

Singlemode versus Multimode Optical Fibre

Optical fibre cable comes in two varieties: singlemode and multimode. Both have applications in structured cabling systems. Singlemode optical fibre cables transmit a single ray of light used to carry modulated signals. It is normally used in applications requiring the transmission of signals over a long distance, for example, between separate facilities on a campus.

Multimode optical fibre cable carries multiple light rays with different reflection angles within the fibre core. With a fibre core that's thicker than singlemode optical fibre, multimode optical fibre is better suited for short runs, such as those between equipment and panels. Multimode should be used to connect devices such as optical routers and servers.

Optical fibre cable offers a level of security that exceeds copper or microwave transmission because it is difficult to tap into without breaking.

Ultra Physical Contact Connectors and Angled Physical Contact Connectors

Attaching a connector to an optical fibre cable will cause some of the light traversing that optical fibre to be lost. Regardless of whether the connector was installed in the factory or the field, its presence will be responsible for some light being reflected back towards its source, the laser. Commonly known as return loss (RL), these reflections can damage the laser and degrade the signal's performance. The degree of signal degradation caused by RL depends on the laser's specifications; some lasers are more sensitive to RL than others.

The amount of optical return loss generated is related to the type of polish that is used on the connector.

The "angled physical contact" (APC) connector is best for high bandwidth applications and long haul links since it offers the lowest return loss characteristics of connectors currently available. In an APC connector, the endface of a termination is polished precisely at an 8-degree angle to the fibre cladding so that most RL is reflected into the cladding where it cannot interfere with the transmitted signal or damage the laser source. As a result, APC connectors offer a superior RL performance of -65dB.

However, it is extremely difficult to field terminate an angled physical contact connector at 8 degrees with any consistent level of success. Therefore, if an APC connector is damaged in the field it should be replaced with a factory-terminated APC connector.

The "ultra physical contact" (UPC) connector – while not offering the superior optical return loss performance of an APC connector – has RL characteristics that are acceptable for data transmissions. When using UPC connectors, make sure your laser's specifications can handle the return loss your UPC connectors will generate.

Offering typically -55dB RL, ultra physical contact connectors rely on machine polishing to deliver their low optical return loss characteristics. Ultra physical contact polishing refers to the radius of the endface polishing administered to the ferrule, the precision tube used to hold a fibre in place for alignment. The rounded finish created during the polishing process allows fibres to touch on a high point near the fibre core where light travels. Unlike APC connectors, UPC connectors can, with the proper tools and training, be repaired in the field.

Connectors Styles



LC (Lucent Connector)

Latest generation of small form factor (SFF) connector, perfectly suited for use in Enterprise networks because of its all-round optical and mechanical performance.

The LC has been adopted by all major active manufacturers for data rates in excess of 1Gb/s.



ST® (Straight Tip)

Still commonly used in LAN applications and is best suited to multimode employment. Modern network designs now tend to move toward SFF or SC connector types.



SC (Subscriber Connector)

Along with the LC connector (see above) the SC is a popular choice of connector for data rates in excess of 10Gb/s.



MT-RJ (Mini Termination Registered Jack)

The MT-RJ was the first SFF connector type to be adopted in volume. The advantage of the MT-RJ is that it is small for higher density applications whilst still housing two fibres (Tx and Rx) in a single body.

The MT-RJ is particularly suited to multimode applications.

The above four connector types are recognised as the most commonly deployed within the LAN. Additionally, ADC KRONE also offer a range of patch cords and pigtails terminated with E2000, LX.5 and FC, for both multimode and singlemode applications. Contact ADC KRONE Customer Services for more details.