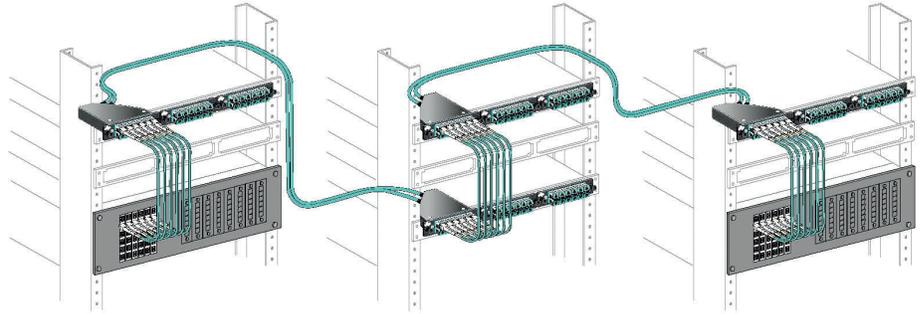


Figure 5: This is the traditional two-fiber application channel with InstaPATCH Plus/ReadyPATCH.

In Figure 5:

The trunk cables are LazrSPEED 550 ReadyPATCH trunk cables with 24 fibers (FYXMPMPAF).

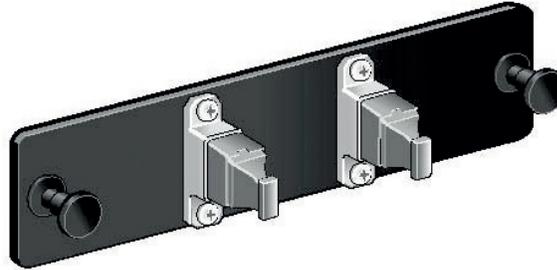
The modules are ReadyPATCH LazrSPEED standard modules with 24 LC ports (RFE-MOD-024-5K-MPO-LC02).

The patch cords are LazrSPEED 550 LC to LC, fiber patch cord, 1.6mm duplex, plenum (FDXLCLC42).

Regarding polarity considerations, the TIA Method B system does not require different cords within the channel. With other polarity management methods, it may be necessary to specify different cords at each end of the channel.

InstaPATCH Plus/ReadyPATCH: The basic parallel transmission channel

When migrating to 40GB/s, the trunk cables are re-purposed to carry the parallel optics traffic by removal of the modules and patch cords, replacing them with MPO passthrough panels and MPO equipment cords.



The MPO pas-through panels are InstaPATCH CommScope 2 MPO adapter panels (RFE-PNL-2MPO) (shown above).

The equipment cords are LazrSPEED 550 ReadyPATCH array cord, MPO (female) to MPO (male) 12-fiber (F2XMPMXGD).

Regarding polarity considerations, the TIA Method B system does not require different cords at each end of the channel. With other polarity management methods, it may be necessary to specify different cords at each end of the channel.

The other consideration that requires attention is the gender of the MPO connector. Specify the equipment cords with one end as an un-pinned MPO (female) and the other end as a pinned MPO (male) connector. The female end will plug into the active equipment. The male end will plug into the passthrough panel adapter.

In the event that the channel contains a cross-connect, specify the array patch cords with pinned MPO (male) connectors on both ends:

The cross-connect cords are LazrSPEED 550 ReadyPATCH array cord, MPO (male) to MPO (male), 12-fiber (F2XMXMXGD).

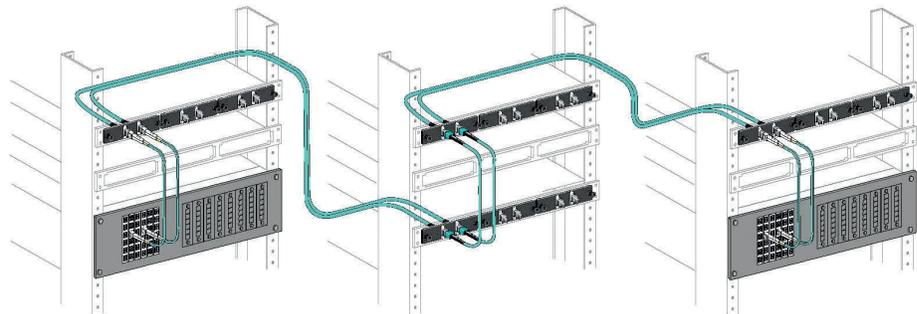


Figure 6: Here is an example of a basic parallel transmission channel with InstaPATCH Plus/ReadyPATCH.

InstaPATCH Plus/ReadyPATCH: The optimized parallel transmission channel.

In an optimized parallel transmission channel, the fibers in the trunk cable can be fully utilized through the use of the 4x4 parallel modules. These modules are used in place of the MPO pass-through panels on each end of the trunk cable.

The module is designed to receive three MPO equipment (or cross-connect) cords on the front side. The dark fibers are dropped from use, resulting in full utilization of the fibers in the two MPO trunk connectors on the rear of the module.



The MPO 4x4 parallel module is the ReadyPATCH 4x4 LazrSPEED standard parallel module (RFE-MOD-4x4-P-LS) (shown above).

In this configuration, the equipment cord should be specified with both ends having un-pinned MPO (female) connectors, which will plug into the active equipment and the module.

The equipment cords are LazrSPEED 550 ReadyPATCH array cord, MPO (female) to MPO (female) 12-fiber (F2XMPMPGD).

If a cross-connect is incorporated in the channel, consideration should be given to the functionality of the cross-connect. If it is desirable to be able to administer the 40G circuits independently, install the 4x4 parallel modules on the ends of the trunks at the cross-connect. In this case, the cross-connect cords would be the same gender as the equipment cords in this section (female to female). If 4x4 parallel modules are not installed, the three 40G circuits can only be administered as a collective group to a common set of two other trunks.

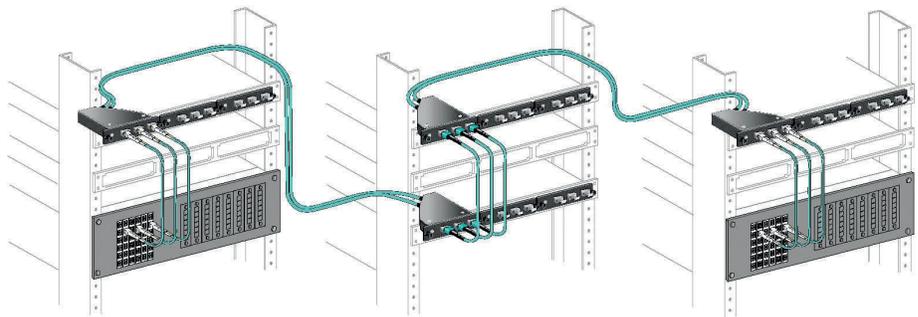


Figure 7: This is an optimized parallel transmission channel with InstaPATCH Plus/ReadyPATCH.

Conclusion

Because the InstaPATCH 360, InstaPATCH Plus and ReadyPATCH solutions are based on the MPO connector and Method B Polarity, the upgrade path from two-fiber channels to 40GB/s parallel optics channels is simple and easy.

- Standard MPO passthrough panels and standard equipment cords allow for use of existing trunk cables.
- The 4x4 parallel modules allow maximization of the fiber investment through full utilization of the trunk fibers.
- Management of polarity is optimal, as the Method B solution does not require different fiber mapping at each end of the network.



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