

## Comparison of Fiber Optic Cable Connectors: Choosing the Right Connector is Crucial to System Performance

### Understanding the Fiber Optic System

There are three main components in a fiber optic system: the transmitter, the receiver, and the media. The media component includes the fiber, cable and connectors. When designing and installing a fiber network, it is important to understand the effects that each component or subcomponent has on the overall system performance.

For many years, most of the attention was on fiber type and cable design, with little thought given to connectors. As technology advances and data transmission rates continue to increase, more attention needs to be placed on connector styles and termination practices. When the fiber system only had to support 10/100 Mb throughput, there was plenty of headroom in the power budget to make up for poorly designed or installed connectors.

Now that fiber systems are supporting 1 Gbps, 10 Gbps and even 40 Gbps, an excess power budget may no longer be available. Instead of having a 10dB or 12dB power budget for the system, there is only 2.5dB to 3.5dB of budget to work with. This means the choice of fiber connector is more crucial in guaranteeing long-term system performance and growth.

### Make the Right Connection

When trying to design a fiber optic system, consider the following basic questions to determine which type(s) of connectors to include in the installation:

- What densities are needed?
- In what environment is the connector being used?
- What interface (switch, routers) is on the electronic components?
- What data transmission rates are to be supported by the infrastructure?
- Is the connector proprietary or a standards-based connector?
- What will be the total installed cost of the connector?
- What is the overall performance of the connector?

Having the right fiber types and cable designs are important, but don't overlook the one element that might become the weak link - the connectors.

All CommScope connectors can be installed on multimode fiber or single-mode fiber - either in the field or at the factory. CommScope offers three different types of fiber optic connectors as an integral part of a low-cost, high-performance fiber optic solution. Each connector type has its own unique features and benefits.

**LC Fiber Optic Connectors** - These small form-factor connectors use the RJ-45 style latch and provide excellent optical and mechanical performance. The advantage of an LC connector is that it is half the size of standard connectors, and it can be utilized in cramped cabling environments where space is at a premium. In addition, the LC connector:

- Doubles the density in almost all applications
- Can be simplex or duplex configuration
- Can be field tuned to six positions for better performance
- Has a 1.25mm Zirconia ferrule
- Ferrule can be flat or pre-radiused



SFC-LCU-09



MFC-LCU-16

**Fiber SC Connectors** - These standard square-bodied, push-pull style connectors offer excellent packing density and resistance to fiber end-face contact damage during unmating and remating cycles. Due to their high level of durability, SC connectors are well-suited for harsh environments. In addition, the SC connector:

- Offers better than standard density in some applications
- Can be simplex or duplex configuration
- Has a 2.5mm Zirconia ferrule
- Ferrule is pre-radiused



MFC-SCU-09



SFC-SCU-29

**Fiber ST Connectors** - These twist-lock style connectors are a good choice for easy field installations. The twist-lock mechanism offers a slightly higher level of security from accidental disconnects. They can be inserted into and removed from a fiber optic cable quickly and easily. ST connectors are constructed with a metal housing made of nickel-plated brass. In addition, the ST connector:

- Provides standard density
- Can be simplex configuration
- Is one of the original proven designs
- Has a 2.5mm Zirconia ferrule
- Ferrule is pre-radiused



SFC-STU



MFC-STU

### Multimode Fiber Connectors

| Specification                         | LC                 | SC                    | ST             |
|---------------------------------------|--------------------|-----------------------|----------------|
| Fiber Diameter                        | 125 µm             | 125 µm                | 125 µm         |
| Cable OD                              | 0.9, 1.6 and 2.9mm | 0.9, 1.6 and 2.9mm    | 0.9 and 2.9mm  |
| Insertion Loss, standard deviation    | 0.2dB, 0.1 dB      | 0.2dB, 0.2dB          | 0.3dB, 0.2dB   |
| Return Loss                           | 25dB               | 25dB                  | 25dB           |
| Axial Load; 900um buffer, 3.0mm cable |                    | 2lbs, 20lbs and 30lbs | 2lbs and 15lbs |
| Mating Durability                     | <0.2dB             | <0.2dB                |                |
| Temperature Stability                 | -40 to 75° C       | -40 to 85° C          | -40 to 75° C   |
| Insertion Loss Change                 | <0.3dB             | <0.3dB                | <0.3dB         |
| Tip Material                          | Zirconia           | Zirconia              | Zirconia       |

### Single-mode Fiber Connectors

| Specification                         | LC                 | SC                 | ST            |
|---------------------------------------|--------------------|--------------------|---------------|
| Fiber Diameter                        | 125 µm             | 125 µm             | 125 µm        |
| Cable OD                              | 0.9, 1.6 and 2.9mm | 0.9, 1.6 and 2.9mm | 0.9 and 2.9mm |
| Insertion Loss                        | 0.2dB, 0.06dB      | 0.2dB, 0.2dB       | 0.3dB, 0.2dB  |
| Return Loss                           | 55dB               | > 40dB             | > 40dB        |
| Axial Load; 900um buffer, 3.0mm cable |                    | 2lbs, 30lbs        | 2lbs, 15lbs   |
| Mating Durability                     | <0.2dB             | <0.2dB             | <0.3dB        |
| Temperature Stability                 | -40 to 75° C       | -40 to 85° C       | -40 to 75° C  |
| Insertion Loss Change                 | <0.3dB             | <0.3dB             | <0.3dB        |
| Tip Material                          | Zirconia           | Zirconia           | Zirconia      |



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