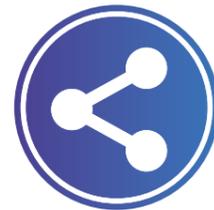


A Technical Guide to the WightFibre Resilient Point to Point Network



The WightFibre Resilient Point to Point Network

WightFibre has one of the most advanced networks in the world and it is being built out across the Isle of Wight to reach over 70,000 homes and businesses by 2025. This White Paper explains how the WightFibre network works and why it is so special.

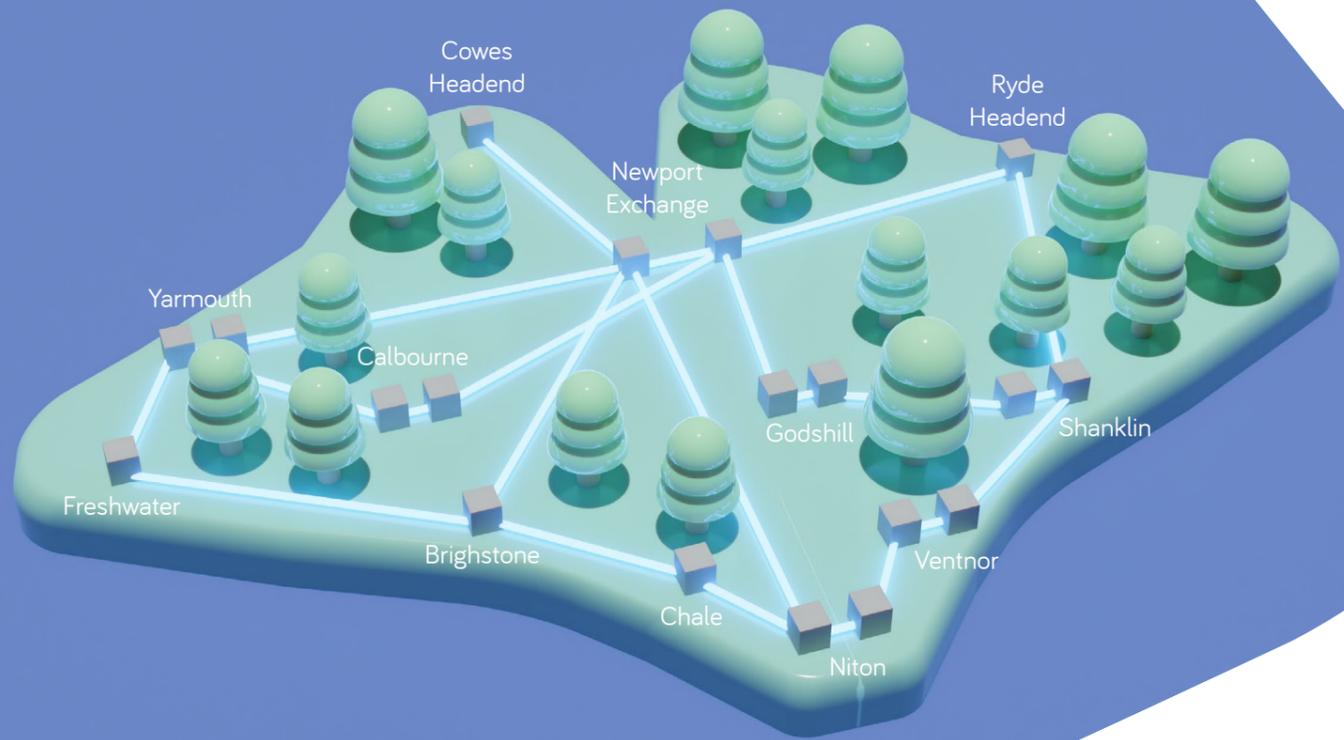
The WightFibre Network is ultrafast, future-proof, very resilient and secure with many design features that are unique to the Isle of Wight. It's a different kind of broadband, putting the Island on a par with countries like Singapore and South Korea who have traditionally led the way when it comes to modern Internet and telephony connectivity. Future proofed means it can grow to meet whatever future demands may be, to deliver on new ideas and innovations with almost unlimited speeds and capacity.



In a Nutshell – Getting Technical

The WightFibre network has a scalable Point to Point (P2P) Network Topology and Resilient Ring Network Architecture which uses the most recent version of the Internet Protocol, IPv6.

- A P2P network means you can get as much bandwidth as you could possibly use, and this is symmetrical, meaning you not only have ultra-fast downloads but ultra-fast uploads too. This is perfect for YouTubers with massive file uploads, ideal if you are storing files in the Cloud or uploading data whether you're a home user or using Cloud business services.
- On a P2P network each premise (point) has its own dedicated fibre optic cable all the way back to the cabinet (the other point, hence point to point) therefore no sharing with your neighbours. This means each connection can reach the Internet with no compromise, at full bandwidth, with minimum latency and without competing with neighbouring connections. Other network providers typically use 'GPON' technology instead of P2P and this shares each fibre connection with 64 other premises on average. We know sharing is good but not when it comes to your internet connection.
- The Resilient Ring Architecture means that every street cabinet is resistant to a fault for instance a digger being put through the cable somewhere along the road.
- There are two data centres on the Island housing the WightFibre 'Head Ends', both of which are themselves resilient with Uninterruptible Power Supplies (UPS), backup generators, and backup cooling.
- The WightFibre Data Centres connect out to two Points of Presence (PoPs) in London via geographically diverse routes including two distinct routes across the Solent. There are then connections to the Internet via three Internet Exchange Points (IXPs) and two major Internet transit providers.
- There is direct peering with many content delivery providers and business solutions providers including Amazon Web Services (AWS), Microsoft Azure, Google (which includes YouTube), JANET, Netflix, DropBox, Steam (for gamers) and OpenDNS amongst many others. This ensures the best possible low latency connection to these services.



In Detail

Starting the WightFibre journey at the street cabinet we will trace the path via the data centres and on to the Internet, and most importantly the other way from the street cabinets to your premises.

Starting at the Cabinet

You will have probably spotted the white street cabinets with the WightFibre logo. 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.



The Cabinets link to your premises 'downstream' and to the WightFibre Data Centres and then the Internet 'upstream'.

Resilient Ring Topology

Each Cabinet is connected in two different directions to the rest of the WightFibre Network (as many of these connections on the Island are East and West, this is called 'East-West' resilience).

Moving further away from an individual cabinet, different parts of the network are connected in a ring, so that even if a mechanical digger went through a cable somewhere else on the Island, a path around the blockage still exists – in short, you'd have to put two mechanical diggers through two cables very nearby to disconnect a cabinet.

Our Digital Head Ends

There are two Digital 'Head Ends' in the WightFibre Data Centres on the Isle of Wight, one in Cowes and one in Ryde, and they receive the major trunk connections from the resilient ring.

Each Digital Head End employs market leading routing and switching equipment from Juniper Networks using Coarse Wavelength Multiplexing technology (CWDM). CWDM uses passive multiplexing technology, which is both robust and energy efficient. More importantly this equipment can be upgraded as bandwidth demands increase in the coming decades – part of future proofing the network.

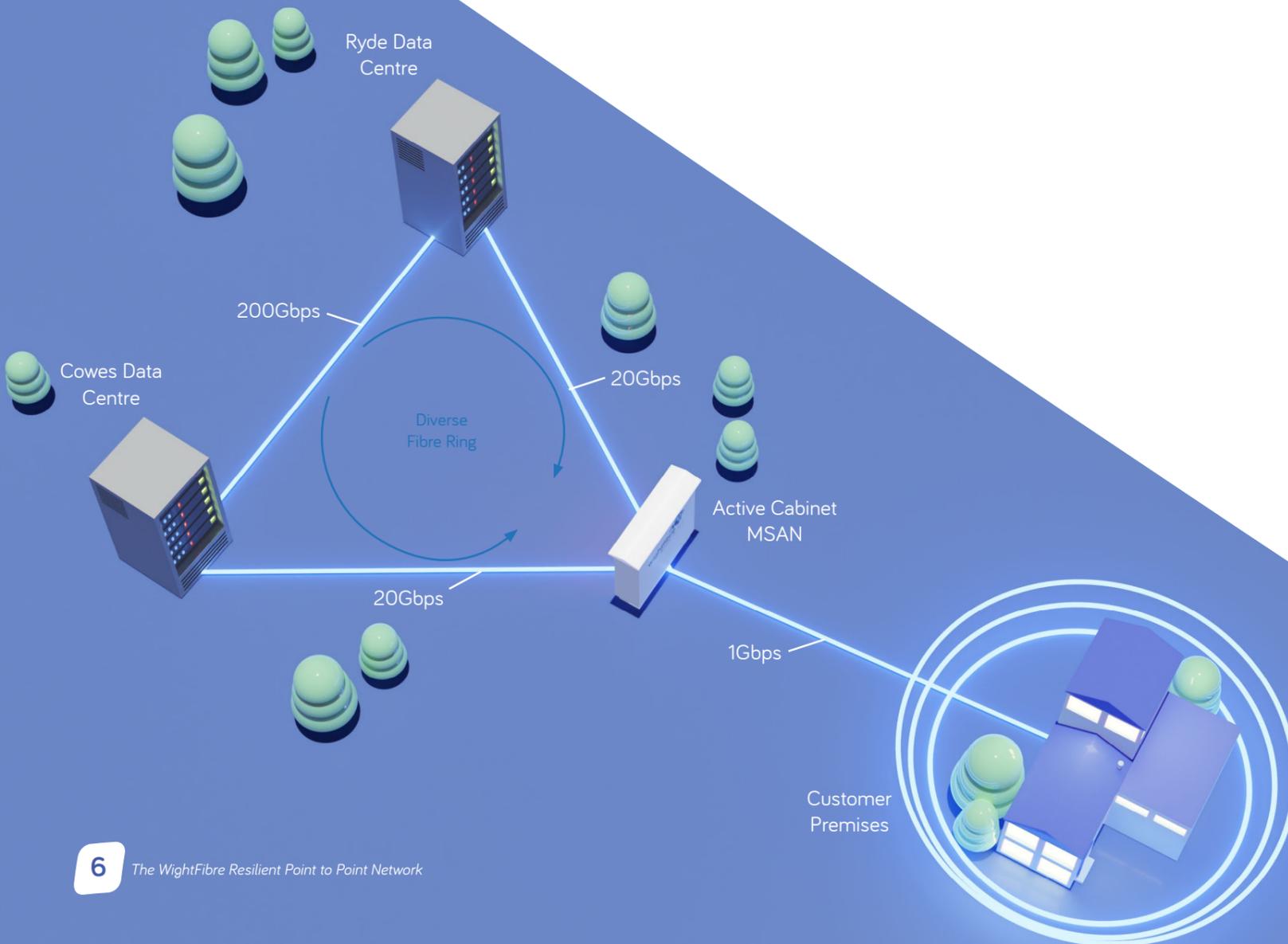
The Digital Head End infrastructure has been designed with no single point of failure and as well as having a dual UPS power supply from batteries, there are also backup diesel generators which can kick-in within seconds in case of a mains power failure.

There is also N+2 air-conditioning redundancy, which means that there are spare air-conditioning units available.

Domain Name System (DNS) Servers and Resolvers are hosted in the WightFibre Data Centres for customers, these use primary, secondary and tertiary servers for resilience. A DNS Server translates domain names, such as google.com to an IP address, allowing you to type the friendly and more memorable name into your browser and still route your traffic to the correct Google web server.

This redundancy is in EACH data centre, meaning the chance of a total outage is tiny meaning we can achieve a '5 nines' reliability target – that's a 99.999% uptime guarantee, in other words less than 7 minutes unplanned outage a year.

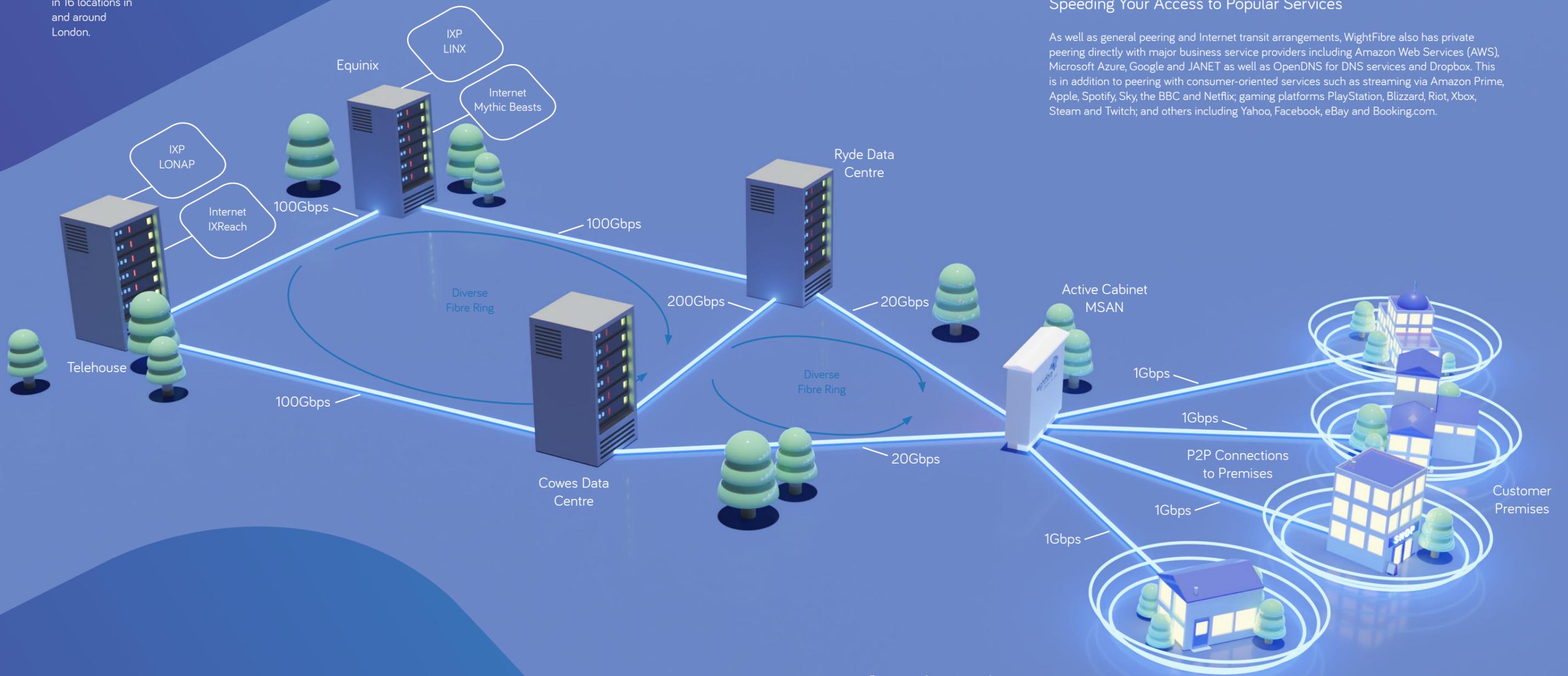
Within each network operations centre are state-of-the-art Juniper switches and routers. Collectively our equipment can handle 6.4Tbps of traffic, per second and are easily upgradeable should we need more.



The LINX

The London Internet Exchange (LINX) was formed in the mid-1990s in the early days of the explosion in Internet traffic generated by the then brand new World Wide Web, when two early ISPs Pipex and UKNet linked their two networks together. This was followed by more ISPs joining together to cost effectively share the relatively limited and expensive transatlantic Internet connections.

Over the years the LINX has grown to create one of the biggest and most resilient and reliable Internet hubs in the world, connecting not just to the USA but to other hubs up and down the UK and around the world. Originally housed in a single room in a telecoms building in Docklands, the LINX now has hundreds of members with equipment housed in 16 locations in and around London.



Connecting to the Internet

At the LINX the WightFibre Network peers directly with the LON1 and LON2 and LONAP exchange points as well as connecting with two Internet transit providers directly, Mythic Beasts and IXReach, each with 20 Gigabit connections. This means there is enough bandwidth for any task. The connections are extremely low latency and are easily upgradeable as demand grows.

Speeding Your Access to Popular Services

As well as general peering and Internet transit arrangements, WightFibre also has private peering directly with major business service providers including Amazon Web Services (AWS), Microsoft Azure, Google and JANET as well as OpenDNS for DNS services and Dropbox. This is in addition to peering with consumer-oriented services such as streaming via Amazon Prime, Apple, Spotify, Sky, the BBC and Netflix; gaming platforms PlayStation, Blizzard, Riot, Xbox, Steam and Twitch; and others including Yahoo, Facebook, eBay and Booking.com.

For more information on how your home is physically connected to the WightFibre Network, take a look at the 'Connecting you with WightFibre Microduct Technology' White Paper.



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