

# Ethernet Fibre Optic Connection

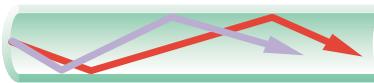
Historically the standard medium for factory networking has been copper cable because in the past fibre optic cables were expensive and difficult to terminate. Instead of conducting electrical signals as in the case of the copper cable, fibre optic cable propagates light waves. A fibre optic cable is made up of core and cladding layers of glass. The difference in the refractive index of the two types of glass cause total internal reflection of the light within the core to occur and hence propagation of that light. Surrounding the fibre there is a protective layer which acts as a buffer. Electrical signals are converted to light using LEDs or lasers and photodiodes are used to receive the light and convert back to the electrical signals.

Typically in Ethernet systems there are two types of fibre optic cable used; single mode and multi mode.

Single mode fibre typically has a core diameter of 9 microns and when used in conjunction with light of 1300 nm allows the propagation of only a single mode of light. The advantage of this is that the pulses of light can not be distorted by waves taking different paths through the core. This means that single mode systems can be used over much greater distances and with higher bandwidths than multimode cable.



Multimode fibre tends to have core diameters of 50 or 62.5 microns. More distortion of the light pulses mean that transmission distances are much lower than for single mode fibres. Components for multimode systems tend to be much cheaper than those for single mode thus compensating for the lower transmission ranges.

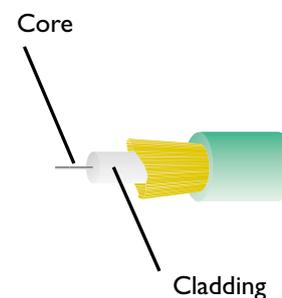


The greatest advantage of the fibre optic cable is that it is immune to electrical and magnetic interference. Consequently, it is highly suitable for harsh industrial environments, guarantees secure transmission and has a very high transmission capacity.

## Fibre Optic Cable Construction

### Fibre optic cable is composed of:

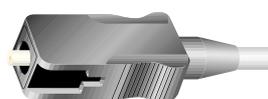
- Core** The centre of the fibre and the medium for the transmission of optical (light) signals. It ranges in diameter from 5 to 200 microns.
- Cladding** The optical material which surrounds the core and causes the light from the core that strikes it to be reflected keeping the optical information in the core. The cladding increases the diameter of the glass fibre to the range of 125 to 230 microns.
- Connectors** There are many connectors on the market for fibre cables, but there are four main connectors used for professional Ethernet installations and they are:



**ST** simplex connector used for multi mode 2 km (6666 ft)



**MTRJ** duplex connector used for multi mode 2 km (6666 ft) or single mode 15/40 km (50000/133333 ft)



**SC** simplex connector used for multi mode 2 km (6666 ft) or single mode 15/40 km (50000/133333 ft)



**LC** duplex connector used for single mode 15/40 km (50000/133333 ft)