Fiber Cables

Wavelength-Division Multiplexing

Bi-direction communication over a single strand of fiber

Uses different wavelength for each carrier (different colors)

Coarse Wavelength-Division Multiplexing

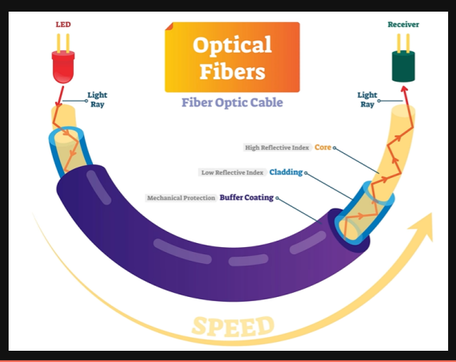
10GBASE-LX4 uses 4 3.125 Gbit/s carriers at 4 different wavelengths

Dense Wavelength-Division Multiplexing
Multiplex multiple OC carriers into a single fiber
Add 160 signals, increase to 1.6 Tbit/s

Optical Fiber

Fiber communication happens by light meaning that there is no radio frequency so it's very difficult to monitor or tap.

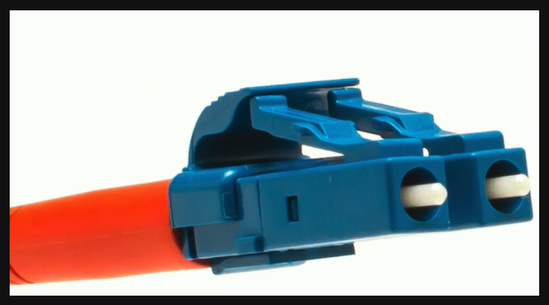
Signal slow to degrade which means it can be transmitted over long distances



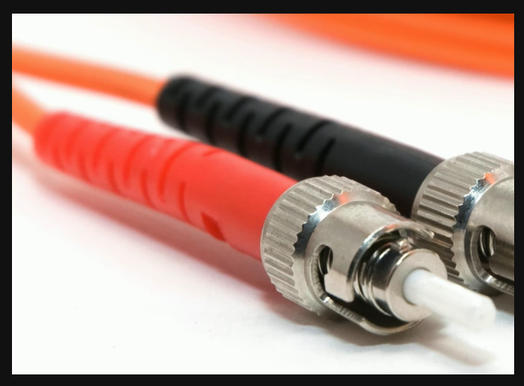
Mutlimode fiber:
Usually used for short-range communication (Up to 2 km)
Uses inexpensive light source (LED)

Single-mode fiber:
Usually used for long-range communication (Up to 100km without processing)
Expensive light source (Laser beams)

Fiber Connectors

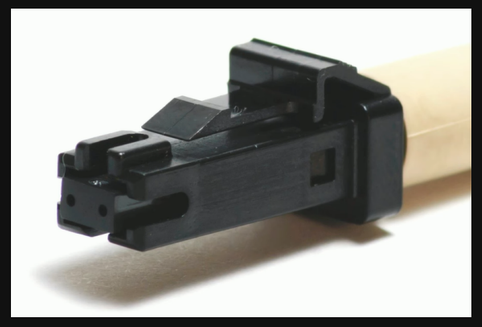


Local Connector (LC)



Straight Tip (ST)

Subscriber Connector



Mechanical Transfer Registered Jack (MT-RJ) (uses the least space so can be used when we need to fit the most cables)

Controlling Light

Since fiber uses light there is lots of physics involved

Return loss is how much light is returned back to the source

Ultra-Polished Connectors (UPC):
The ferrule end-face radius is connected at a zero degree angle
High return loss

Angle-Polished Connectors (APC):
The ferrule end-face radius is connected at an eight degree angle
Lower return loss
Higher insertion loss

Media Converter

Operates at layer 1 (Physical Layer)

Changes the media from one type to the other (ie fiber to copper or the opposite)

Can be used to extend the copper connection length by converting the media into fiber over the long distance and then back into copper again.

Almost always needs to be powered