CABAC

FAQ

FIBRE OPTIC LEADS EXPLAINED

Transmission Distances with Differing Fibre Optic Cable

There are a number of different fibre types, and transmission modes, and in the tables below you will find explanations of some of the fibre optic terminology

	Multi-Mode			Single-Mode
Type	**OM1**	**OM2**	**OM3**	**OS1**
Diameter	**62.5/125µm**	**50/125µm**	**50/125µm**	**9/125µm**
100Mb Fast Ethernet	300m (850nm) 100Base-SX 2km (1310nm) 100Base-FX	300m (850nm) 100Base-SX 2km (1310nm) 100Base-FX	300m (850nm) 100Base-SX 2km (1310nm) 100Base-FX	2km (1310nm) 100Base-FX
1 Gigabit Ethernet	275m (850nm) 1000Base-SX 550m (1310nm) 1000Base-LX*	550m (850nm) 1000Base-SX 550m (1310nm) 1000Base-LX*	2km (850nm) 1000Base-SX 550m (1310nm) 1000Base-LX	10km – 20km (1310nm) 1000Base-LX/LH 20km – 100km (1550nm) 1000Base-LX/LH
10 Gigabit Ethernet	33m (850nm) 10GBase-SR 300m (1300nm) 10GBase-LX4*	82m (850nm) 10GBase-SR 300m (1300nm) 10GBase-LX4*	300m (850nm) 10GBase-SR 300m (1300nm) 10GBase-LX4	10km (1310nm) 10GBase-LR 10km (1310nm) 10GBase-LX4

These are guidelines only; every manufacturer's cable differs so there are variations in performance. Please check cable specifications if in doubt.

* Mode Conditioning Patch Cable Required

Fibre Optic Cables - OM1, OM2, OM3 and OS1 Explained

Multi-Mode - OM Optical Multi-Mode

OM stands for "Optical Multi-Mode". There are several different classes of Multi-Mode Fibre Optic Cable available:

OM1 - This is very much the original optical fibre that has been used for the past number of years. This is 62.5µm optical fibre.

OM2 - This is 50µm fibre with Overfilled Launch Bandwidth of 500MHz/Km. The applications will support Gigabit networks up to 550 metres.

OM3 - This is essentially the new Laser Optimised Fibre with refractive index profile optimised for laser light insertion @ 850nm, and is targeted at 10G. OM3 optical fibre systems are the pinnacle of Multi-Mode fibre design. To utilise the new 10Gbs Ethernet protocols in an optical fibre system requires the use of either a full blown single mode solution or OM3 50/125 Multi-Mode cable. The OM3 system allows for new VCSEL laser based hardware and old legacy LED based hardware to co-exist over one system, providing a simple migration path through from 10Mb to 10Gbs and the security knowing the system you are installing today will give many years of solid, secure service to your network. OM2 fibre can support 1Gbps transmission speeds over distances of about 550m, but OM3 can achieve 800m; the increase is even more significant for 10Gb, increasing from 82m for OM2 to 300m for OM3.

Single-Mode - OS Optical Single-Mode

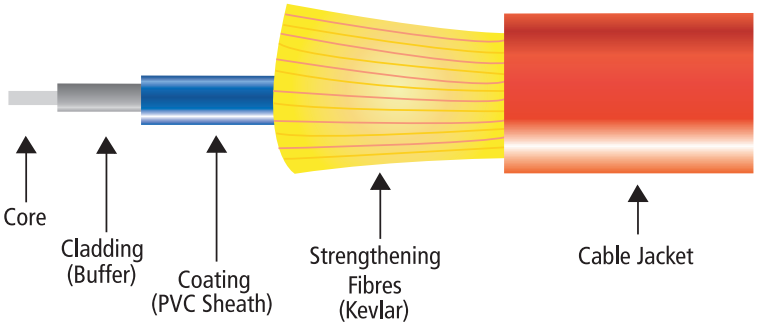
OS1. This is single mode 9/125µm fibre and is the highest performance cable which is generally used for Telecom's and campus networks. OS1 fibre requires laser based hardware and can support high data rates over very long distances.

Fibre Optic Data Propagation Modes

Fast Ethernet	100Base-SX 100Base-FX	100Mbps 850nm LED Short Wave 100Mbps 1310nm LED Long Wave Length
One Gigabit Ethernet	1000Base-SX 1000Base-LX 1000Base-LX/LH 1000Base-LX/LH	1000Mbps 850nm LASER Short Wave Length 1000Mbps 1310nm LASER Long Wave Length 1000Mbps 1310nm LASER Long Wave Length/Long Haul Single Mode 1000Mbps 1550nm LASER Extra Long Wave Length/Long Haul Single Mode
Ten Gigabit Ethernet	10GBase-SR 10GBase-LR	10Gbps 850nm LASER Short Wave Length 10Gbps 1310nm LASER Long Wave Length

FIBRE OPTIC LEADS EXPLAINED

Fibre Optic Cable Construction



MULTI - MODE

Multi-mode Fibre has light travelling in the core in many rays, called modes. It has a bigger core (62.5µm / 50µm) and is used with LED sources at wave lengths of 850nm and 1300nm and lasers at 850nm and 1310nm.

"Multi-mode fibre"
multiple paths through the fibre

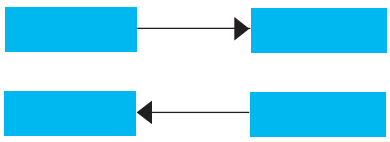
SINGLE - MODE

Single-mode Fibre has a much smaller core, only about 9 microns, so that the light travels in only one ray or mode. It is used with laser sources at 1310nm and 1550 nm.

"Single mode fibre"
single path through the fibre

HALF DUPLEX

A signalling system whereby transmission can occur in both directions, but in only one direction at a time. A good example of this is a walkie talkie conversation between two people. One has to "tell" the other they are finished speaking, or "over" to you.

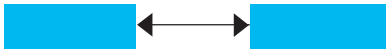


Signal goes in one direction only (half duplex)
Example: Walkie-Talkie, push button to talk, one speaker at a time

FULL DUPLEX

A method where transmission can take place in both directions at the same time

An example of full duplex transmission is a telephone conversation, as both participants can talk and listen at the same time without waiting for the other to finish.



Signals go in both directions (full-duplex)
Example: Telephone; both parties can speak and hear at the same time

MODE CONDITIONING LEADS

When using multi-mode 62.5/125µm optical fibre for transmitting Gigabit data over distances greater than 300 metres, a Mode Conditioning Patch cord must be used at each transmitter/receiver. This is because when a laser is launched into the centre of a multi-mode fibre it may cause differential mode delay (DMD) effects that generate multiple signals. The Mode Conditioning Patch cord overcomes this problem by launching the laser light from the transmitter into a single mode fibre which is aligned with a precise offset from the centre of the core of a 62.5/125µm fibre in the "mode conditioning" part of the patch cord. The output from the patch cord is then compliant with the standard for 1000Base-LX.

Mode Conditioning Patch Cords are not recommended for short transmission distances - a few tens of metres - as bit errors may occur/increase.