Digital Connectivity Infrastructure – Glossary

ADSL

Asymmetrical Digital Subscriber Line (ADSL) was the most common type of broadband internet connection prior to Fibre to the Cabinet (FTTC) delivered over a standard copper telephone line (so you can speak on the phone while still surfing the net). VDSL, ADSL+, ADSL2+ ADSL Max etc are all forms of ADSL offering differing bandwidths, depending on the length and quality of the telephone line. Nearly every home in the UK can get an ADSL connection, with speeds of up to 8 Mbps. But the further you live from the telephone exchange, the slower the likely connection speed.

Bandwidth

This is the amount of data that can be transferred by your internet connection per second. This is measured in bits per second (bps) or megabits per second (Mbps).

Barrier Busting

'Barrier busting' means to identify and address the barriers preventing the fast, efficient and cost-effective deployment of gigabit-capable broadband and improved mobile coverage, including 5G technology.

The government set up a Barrier Busting Task Force (BBTF) in 2017. Cambridgeshire & Peterborough is among the first areas in the country to set up a team to proactively remove the barriers to the rapid delivery of a future proof digital connectivity infrastructure. The Enabling Digital Delivery (EDD) service supports plans for full fibre networks and next generation mobile coverage, making best use of public sector assets and attracting commercial investment.

Basic broadband

Broadband which delivers access line speeds of at least 2Mbps.

BDUK

Building Digital UK (BDUK), part of the Department for Digital, Culture, Media & and Sport (DCMS) is delivering broadband networks to the nation and is the organisation responsible for the Government's policies on broadband.

Broadband

Broadband allows permanent, faster access to the internet due to the increased bandwidth. The most commonly used form is ADSL which uses the existing copper telephone line so you can make telephone calls while using the internet. While traditional broadband is delivered via copper telephone lines, fibre broadband uses fibre optic cables. Copper telephone cables weren't built with the internet in mind, so they can be slow - fibre-optic cable is quicker and will eventually replace all the older copper cable.

Copper switch-off

The Public Switched Telephone Network (PSTN), the copper telecommunications network used primarily for landlines, will be phased out from 2026 and replaced with digital systems delivered over broadband connections. This will affect all public services, businesses and domestic premises, making people even more reliant on digital connectivity and will require signposting and awareness raising, particularly among those who do not use mobile phones, or cannot access the internet.

Community Fibre Partnership

A Community Fibre Partnership (CFP) is when Openreach works with a local group of residents or business owners, to find a solution to bring fibre broadband to their area when they are not included in any existing upgrade plans. This usually needs to be a joint-funded approach, where Openreach covers the costs in line with its commercial model and the community provides the remaining gap funding required for the infrastructure build.

Openreach will then build the most affordable solution to meet local needs and will also advise on any grants available such as the Government's Gigabit Broadband Voucher Scheme: https://gigabitvoucher.culture.gov.uk/.

If an area already has fibre broadband, a Community Fibre Partnership can be used to upgrade to faster speeds.

Digital inclusion

Digital inclusion is about making sure people have the access, skills or confidence to use the internet to do things that benefit them day to day. Actions include supporting people to improve skills and confidence to go online and providing access to suitable devices and sufficient connectivity infrastructure

Download

The process of transferring data (such as a video or music track) for storage on your computer or smart phone. This is opposed to 'streaming', where you watch or listen on your computer screen without actually transferring the item to your computer itself. The download speed is the speed at which you can download data from the internet to your computer.

Fibre | Full Fibre | Fibre Broadband

Fibre broadband is the second generation of broadband. It is much faster, more reliable and uses a different technology than standard first-generation broadband. Whilst traditional broadband is delivered via copper telephone lines, fibre broadband uses fibre optic cables to deliver high speed broadband services which are often referred to as next-generation services.

Fibre, in broadband terms, refers to the use of fibre-optic cable – using a glass/plastic tube to send network signals in replacement of a copper cable. Fibre has the advantage of being easily upgradeable by only changing the equipment connected at each end and it allows data to be sent at very high speeds.

Fibre broadband can be delivered in two ways from the exchange: Fibre to the Cabinet (FTTC) and Fibre to the Premises (FTTP). Many broadband services are advertised as 'fibre' but are, in reality, a partial fibre service, i.e. they feature more fibre than old dial-up and ADSL services, but still fall short of a true fibre entering your home. The phrase' full fibre' is often used to refer to services where you have a thin piece of fibre delivering the service.

Fibre ducting | Fibre trunking

Ducting to protect fibre cabling. Essentially a 'tube within a tube' design - a smooth, inner section that allows for smooth pulling-in and undisturbed cables - and a corrugated outer layer that protects against notching and impacts from the outside.

Fibre infrastructure | Backhaul

Fibre infrastructure is important for mobile networks because the masts that transmit mobile signals must be connected to a core internet network. The connection between a mobile mast and the core network is called backhaul.

Backhaul is usually provided by fibre cables due to the need to support large volumes of data traffic. This is particularly the case for 5G due to the large volumes of data that 5G networks will support.

Base stations for 5G networks will likely be close together. This is because some applications of 5G will use higher frequency spectrum that cannot travel long distances. These base stations will require a dense fibre infrastructure to support them or new solutions to provide backhaul.

FTTC - Fibre to the Cabinet.

Fibre to the Cabinet (FTTC) is a technology used to provide high speed broadband services. It involves using fibre optic cable through the network from the telephone exchange to the street cabinet (usually a green on-street cabinet) but then uses existing copper wires to connect the cabinet to homes and businesses.

FTTC can deliver superfast speeds from 24 Mbps up to 80Mbps (download), depending on the distance from the cabinet. The further a premise is from the cabinet, the lower the speed you can get. This is because the last part of the FTTC service uses the copper telephone line into your home and the copper line needs to be less than 1.2km long to deliver "superfast" speeds (24Mbps or more).

Where properties are too far away from the fibre cabinet to get superfast speeds using FTTC, the solution has sometimes been to build a new fibre cabinet closer to them, using copper rearrangement to move the existing broadband connection so boost speeds. But this is not always possible, which leads us onto FTTP.

FTTP - Fibre to the Premise

Fibre to the Premise (FTTP) technology involves running fibre optic cable directly from the telephone exchange to the door of each bouse or business, either via underground ducts or overhead cables on telegraph poles to deliver high speed broadband services.

FTTP offers download speeds of up to 330mbps and upload speeds up to 30mbps (offered as different service packages by ISPs), but can also be gigabit-capable (1000mbps) so is more future proof (however you can also use FTTP for lower speed packages depending on your requirements).

Internet of Things (IoT)

The Internet of Things (IoT) is a network of objects with embedded electronics and sensors which share data and can be remotely controlled. A 'thing' could be anything from a smart thermostat to a lightbulb to an internet-connected fridge.

The IoT provides actionable insight from the data collected and shared between devices and sensors. IoT has applications across a wide range of sectors such as healthcare, utilities, manufacturing, consumer electronics, and smart cities among others.

Gigabit | Gigabit-capable

A gigabit (Gb) is a unit used to measure the speed at which data travels across an internet connection, sometimes written as Gbps, or gigabits per second. refers to broadband with a connection of 1Gbps (1000mbps) – even though there are actually 1,024 megabits in one gigabit.

Gigabit-capable refers to any technology that can provide download speeds of at least 1 gigabit-per-second (1 Gbps or 1000Mbps). This is typically achieved through FTTP technology however, there are other ways in which these speeds can be reached, such as 5G.

Not all gigabit services are symmetric but a good number are, and this means you can upload data to the internet (e.g. post videos to social video) at speeds of 1000 Mbps and also download data at the same speed.
A 1 Gbps download speed allows a high-definition, 90 minute film to be downloaded in under 1 minute.

Gigabit Broadband Voucher Scheme (GBVS)

Over the next 3 years, up to £210m will be allocated to deliver the Government's Gigabit Broadband Voucher Scheme. These vouchers will be available to rural businesses and households with current speeds of less than 100Mbps in areas unlikely to receive commercial gigabit broadband rollout.

High Speed or Fast Broadband

There is no firm definition but using one of these terms mean a connection offering 10 or 15Mbps type download speeds (up to 24Mbps).

ISPs

An Internet Service Provider (ISP) is a company that supplies you with access to the internet in exchange for a monthly fee (and often offers extra services including a home phone line and a digital TV package). Depending on the service signed up for, your internet could be delivered via copper or fibre optic cables under the ground, through the air via satellite or through a 3G/4G network. By, for example: Virgin Media, SKY, Plusnet, TalkTalk or Openreach.

LAN

Local Area Network (LAN) is a short distance network, linking multiple computers in a single building. With home networking this will usually refer to the network within your house.

LoRa gateway / LoraWAN / LPWAN / Sigfox

LoRa (long range) networks, also sometimes known as LoRaWAN (long range, wide area networks) or LPWAN (low-power wide-area networks), are a type of long range, low powered, wireless communication technology that allows secure data transmissions and information to be carried from a connected device, such as a sensor, for Internet of Things (IoT) applications.

LoRaWANs and LPWANs are typically used in asset monitoring and management in smart towns and cities for IoT applications. A single gateway or base station can cover entire cities or hundreds of square kilometres (range depends on the environment or obstructions in the location).

Because they allow long-range communications for applications and services that have low data rates, these networks are ideal for devices such as sensors which can be operated on a low cost with a long-life battery - especially in remote and hard to reach locations.

- Public LoRaWANs Providers of public LoRaWANs allow users to connect freely (public 'open') or at minimal charges (public 'closed') thereby supporting developers, small/medium businesses and enterprises, government and public initiatives across the UK local authorities.

- Private LoRaWANs There are several private LoRaWAN providers operating in the UK. Some of the services provided by these networks include intelligent lighting and property management, waste management solutions, flood and air quality monitoring.

- Sigfox Sigfox is a narrowband (or ultra-narrowband) technology. They build wireless networks to connect low-power objects such as electricity meters and smartwatches, which need to be continuously on and emitting small amounts of data. It is a proprietary technology that uses licence-exempt spectrum and offers good coverage with very low transmission power.

Mbps

Broadband speed is measured in megabits per second (Mbps). One bit means one piece of basic information and one megabit is a million bits of information. The higher the number of Mbps you are able to download each second, the faster your connection. It essentially means the rates at which data is downloaded or uploaded.

Mobile

3G

The third generation of mobile phone technology following on from 2G. 3G allows for faster access to the internet than 2G and allows services including video calls and wireless internet.
Most of us currently access the internet on our mobiles and laptops using 3G mobile technology, which covers most of the country.

4G

The fourth generation of mobile access technology that supersedes the speeds of 3G technologies.
4G promises more reliable connections and faster download speeds. Coverage is still patchy in places, but it will eventually replace 3G mobile broadband.

5G

5G is the next generation mobile phone technology, the successor to 4G. 5G can support much more capacity for video, very fast download speeds and near instant response times - allowing many devices to access large amounts of data at once. It will also be able to deliver a wide range of applications beyond mobile phone services such as remote health care, automated manufacturing, transport and traffic management, and driverless cars.

5G uses higher frequency waves than earlier mobile networks, allowing more devices to have access to the internet at the same time and at faster speeds. These waves travel shorter distances through urban spaces, so 5G networks require more transmitter masts than previous technologies, positioned closer to ground level.

NB-IoT and LTE-M

Narrowband Internet of Things (NB-IoT) is a radio technology, wide-area solution (e.g. a low power wide area network - LPWAN), that supports massive deployment of IoT devices and is also optimised for a very long battery life. NB-IoT networks can be deployed in mobile bands and integrated on existing mobile base stations to enable a wide range of cellular devices and service.

Long Term Evolution for Machines (LTE-M) is a complementary technology to NB-IoT with the added capability of supporting IoT applications with higher data rates and lower latency requirements. It can also be deployed in mobile bands and integrated on existing mobile base stations. The advantage of LTE-M over NB-IoT is its comparatively higher data rate, mobility, and voice over the network, but it requires more bandwidth, is more costly.

Neutral host (Active and Passive)

Neutral host is when a network infrastructure is owned and maintained by a third party organisation that rents or leases its infrastructure to any network operators looking to scale up their network capacities.

A neutral host network is a cost-effective alternative for network deployments to provide better mobile performance to both, individual customers and enterprises, which provides more flexibility as it is not dependent on an operator's rollout plans to each area. Access to the shared network may be paid or unpaid, and it can be based on dedicated spectrum owned by the neutral host provider itself, shared spectrum or the mobile operator's own frequencies. Sharing of **active** infrastructure means antenna and transceivers. Sharing of **passive** infrastructure means the physical site and power systems.

Ofcom

The Office of Communications, commonly known as Ofcom, is the government-approved regulatory and competition authority for the broadcasting, telecommunications and postal industries of the United Kingdom. As the regulator for the communications services that we use and rely on each day, they make sure people get the best from their broadband, home phone and mobile services (as well as keeping an eye on TV and radio standards).

Oxford-Cambridge Arc

The Oxford-Cambridge Arc is a globally significant area between Oxford, Milton Keynes and Cambridge. It is formed of five counties: Oxfordshire, Bedfordshire, Buckinghamshire, Northamptonshire and Cambridgeshire. It supports over two million jobs, adds over £110 billion to the economy every year and houses one of the fastest growing economies in England: https://www.gov.uk/government/publications/oxford-cambridge-arc/oxford-cambridge-arc.

Project Gigabit

Project Gigabit is the government's national scheme to deliver lightning-fast, reliable broadband for everyone in the UK by conducting a procurement to cover as many premises as possible that are currently unable to access gigabit speeds. Cambridgeshire & Peterborough is fortunate to be one of the first areas to benefit from Project Gigabit; the Connecting Cambridgeshire programme has consulted broadband infrastructure suppliers about their plans, to draw up an intervention area showing all eligible premises that can't get gigabit speeds, in preparation for the government-led procurement - likely to take place from autumn 2021. Delivery could then start in autumn 2022.

Small cell

A small cell is a low-cost radio access point with low radio frequency power output, footprint and range. It can be deployed indoors or outdoors, and in licensed, shared or unlicensed spectrum.

Small cells deliver high-quality, secure cellular coverage, complementing the macro network to improve coverage, add targeted capacity, and support new services and user experiences. There are various types of small cell, with varying ranges, power levels and form factors, according to use case. The smallest units are for indoor residential use, the largest are urban or rural outdoor picocells. In the 5G era, small cells will be deployed in a far wider range of scenarios than in the past, and the form factors and architectures will be extremely varied.

Smart | Smart technology

A smart device is an electronic gadget that is able to connect, share and interact with its user and other smart devices or networks (via wireless technology like Bluetooth, Wifi and 5G etc). Smart devices understand simple commands sent by users and can help in daily activities. Although some of the most commonly used smart devices are small in size – e.g smartphones, tablets, smartwatches, smart glasses, smart thermostats and smart doorbells – they can include larger items e.g smart refrigerators and smart vehicles.

Spectrum

Spectrum relates to the radio frequencies allocated to the mobile industry and other sectors for communication over the airwaves. Spectrum frequency bands have different characteristics, making them suitable for different purposes.

Low-frequency transmissions can travel greater distances, so can support widespread coverage across urban, suburban and rural areas and Internet of Things services. The radio waves can pass through dense objects more easily, but less data can be transmitted. Higher-frequency transmissions - which 5G can make use of – can carry more data but are poorer at penetrating obstacles.

Street Works

Any activity undertaken in a street has the potential to cause disruption. Roadworks or needing to dig up a pavement to lay a fibre cable can temporarily reduce the width of the street available to traffic, pedestrians and other users. Cambridgeshire County Council's Street Works team is responsible for operating a Permit Scheme, whereby those responsible for road and street works have to apply for permission before they start the work.

Street Works will grant, refuse or tailor the application; taking into considerations works already in progress and demands on the network. The permit will have a list of specific conditions that the utility companies and their workforce have to adhere to e.g working hours or traffic control to benefit the highway users.

Superfast (speeds between 30-80Mbps)

Superfast broadband does not have one single definition. Ofcom defines superfast broadband as download speeds greater than 30 Mbps. This is the EU definition and is used by broadband projects that have significant EU funding. The UK Government's targets for superfast broadband coverage, as part of the original BDUK process, were based on a definition of download speeds above 24 Mbps.

Superfast Broadband programme

The Superfast Broadband programme was announced by the Government in 2010/11 in response to concerns that the commercial deployment of superfast broadband would fail to reach many parts of the UK.

The programme was established to fund further deployment of superfast broadband coverage to these areas to produce economic, social and environmental benefits. Building Digital UK, a directorate of DCMS, is the accountable body for the programme. https://www.gov.uk/government/publications/superfast-broadband-programme-state-aid-evaluation-report-2020

Symmetric

A symmetrical connection is one with equal download and upload speeds. For example, with a 500/500 Mbps fibre internet connection you get 500 Mbps of download AND 500 Mbps of upload speeds. An asymmetrical connection does not have equal download and upload speeds. For example, 60/3 means 60 Mbps download and 3 Mbps upload speed.

Asymmetrical speeds are usually found in traditional internet connections, like ADSL.

Ultrafast (speeds up to 1Gbps or 1000Mbps)

Ultrafast broadband offers speeds of 300Mbps – 1000Mbps. The term refers to broadband that connects at 100Mbps and faster (but Ofcom the UK regulator uses a definition of 300 Mbps, which differs with the UK Government, industry and the EU).

Wayleaves

A wayleave is a contractual agreement between a landowner or landlord and a telecoms provider or utility company, where the landowner grants the network provider a licence with the right to access land and/or property, to install and/or maintain electronic communications apparatus e.g. cables and pipes or poles.

Wifi

The term 'Wifi' is commonly used to refer to devices that work wirelessly over a Wifi network or wireless local area network (WLAN). Wifi is now widely available in public places such as cafes, airports and hotels. Having a wireless router in your home or office means you don't have to run separate wires to different computers.

WLR - landline phone systems

Wholesale Line Rental (WLR) allows alternative suppliers to rent access lines on wholesale terms from BT, and resell the lines to customers, providing a single bill that covers both line rental and telephone calls.