JIGSAW24

Fibre, Dark Fibre and metro Fibre: Why do we need it and what are the benefits?

March 2018

First, what is ‘Dark Fibre’?

Obtainable, affordable Fibre connections are prevalent in the media and entertainment industry, and especially in Soho, London. But is a Fibre connection required? Is it the solution that will enable the industry to migrate its traditional operations and workflows to next generation models like colocation and remote working?

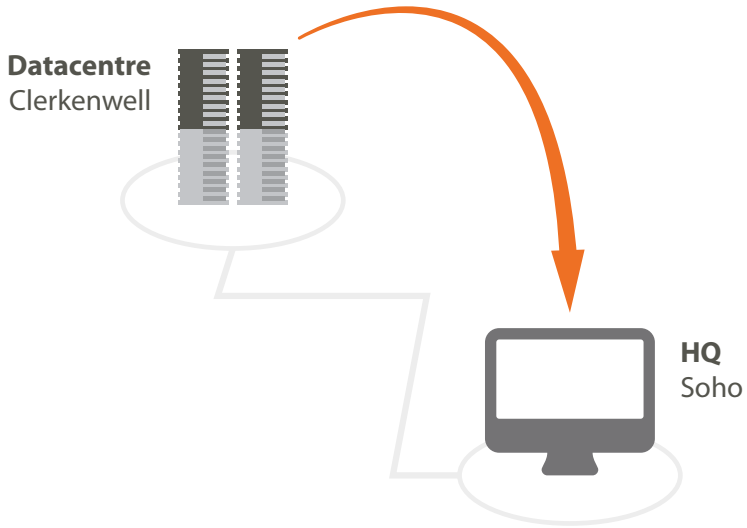
When Fibre is first supplied, no services are present and no one is using any of the network’s capacity. Fibre in this state is referred to as Dark Fibre, or sometimes ‘unlit Fibre’.

Historically, Fibre networks have been ‘managed’. A managed Fibre carries multiple services for multiple end points and customers, with the management of the connection itself being carried out by a third party telecoms company. Because more than one company or user service may share the Fibre, each is limited by the nature of what can be accomplished over the ‘managed’ connection, with these services generally being limited to IP based applications (typically internet access, VPN links and so forth).

What kind of performance can you expect from Dark Fibre?

As a working example, let’s take one of the pairs of Fibre cores we at Jigsaw24 have between our Wardour Mews office and Volta’s datacentre in Clerkenwell.

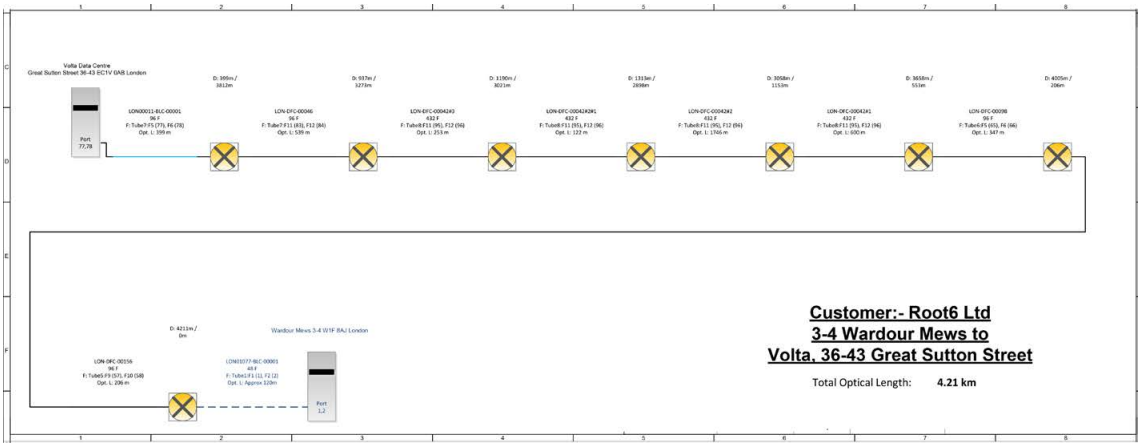
Within this configuration, along with all the campus and metro Fibres there are two single mode Fibre cores exclusively for use by Jigsaw24. We are using one core as a main connection and the other as a backup.



The Jigsaw24 Golden Square link is 4.2km when measured using a time-domain reflectometer (TDR), which equates to approximately 80nS of delay. For the wavelengths that are carrying Ethernet, we have two network circuits on the Fibre: a 10GbE connection for media and a 1GbE connection for the management network.

On these, the Jigsaw24 LAN ping latency rises from 2mS to 2.00008mS (approximately). We can’t really tell what is local and what is located at the other end of the Fibre, which is part of the beauty of having your own Fibre as opposed to a managed connection.

Attenuation has been measured at 1.9bD on core one and 2.1dB on core two. These numbers are typical for the distance and number of splices (the number of EUNetworks POPs [point of presence] the Fibre has gone through), and without any distribution points in the path we can run the Fibre about 80km – the distance from Soho to Milton Keynes or Southend-on-Sea.



To go the full 80km on CWDM optics you have to pay a small premium. 10km and 40km are the traditional lengths, but these are becoming rarer as the price difference between 80km and 40km becomes less; at this point, the distance figure is a way of saying when you hit 28dB of signal noise, the point that the fibre is noisy and unworkable.

We currently have eight way CWDM multiplexers at each end of the Fibre. We can use either 18 way CWDM or 140 way DWDM, and each wavelength can carry either synchronous broadcast signals (SDI, HDMI, MADI, etc) or asynchronous data signals (Ethernet, Fibre Channel, Infiniband, etc). What you can put on a wavelength is limited by the optical SFP – in effect, a strand of single-mode Fibre is has almost limitless bandwidth and is capable of carrying more than one hundred 10GbE circuits. For example, this is the technology used for the cable that carries internet traffic across the Atlantic.

Why not IP?

IP for video is increasing in popularity, but remains problematic for high-end media and entertainment operations as it relies on compression and high latency – a whole frame of latency is typical for HD footage, rather than the few pixels latency you experience with Fibre wavelength transport.

Because of this, Fibre is still preferred for campus and metro video transport. Its inherent security means it has also been heavily adopted by the government and the Ministry of Defence.