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because we care

A Technical Guide to the WightFibre Cabinet

A Different Kind of Broadband • Full-fibre • Ultrafast • Future-proof

What is in a WightFibre Cabinet?

This White Paper explains what is in the WightFibre street cabinets and why they are such an important and resilient component within the full-fibre network.

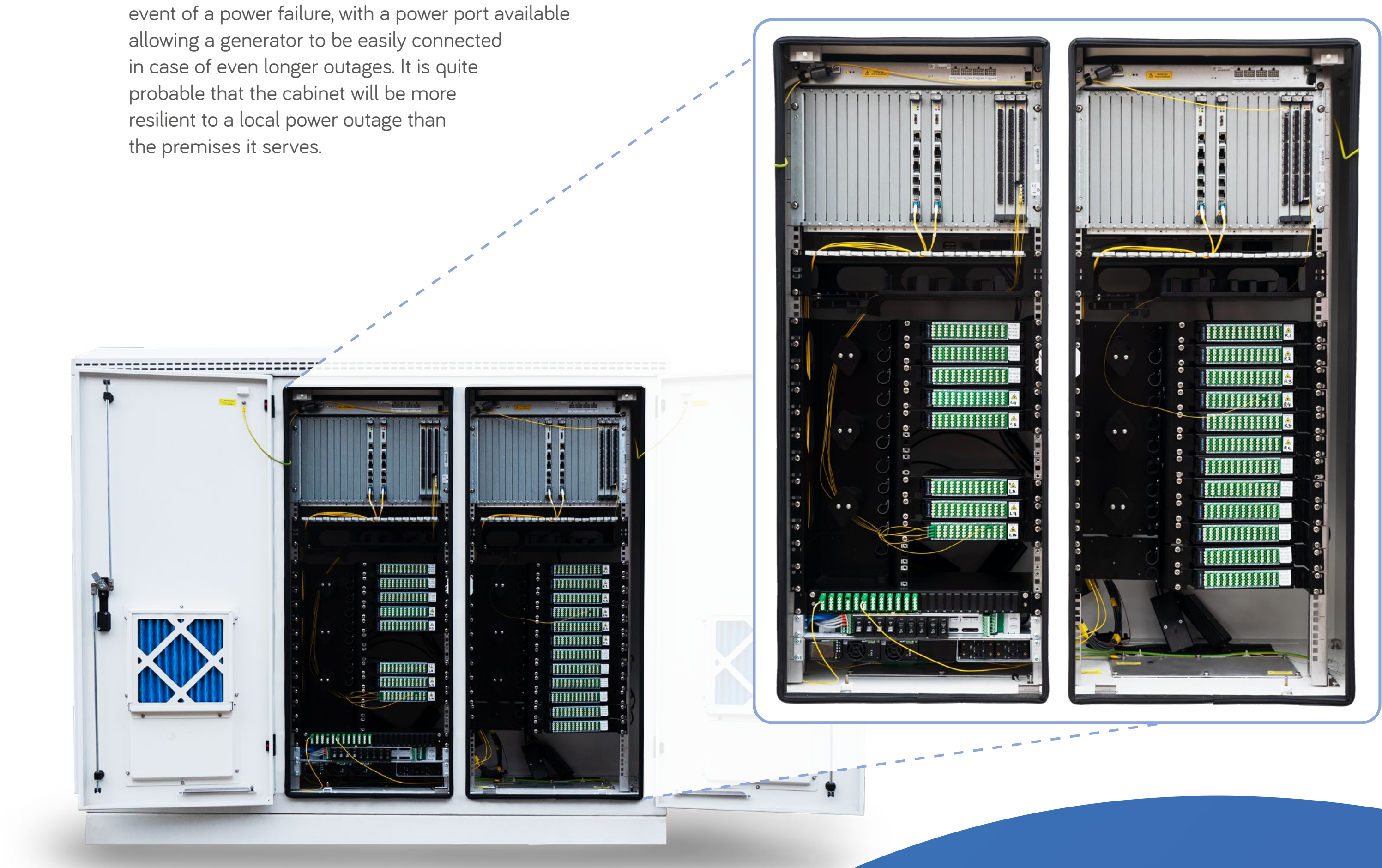
You may spotted the white street cabinets with the WightFibre logo around the island. There are two kinds of cabinet, larger 'Active Cabinets' which is where all the high-speed local connections are made from and smaller 'Passive Cabinets' which contain fibre distribution panels to connect parts of the system together.

WightFibre Active Cabinets

Inside each Active Cabinet is a Multi-Service Access Node (MSAN) which consists of highspeed fibre switches and distribution panels. This is where all the local connections to neighbouring residential and business premises are made, but importantly this is also where the trunk connections back to the WightFibre Digital Head Ends are made. Even more importantly these two connections go in opposite physical directions – this means that if, for example, someone puts a digger through one cable the traffic will automatically route along the working cable. As many of the connections go East and West on the Island this is termed East-West Resilience.

Each trunk connection is presently sized at 40Gbps and makes use of Wavelength Division Multiplexing (WDM) with ample provision for scaling. To allow for future scaling of the network there is already provision for a total of 160Gbps in each Active Cabinet. In future decades this equipment will be easily upgradeable to even faster speeds. The 'East-West' resilience plus spare capacity means in practice there are no local contention issues with connections competing for the bandwidth upstream. This is how WightFibre are able to provide speed guarantees even at peak times where others can't, and why WightFibre's advertised speeds are the actual speeds we deliver.

The Active Cabinets are powered and there is resilience in power provision too with each cabinet having their own dual power feeds. The cabinets also have an Uninterruptible Power Supply (UPS) built in providing power from batteries for 24 hours in the event of a power failure, with a power port available allowing a generator to be easily connected in case of even longer outages. It is quite probable that the cabinet will be more resilient to a local power outage than the premises it serves.



WightFibre Passive Cabinets

As the name implies, Passive Cabinets are very simple and because they use optical fibre they don't even need power – which is why they are called 'passive'.

On the left-hand side of the cabinet the fibre trays hold the fibres coming from the active cabinet. On the right is the Optical Distribution Frame (ODF) where the fibres from the fibre tray are spliced. The fibre blown from the home enters on the right and connects to the corresponding port on the ODF.

This means that the signal from three single-mode fibres effectively goes all the way from the MSAN in the active cabinet to your premise.

For more on how the cabinets can be connected 'upstream' into the WightFibre resilient Point to Point network and 'downstream' to your premises see the Wight Papers on 'The WightFibre Resilient Point to Point Network' and 'Connecting you with WightFibre Microduct Technology'.

More about Wavelength Division Multiplexing

Many network engineers will be familiar with the technique of Time Division Multiplexing (TDM), which carves up different signals and allocates different time slots for each sending them a few bits or bytes at a time when they 'own' the wire or 'pipe'; or Frequency Division Multiplexing (FDM) which moves the frequency of the different lower frequency signals to fit them down a higher frequency 'pipe' at the same time.

Both of these work quite well for older technologies where the bandwidth of each signal you are sending is smaller than the 'pipe', meaning you can get several signals down the same pipe, and where the pipe is made of copper wires.

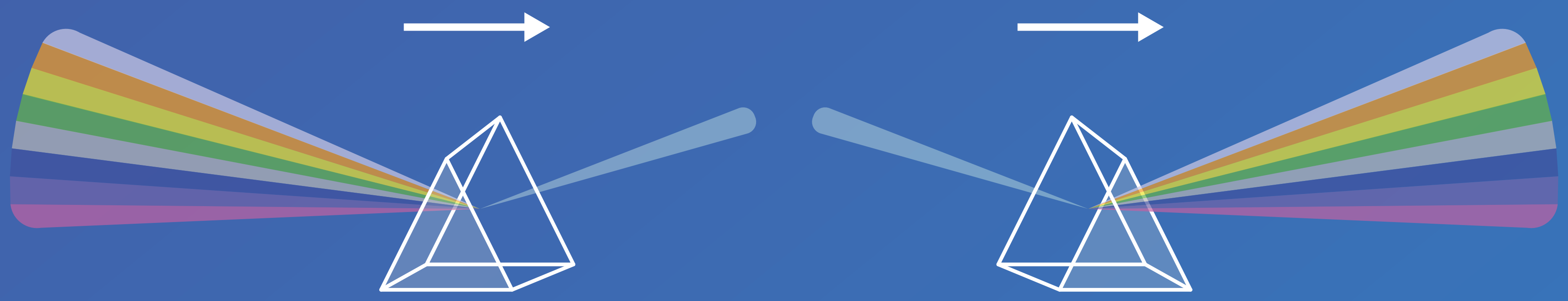
The fact that fibre optic cables are used to carry light opens up the possibility of using Wavelength Division Multiplexing (WDM).

WDM has a lot in common with FDM, as you might expect because in the electromagnetic spectrum, frequency is the inverse of wavelength.

WDM uses different wavelengths (or colours) of light to carry multiple signals down the same single mode fibre optic cable, and because we are dealing with light the combining of multiple signals and splitting them up again at the other end can be done using optical filters conceptually in much the same way that a prism can split white light into a rainbow of colours, and that spectrum back into white light.

Because this is done optically it is not dependent on expensive high-speed electronics nor are amplifiers or re-transmitters required. These light signals can travel up to 40km with amplification. This means that the transmission throughput can get much closer to the theoretical maximum bandwidth of the fibre. In other words, once the fibre is in the ground, the network capacity can be readily increased by increasing the supporting hardware without having to upgrade the fibre, making the solution very cost-effective and future-proof.

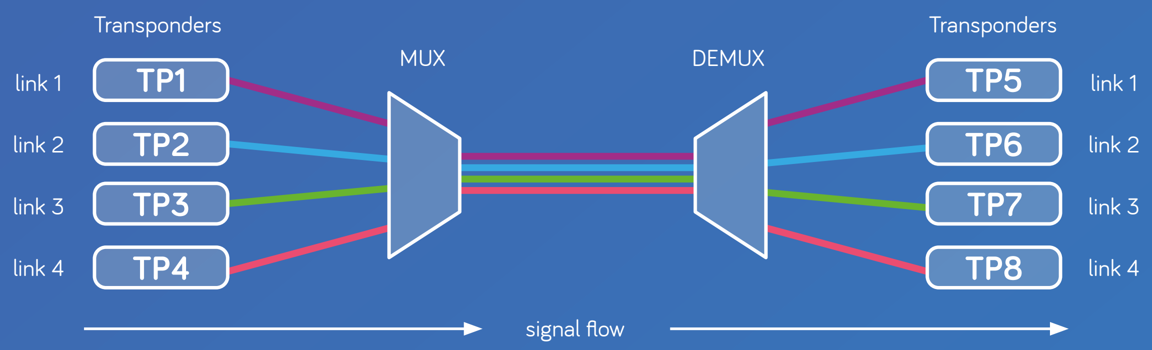
Core parts of the WightFibre Network infrastructure use what is called 'dense' WDM which means there is room for up to 96 'pipes' down a single fibre, each pipe carrying up to 100Gbps using current technologies. This will increase as technology improves allowing easy upgrade to even higher



At Ingress: Multiple optical signals of differing wavelengths are combined to form a single optical signal.

At Egress: A single optical signal is refracted to separate multiple optical signals of differing wavelengths.

wavelength-division multiplexing (WDM)



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