FIBRE OPTIC LEADS & MODES 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 technology.

<table>
<thead>
<tr>
<th>TYPE</th>
<th>OM1</th>
<th>OM2</th>
<th>OM3</th>
<th>OS1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter</td>
<td>62.5/125µm</td>
<td>50/125µm</td>
<td>50/125µm</td>
<td>9/125µm</td>
</tr>
<tr>
<td>100Mb fast ethernet</td>
<td>300m (850nm) 100Base-SX 2km (1310nm) 100Base-FX</td>
<td>2km (1310nm) 100Base-FX</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1Gigabit ethernet</td>
<td>275m (850nm) 1000Base-SX 550m (1310nm) 1000Base-LX*</td>
<td>2km (850nm) 1000Base-SX 550m (1310nm) 1000Base-LX*</td>
<td>10km - 20km (1310nm) 100Base-LX/LH 20 - 100km (1550nm) 100Base-LX/LH</td>
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<tr>
<td>10 Gigabit ethernet</td>
<td>33m (850nm) 10GBase-SR 300m (1300nm) 10GBase-LX4*</td>
<td>82m (850nm) 10GBase-SR 300m (1300nm) 10GBase-LX4*</td>
<td>300m (850nm) 10GBase-SR 300m (1300nm) 10GBase-LX4</td>
<td>10km (1310nm) 10GBase-LR 10km (1310nm) 10GBase-LX4</td>
</tr>
</tbody>
</table>

These are guidelines only, every manufacturer's cable differs so there are variations in performances, 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 Multimode

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 62.5 micron optical fibre.

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

OM3 – This is laser Optimised Fibre with refractive index profile optimised for laser light insertion @ 850nm, and is able to support 10G Ethernet networks. OM3 optical fibre systems are the pinnacle of multimode 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 multimode 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 Teleco 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 100Mbps 850nm LED Short Wave 100Base-FX 1000Mbps 1310nm LED Long Wave Length

One Gigabit Ethernet 1000Base-SX 1000Mbps 850nm LASER Short Wave Length 1000Base-LX 1000Mbps 1310nm LASER Long Wave Length 1000Base-LX/LH 1000Mbps 1310nm LASER Long Wave Length/Long Haul Single Mode

Ten Gigabit Ethernet 10GBase-SR 10Gbps 850nm LASER Short Wave Length 10GBase-LR 10Gbps 1310 LASER Short Wave Length 10GBase-LX4 10Gbps 1300nm(MM), 1310(SM) LASER Long Wave Length

Mode Conditioning Leads

When using multimode 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 multimode 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 set from the centre of the cord 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.