Local Government Association

A councillor's guide to digital connectivity

Guidance

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Introduction

Digital connectivity is an all-encompassing term used to describe mobile or fixed connections to the internet. Being connected in this way has become part of the fabric of everyday life – as important to communities and businesses as a water, gas or electricity connection.

With better access to high speed and reliable broadband and mobile connections, local communities can access public services more conveniently and purchase goods online at a lower cost. People can work from home, cutting out their commute and improving their quality of life. Businesses can grow, become more productive, sell their products in a global market and access a raft of services not available to those offline. Tourists can find out more information about local attractions and share photographs of their experiences with friends and on social media. In contrast, areas stuck in the digital slow lane are less attractive places to live, work and visit, and risk being left behind as other areas reap the benefits of our digital revolution.

At the national level, the Government has set out its ambitions to build 'a world-class digital infrastructure' and has committed to rolling out nationwide full fibre broadband[1] coverage by 2033 and increase geographic mobile coverage to 95 per cent of the UK by 2022. However, the job of connecting the UK is far from complete.

While most people in the UK are connected to a basic broadband connection (defined later in this guide), there remain too many communities where streaming a movie at home or even sending pictures to friends and family via email is considered a luxury.

These poorly connected areas aren't just in out of the way hamlets deep in the countryside. Some inner-city areas such as Rotherhithe, in London, Deansgate in Manchester and the Baltic Triangle in Liverpool, have average speeds well below the Government's minimum aspiration.

Similarly, while many parts of the country take for granted the existence of ever-present, high-quality mobile connectivity, there are significant gaps in coverage. These gaps are usually found in rural communities, where residents suffer from partial mobile coverage, where not all mobile network operators cover an area, or 'not spots', where a mobile phone will not be able to make a call on any network.

1 A connection that can achieve download speeds of up to 1 Gbps (with similar upload speeds)

As technology continues to evolve, it is vital that all local areas have the digital infrastructure able to meet the demands of consumers and businesses both today and in the future.

This guide is structured to provide councillors with key information on digital connectivity. It explores the main issues and challenges facing our local areas and includes hints, tips and case studies from experienced councillors who have already undertaken work to get their communities better connected. It also provides a brief overview of Government policy and a glossary of widely used terms. Finally, it sets out the vital role councillors can play in this area by:

- **educating residents, voluntary and third-sector groups and businesses on the benefits of faster, more reliable connectivity**
- **bringing communities together to advocate for improved digital connectivity by applying for grants or aggregating their demand to persuade telecommunications providers to build the necessary infrastructure on their road**
- **helping residents consider where it is most appropriate to build new digital infrastructure, such as a phone mast, to improve residents' and businesses' connectivity whilst conserving local landscapes**
- **working in partnership with council portfolio holders, officers and other local stakeholders to consider the role your council can play in helping to improve communities' digital connectivity.**

For any queries relating to the guide please email localism@local.gov.uk.

Why digital connectivity matters

Digital connectivity is revolutionising people's quality of life. According to research commissioned by the communications regulator Ofcom, in 2017 64 per cent of people said the internet was an essential part of their day to day life.

As more of us use faster broadband and mobile services we have more choice about how and when to make voice and video calls, message friends and relatives, browse the internet, watch on-demand TV, stream music, play games, do shopping or work from home.

It is equally important for businesses too. Research by the Federation of Small Businesses found that 94 per cent of small business owners rate a reliable broadband connection as critical to the success of their business.[2] A survey conducted by the Confederation of British Industry found that 81 per cent of firms also said that they see more reliable mobile connectivity as essential.

We know that improved digital connectivity increases innovation and productivity across the economy. Increased broadband speeds alone could add £17 billion to UK output by 2024.[3] Studies have also shown mobile broadband is associated with positive impacts nationally, such as higher GDP and increased employment.[4]

The digitisation of public services also offers an important opportunity to support sustainable local services, especially in more remote settings with the public keen to use more services online.[5] Of course, it is worth noting that not all residents will feel comfortable using digital services and therefore must be accommodated via other means.

Finally, better digital infrastructure can enable local government to fully utilise advances in technology and data analysis to better understand local areas and deliver services more effectively. The transformation of public sector assets such as lamp posts into "smart infrastructure" means they can now supply public access to wifi (explained later in this guide); support environmental monitoring such as air quality or flooding; or even monitor pedestrian flow or parking spaces.

2 www.fsb.org.uk/standing-up-for-you/policy-issues/digital-economy/broadband-and-mobile-connectivity
3 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/257006/UK_Broadband_Impact_Study_-_Impact_Report_-_Nov_2013_-_Final.pdf
4 www.mobileuk.org/cms-assets/The%20Impacts%20of%20Mobile%20Broadband%20&%205G.pdf
5 The Citizen View of Government Digital Transformation, Rural England, Ipsos Mori and Sopra Seria, 2017 – 89 per cent of residents say they are ready and willing to use additional digital services when they become available.

What is broadband?

Broadband is the ‘always-on’ way of connecting a computer to the internet using a copper, cable, fibre or wireless connection.

Although there is no universally accepted definition of different types of broadband, it is often defined by its download speed ie the speed at which a device can receive information (data) from the internet. A broadband connection’s upload speed ie the rate at which data, such as your photographs or videos is sent to the internet, is also a vital component of ensuring a high-quality online experience. The speed at which data is downloaded or uploaded is measured in megabits per second often abbreviated to either Mbit/s or Mbps.

The Government and Ofcom use the following terms to define a connection’s speed:

- **decent** – download speeds up to 10 Mbps (upload speeds of up to 1Mbps)
- **superfast** – download speeds up to 30 Mbps (with upload speeds of up to 10 Mbps)
- **ultrafast** – download speeds of up to 300 Mbps (upload speeds between 5 Mbps – 21 Mbps according to the broadband package chosen)
- **full-fibre** – download speeds of up to 1 Gbit/s (with similar upload speeds).

Broadband that offers faster download than upload speeds is often referred to as an asymmetric connection. Asymmetrical connections are caused either by limitations in the capacity of the digital infrastructure or because the internet service provider (defined later) limits upload speeds.

Broadband services delivered over copper telephone lines often suffer from lower than advertised headline speeds because the signal degrades with distance. Full fibre connections, where the fibre optic cable extends all the way to the customer premises do not suffer from the same problems. Hence full fibre connections are capable of delivering very high speed, symmetric services, often of 1 Gbps (1,000 Mbps), irrespective of location, urban or rural.

Wireless broadband services come in two types – fixed and mobile. Fixed Wireless Access services connect to an antenna usually sited on the customer premises. Mobile broadband uses the mobile phone network to deliver services.

What you can do with different types of broadband

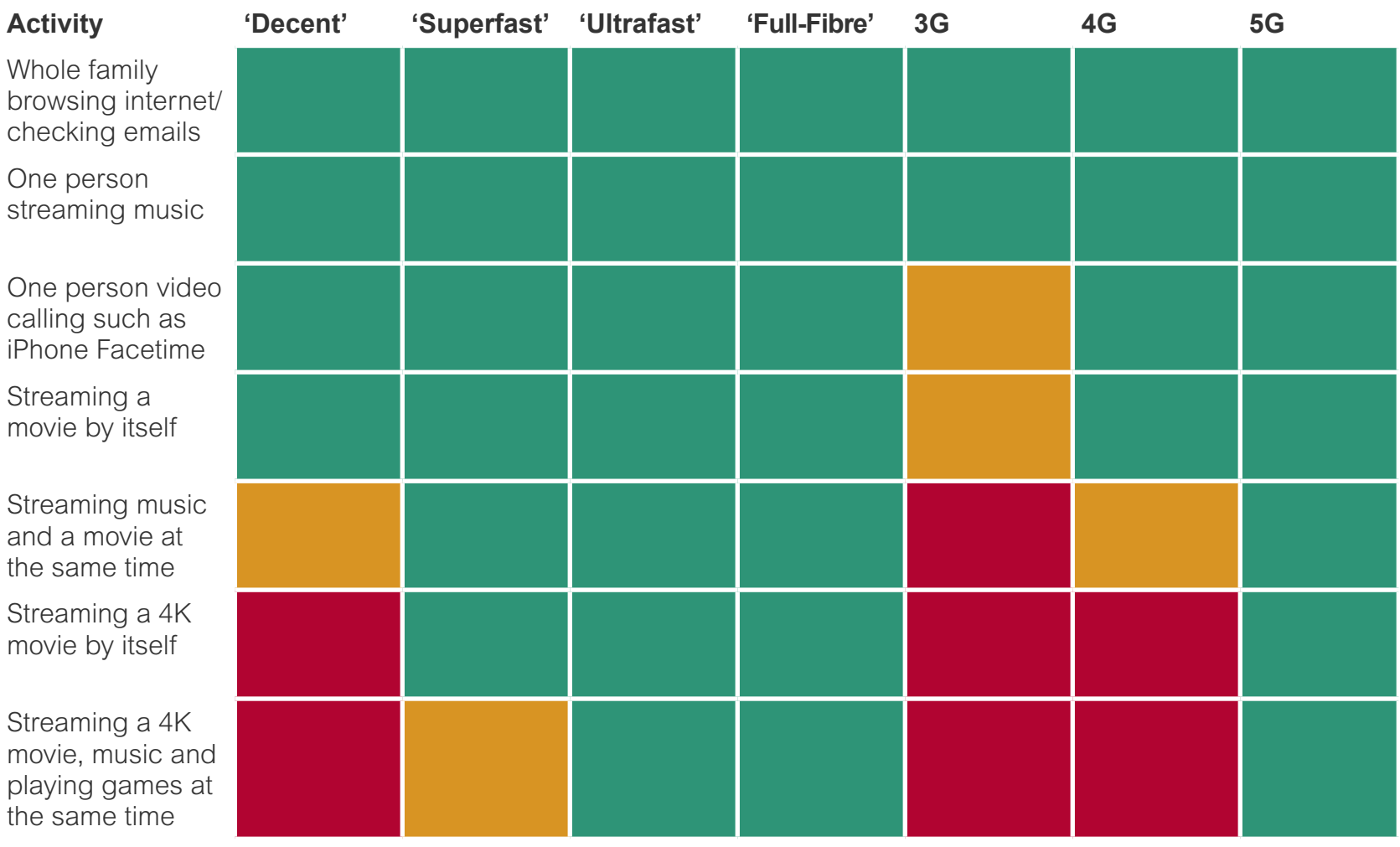
The broadband and mobile infrastructure that supplies a connection can be compared to water pipes; just as there's a maximum amount of water you can get through a water pipe of a particular size, there's a maximum amount of data you can get through a broadband connection. The faster your broadband connection, the more things you can do at the same time.

This has raised consumers' expectations for connectivity. In an 'always on' society, people expect to be connected everywhere through a plethora of devices.

1 Mbps	**10 Mbps**	**30 Mbps**	**300 Mbps**
Web browsing and music streaming	High definition video call	One person streaming Ultra HD video	Multiple people streaming Ultra HD Video

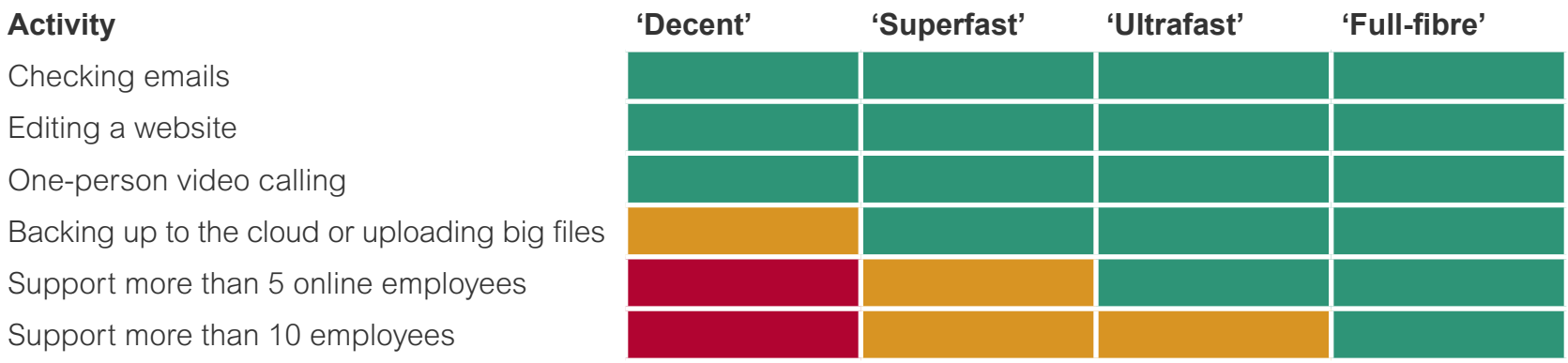
What can a family do with different download speeds at home

While a decent broadband or a 3G mobile connection will enable basic web browsing, if a family wants to enjoy increasingly high definition videos such as 4K (Ultra HD) via demand services such as Netflix or BBC iPlayer, they will need a faster connection, especially if several people in a family are using different services at the same time.



What can a business do with different download speeds

For any business, internet connectivity is essential. With superfast broadband, businesses can communicate with customers and colleagues using video conference platforms and run e-commerce operations. But the more employees a business has, the faster its connection needs to be. Symmetric connections, where download is as fast as upload speed are especially important for businesses. With an ultrafast symmetric connection uploading files to a cloud service is as quick as storing them on a local hard disk. This is extremely useful for small businesses and home workers who are increasingly moving to cloud services for resilience, security and convenience. Fast upload speeds also facilitate video communications for both social and business interaction.



The broadband marketplace

The broadband marketplace comprises many different companies which supply a range of services to businesses, consumers, or other broadband providers. It can be complex and hard for consumers to understand.

There are three types of broadband provider.

Digital infrastructure providers - those that only build broadband infrastructure and do not deal with consumers directly

Openreach is the biggest digital infrastructure provider in the UK. It is a separate division of BT and is responsible for installing and maintaining the UK's main telecoms network infrastructure. Openreach sells wholesale products to over 620 retail providers. Recently CityFibre has emerged as a competitor to Openreach building new full fibre networks in cities, operated on a wholesale basis.

Internet Service Providers (ISPs) - those that only supply a broadband retail service to consumers and do not build infrastructure

ISPs such as Sky, BT and many others, use Openreach's and CityFibre's infrastructure to sell broadband retail services to residents. In areas where Openreach has built broadband infrastructure, consumers can often have hundreds of broadband providers to choose from, often including well-known consumer brands such as John Lewis or the Post Office. These providers all use the same Openreach infrastructure.

When a consumer using a broadband retail service provided by one of these ISPs has a problem with their connection, they often have to wait for the infrastructure provider (rather than the ISP they are contracted to) to repair it.

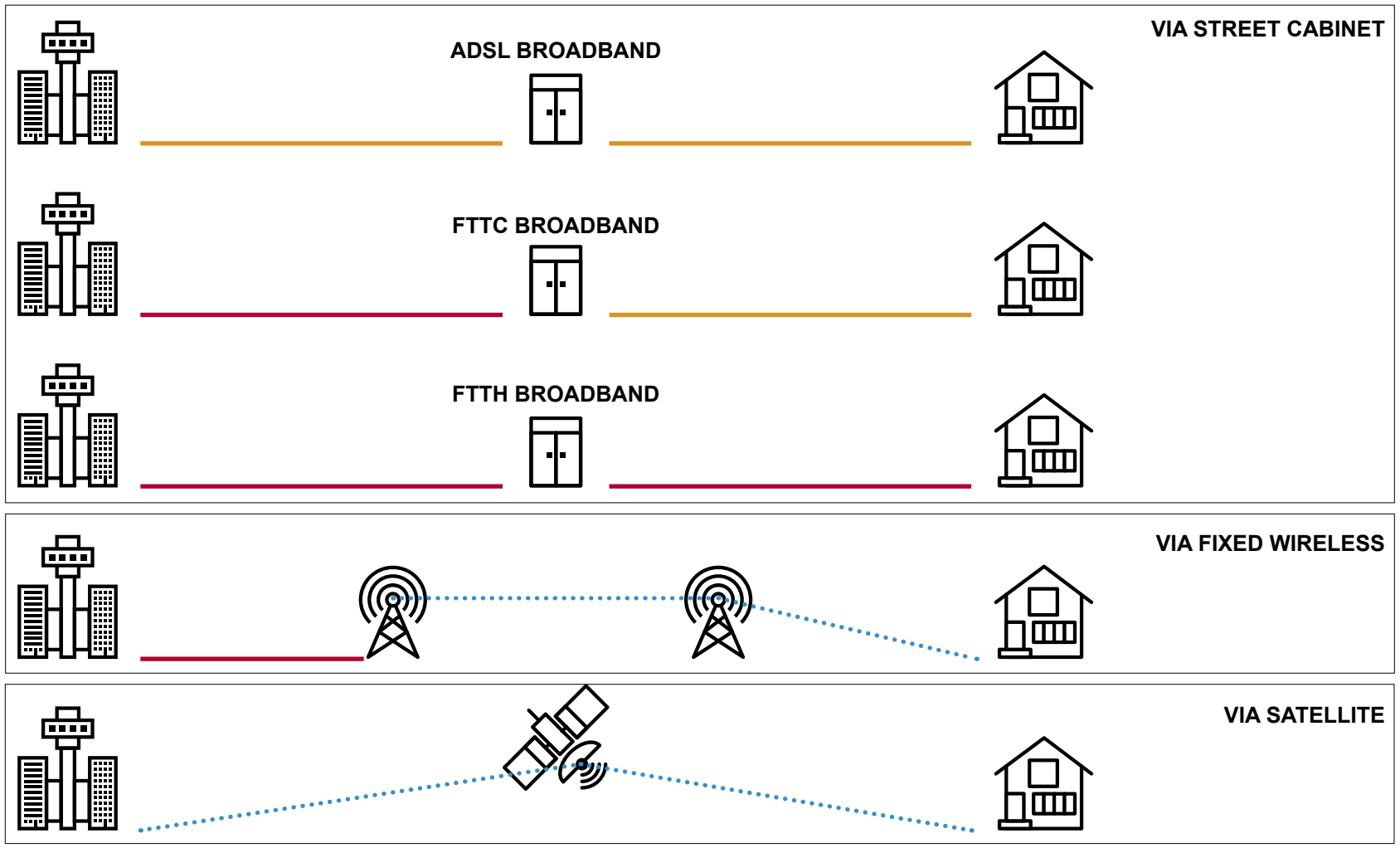
Those that build broadband infrastructure and use it to supply a broadband retail service to consumers.
Virgin Media, Hyperoptic and Gigaclear are three of the largest broadband providers who build their own infrastructure and supply the broadband service over the top. Virgin Media and Hyperoptic are 'vertically integrated' in that they offer access only to their own package of services. Gigaclear is moving to a wholesale model where customers will have a choice of ISP services. Other providers are expected to do the same over time.

Many of the independent providers are listed by their trade association INCA and can be found online. [6]

It is recommended that consumers shop around to understand who supplies broadband in their areas and at what price, where there is competition. Price comparison websites are often the best way to do this. Ofcom also offer a broadband checker app which allows you to find out which services are available in specific locations, such as your home or workplace.[7]

The Parliament website has an interactive map and database of connectivity speeds broken down by each constituency.[8]

Types of broadband infrastructure



6 www.inca.coop/membership/current-members
7 www.ofcom.org.uk/phones-telecoms-and-internet/advice-for-consumers/advice/ofcom-checker
8 https://commonslibrary.parliament.uk/science/technology/constituency-data-broadband-coverage-and-speeds

‘Decent’ broadband is delivered using a technology called **ADSL via copper cables** used by the telephone network. The majority of copper infrastructure across the UK is owned by Openreach with a small enclave around the Hull City Region owned by K-Com.

Cable is faster and uses the same sort of coaxial cables that are used to deliver cable TV direct to people’s houses. It’s only available in the UK from Virgin Media, usually in a package with TV and phone services. It is only available where Virgin Media have installed their infrastructure.

There are two types of fibre broadband, both of which use clusters of fibre optic cables, each one thinner than a human hair.

Most fibre connections in the UK are **‘fibre-to-the-cabinet’ (FTTC)**, with fibre optic cables running from the telephone exchange (the centralised location housing telecommunications and broadband equipment in each area) to street cabinets before using standard copper telephone wires to connect to nearby premises. As with ADSL lots of different providers offer services using the infrastructure owned by Openreach.

Fibre-to-the-premises broadband (FTTP), as the name suggests, involves fibre optic cables running directly to a home or business. This can offer better than an ‘ultrafast’ connection, with download and upload speeds of up to 1 Gbps (ie 1,000 Mbps), but there are only a few companies offering the service and only in a few parts of the country. The Government wants 15 million homes to be connected by 2025 with coverage across the whole country by 2033. This will be essential to take advantage of new and developing technologies, but according to figures from Ofcom in 2018 only about seven per cent of premises were connected.

There are two options for connecting very remote properties where it’s very expensive to lay a cable or fibre. Some ISPs offer **fixed wireless broadband** using a variety of different technologies, including 4G mobile phone networks (defined later). **Satellite Broadband** is another option.

	How it works	Technical considerations	Speed
ADSL	Uses telephone network's old-fashioned copper wires all the way from the telephone exchange to deliver 'decent' broadband	The connection speed drops the further you are away from the telephone exchange	Decent - 10 mbits/s
Cable	Cable technology is used to deliver superfast and ultrafast home broadband over cable TV networks.	Speeds are not lost with distance	Superfast and Ultrafast – up to 362 Mbps
Fibre-to-the-cabinet' (FTTC)	Fibre optic cables running from to street cabinets before using standard copper telephone wires to connect to nearby premises.	Most of the fibre broadband in the UK is FTTC.	Superfast
Fibre-to-the-premises broadband (FTTP)	Fibre optic cables running directly to a home or business	Very expensive to roll-out, requires new infrastructure to every premise	Ultrafast
Alternative solutions to hard to reach places			
Fixed Wireless	Uses radio spectrum to transmit high speed broadband. Broadband signal is passed from a radio on a transmitter to a radio attached to your building, or located inside your building, which allows you to connect to the internet the same way as via fibre or an ADSL connection.	The services offered will depend on the type of network, the radio spectrum used and local geography. Most (but not all) services require an uninterrupted 'line of sight' between the radio mast and the customer's premises.	Superfast to Ultrafast
Satellite	Transmitted wirelessly via a satellite dish. It works in a similar way to satellite TV, except those services just receive information.	Can function at any location but expensive to use. Connection can be affected by weather.	Decent

The current broadband connectivity context

In 2018, the Government set targets to help the market roll out fibre-to-the-premises connections to 15 million premises by 2025 and nationwide by 2033.

At present, figures from the Ofcom's Communications Market Report show:

- more than nine in ten homes and businesses have access to 'superfast broadband coverage'
- full-fibre broadband (using fibre cables all the way from the exchange to people's homes) is now available to seven per cent of UK properties
- 91 per cent of the UK's landmass has access to good 4G mobile coverage from at least one operator, while 66 per cent has coverage from all four mobile network operators.

Troubleshooting a poor broadband connection

There are lots of reasons why people's broadband might not work as well as they expect it to.

It can be caused by too many people trying to use it at the same time. Using the water pipe analogy: just as in a house, if someone tries to run a hot tap in the kitchen while someone else is having a shower both will get lukewarm water, if one person in a family tries to watch a movie while several other people stream music in different rooms both the movie and the music will possibly stutter.

Clearly, the faster your broadband connection, the more things you can do at the same time. An ultrafast connection will allow a household to stream several movies, listen to music and catch-up on TV all at a once.

Similarly, factors outside the home can also have an impact. In the same way that the National Grid used to prepare for half-time in the FA Cup final because there would be a power surge as millions of people went to put their kettle on, if most of a street or village connected to the same network goes online at the same time, then there's a chance everyone's broadband will slow down. This is called the 'contention ratio.'

There may be other problems. Inside the home a wifi router might need an upgrade, or it might be poorly configured, or it might be picking up interference because of where it is placed. Also, the distance of people's homes from the street cabinet or the exchange can affect their broadband connection.

Ofcom has an app which enables you to see if your home wifi is likely to be slowing down your broadband connection. They also have a troubleshooting guide on how to solve problems with people's phone or broadband:

www.ofcom.org.uk/phones-telecoms-and-internet/advice-for-consumers/problems/broadband-landline-faults

But not everyone is connected, there are still large parts of the UK that are poorly served by communications services:

- around two per cent of UK premises cannot access a decent fixed broadband service
- around half the homes and businesses who have access to superfast, or better, broadband don't subscribe to these services.

Regulation of broadband speed

Better broadband speeds information - voluntary codes of practice

One of the ways Ofcom regulates the broadband market is through its voluntary code of conduct which is designed to incentivise ISPs to compete fairly, giving consumers and businesses realistic information on the download and upload speeds they are likely to receive, to enable them to make an informed choice between different services.

The four main areas of the code sign up providers to provide:

- speed estimates that reflect peak time speeds ie the times at which internet use in your area is at its highest (contention ratio) and thus your speed is likely to be lower
- a minimum guaranteed download speed should be provided at the point of sale and the standards apply to all bundled services
- the right to exit a contract should be easy if it doesn't provide the speeds it promises.

The code applies to all broadband technologies. However, not all ISPs have signed up to the code. It can be useful to refer to this code when complaining about the speed of your internet connection to a broadband provider.

www.ofcom.org.uk/phones-telecoms-and-internet/information-for-industry/codes-of-practice

Broadband advertising

Broadband advertising is covered by the Advertising Standards Authority and the Committees of Advertising Practice. They have published guidance that outlines that any numerical speed claim in a broadband advertisement should represent the download speed available to at least 50 per cent of customers at peak time (8.00 pm-10.00 pm) and described in ads as 'average'.

www.asa.org.uk/news/new-standard-on-broadband-speed-claims-in-ads-comes-into-force-today.html

Some of the terminology used by broadband providers can also be confusing to customers. For instance, the term 'fibre' is used to market both 'full fibre' services and those that are 'part fibre' where the fibre optic cable runs to a street cabinet and then connected to the customer premises using a copper telephone cable.

What is mobile connectivity?

There are two ways people can connect to the internet when they're away from home or work, using mobile phone networks or wifi public hotspots.

Mobile phone networks

Mobile phone networks allow devices containing a SIM card (phones, tablets, modems/ dongles, etc) to make calls, send and receive messages, browse the internet, stream audio and video and use apps on the move. They are provided and operated in the UK by four main commercial providers, known as Mobile Network Operators (MNOs):

- **Three**
- **EE**
- **O2**
- **Vodafone.**

In addition, there are more than 60 Mobile Virtual Network Operators (MVNOs) which use the networks owned by the MNOs. These include:

- **BT Mobile**
- **Giffgaff**
- **Sky Mobile**
- **Virgin Mobile.**

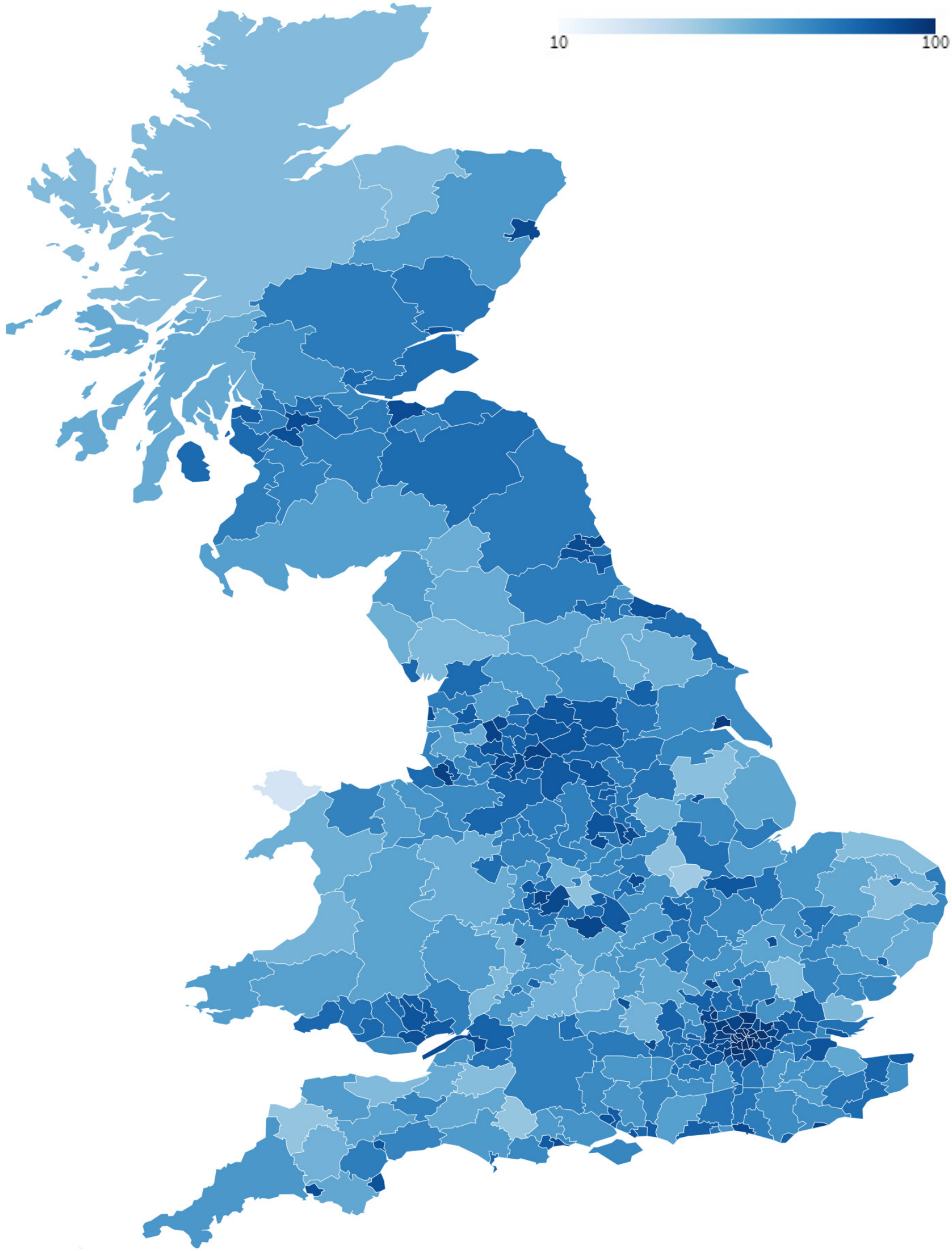
There are four main mobile infrastructure providers (some owned by mobile operators themselves), who do not provide retail services, but build the masts that MNOs use.

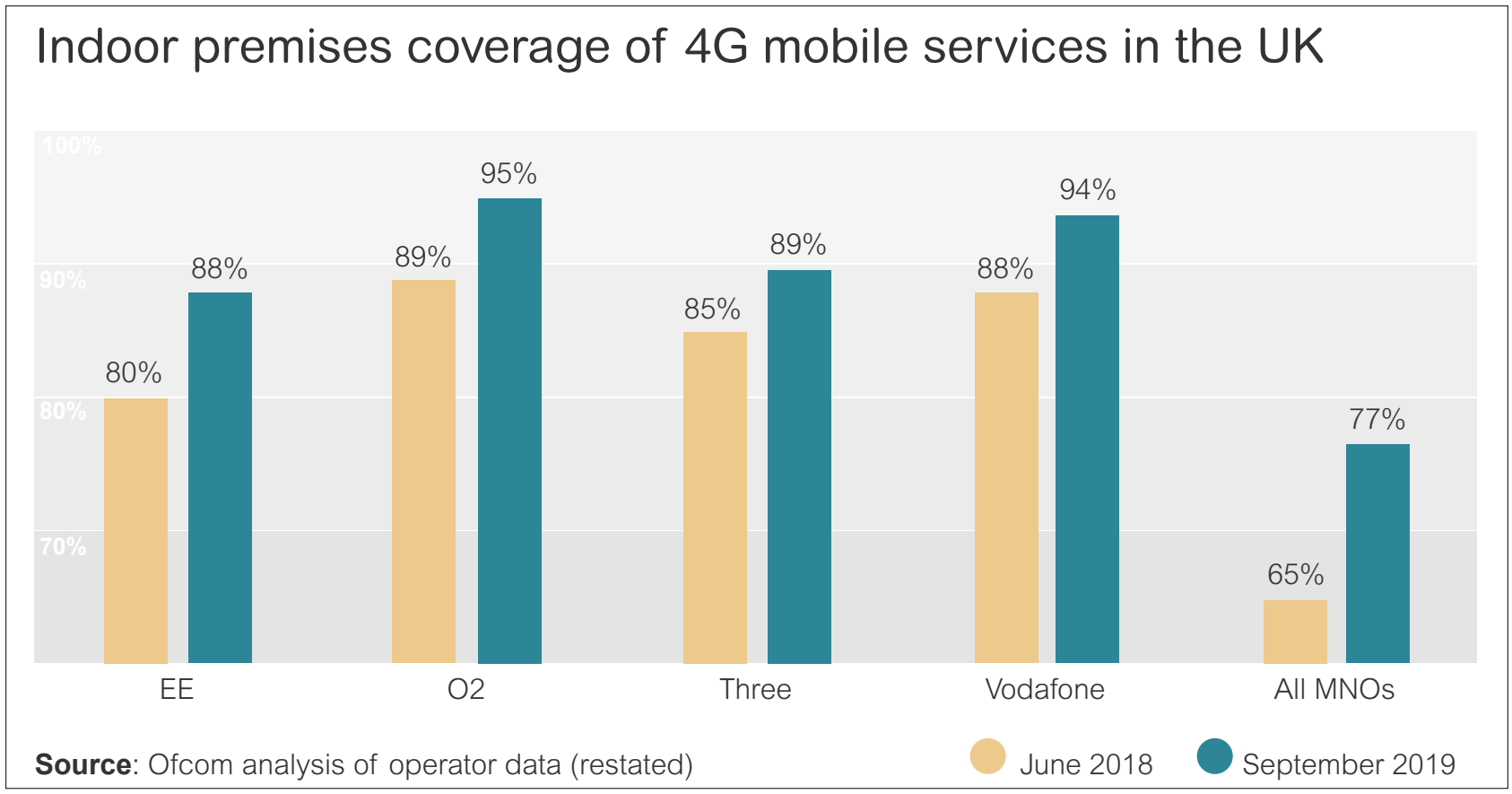
- **MNBL**
- **Cornerstone**
- **Arqiva**
- **Wireless Infrastructure Group.**

A number of other companies also offer 'neutral host' infrastructure, including FreshWave, Densre Air and BT Wholesale, which can be used by any mobile operator.

Before you sign up to a mobile phone contract, it is vital to check the mobile coverage each MNO provides in the places you live, work and visit as each will be different.

Indoor 4G coverage from all four operators by council area





Source: Ofcom analysis of operator data (restated)

The current mobile connectivity context

Ofcom's latest 'Connected Nations 2018' report, an annual survey of connectivity across Britain shows that mobile coverage continues to improve. Almost all homes and offices are able to achieve a good indoor 4G signal from at least one operator. Most of the UK landmass has a good 4G signal from at least one operator, while two-thirds has a good signal from all four operators. However, statistics such as these can be misleading. A person's mobile connectivity is only as good as the connectivity provided by the mobile network operator they are contracted to. Whilst an area might have 95 per cent coverage 'from at least one operator' if your service only has coverage across 80 per cent of an area, you will lose connectivity in the 15 per cent of the area covered by at least one operator.

Coverage by premises

	One operator	All four operators
Indoor voice	92%	77%
Indoor 'good 4G'	95%	77%
Outdoor voice	90%	78%
Outdoor 'good' 4G	84%	66%

Ofcom reports that national mobile connectivity is improving, but country-wide coverage figures tend to mask the deep disparity between coverage in urban and rural areas. When disaggregated, 83 per cent of urban homes and offices have complete 4G coverage, whereas the figure for rural premises is less than half that (41 per cent). In some remote parts of the country, there is no coverage at all.

Each network provides a different service and has its own coverage checker. Ofcom also has an independent coverage map allowing data coverage from different providers to be compared:

https://checker.ofcom.org.uk

Accuracy of mobile coverage data

There is disagreement on the accuracy of mobile coverage maps. Much of the coverage data is generated by computer modelling rather than real life testing. As such it does not always reflect consumer experience on the ground. Gaps in coverage, ie where residents suffer from partial mobile coverage, where not all mobile network operators cover an area, or not spots, where a mobile phone will not be able to make a call on any network, can occur in both rural and urban areas. A lack of coverage can lead to dropped calls – when your mobile call unexpectedly cuts off, or prevent your device connecting to the internet.

How mobile phone networks work

Mobile phone networks use several types of technology. The technologies are rarely referred to by their individual names. Instead they are grouped into families and named after the 'generation' in which they were introduced, with each 'generation' being introduced roughly a decade after the previous one. Each network is faster, more secure and more reliable than the one that preceded it. All modern 'smartphones' support 2G, 3G, 4G and more are now supporting 5G.

Name	Description	Used for	Notes	Speed
2G	The first digital mobile technology, launched in the UK in 1992.	• Calls • Text and picture messaging • Simple text-based websites	Although it isn't mobile broadband, it is used as a fallback on some networks and people may encounter it in rural or remote areas, or on a train when it passes through an area with limited coverage.	From 50 Kbps to 1 Mbps
3G	A later generation of digital mobile technology, launched in 2003.	• video and audio calls • email • text and picture messaging • apps • location-based services (with GPS) • mobile TV and video on demand • music streaming.		Varies but around 5-7 Mbps
4G	The latest generation of mobile technology launched in 2012. It can provide download speeds of over 10 Mbps.	The same as 3G only faster and more reliable – especially audio and video services	9% of the UK landmass doesn't have good outdoor 4G coverage from any operator mainly in rural areas.	Varies but around 10-19 Mbps

5G	The fifth generation of mobile technology is being launched from 2019 onwards.	Potentially faster than 4G, much lower latency, mobile broadband will enable high bandwidth low-latency applications in sectors such as manufacturing, transport and healthcare.	Standards still emerging, likely to be some overlap between 'enhanced' 4G connections and genuine 5G technology	To be confirmed, but could be up to 50Gbps

Mobile phone networks are made up of cells (which is why the Americans call them cellphones). Each cell has one or more base stations that transmit the data to and from mobile devices.

In densely populated urban areas, a cell will often cover a few hundred metres; in a suburban area a cell will cover a couple of miles; in a sparsely populated rural area it may be much larger.

Only a minority of base stations are sited on masts, although the term 'base station' and 'mobile phone masts' are often used interchangeably. Mobile networks are made up of a mix of different types of infrastructure – ground-based masts, rooftop equipment and small antenna – and most of this infrastructure is unnoticed by passers-by.

Base stations are sited to maximise coverage in a local area and there are many factors affecting where they can be sited. Also, as cells only cover a limited area and can only handle a finite amount of traffic, their layout is primarily driven by customer demand.

Mobile infrastructure – a range of shapes and sizes

The design of cells and the location of base stations or transmitters vary in size and shape for all sorts of reasons:

- to accommodate the number of people and devices that will be using them – they will be smaller in cities and bigger in the countryside
- because of local geography such as hills or valleys which interfere with radio waves
- where the base station can be sited, especially its height above the ground. This can be affected by:
  - planning considerations such as conservation areas which may impact the installation of base stations
  - access to electricity to power the radio transmitter
  - the layout of buildings.
- the shape of neighbouring cells whose radio transmissions could cause interference.

Lots of factors limit mobile connectivity, either slowing it down or stopping it altogether:

- phones and tablets have low-powered batteries, so thick walls, hills, or other buildings can

interfere with their ability to send a signal to the base station

- distance from a base station can mean that a device is unable to connect (although mobile phone networks do not require a line of sight)
- radio interference from other networks or base stations will downgrade or eliminate reception
- simply having too many people trying to connect in the same cell at the same time can make it impossible to connect: a device apparently displaying that it has a good signal may be blocked from starting a new connection (anyone who has been to a football match, large concert, a busy shopping mall or got stuck in a traffic jam will have experienced this).

Rolling out rural mobile connectivity – a case for rural roaming?

Mobile Network Operators (MNOs) admit that improving coverage in rural areas is complicated, especially in hilly or extremely remote locations. In addition to practical difficulties of installing and maintaining network equipment in these locations, making the commercial business case to build new mobile infrastructure in areas of low population density and in which fewer 'paying customers' work and reside, can be very challenging.

Many stakeholders are beginning to make the case for Ofcom to enforce rural roaming. This would mean that whenever a consumer passes into a rural area where their chosen mobile operator can't get a service, their phone would be allowed to 'roam' onto another operator's network (assuming the signal is strong enough and present). This approach is similar to when you go abroad and your mobile signal can roam on to different networks. However, in areas where there is no coverage at all, rural roaming will not be a solution.

5G – the future

The next big thing in mobile connectivity is 5G. Two companies, EE and Vodafone, have already launched 5G networks on a small scale in the UK, with O2 and Three due to do the same later in 2019.

5G will enable exciting new services and applications including:

- faster mobile broadband and a more consistent experience in congested areas with a very high number of devices
- industrial applications, enabling businesses to improve their productivity, for example through predictive maintenance and real-time analytics
- Internet of Things (IoT) services, many of which will help councils and businesses deliver services more efficiently including:
  - transport and logistics: connected parcels and fleet tracking
  - health and social care

- environmental monitoring: sensors monitoring air quality and water pollution in real-time
- smart agriculture and smart animal farming, smart retailing
- connected and autonomous cars: allowing cars to communicate with each other, other road users and even the road infrastructure.

The roll out of 5G presents opportunities for councils:

The first wave of the 5G roll out will see MNOs re-use existing sites to install the new infrastructure. Eventually, to widen coverage further, they also need to install lots of new base stations as the cells are smaller. These could even be on lamp-posts, though this may not happen for some time after the initial roll out of 5G.

More importantly, due to the way 5G works it is closely connected with the Smart City agenda and will enable centralised control of lots of different street infrastructure owned or managed by councils, such as street lights, water meters, and bus stops.

The Government is funding trials for 5G technology in Liverpool, Bath, Bristol, Worcestershire and the West Midlands as well as rural trials in Shropshire and Somerset.

For more information on 5G please see the Commons Library Briefing - https://researchbriefings.parliament.uk/ResearchBriefing/Summary/CBP-7883

Wifi hotspots

Wifi hotspots work in much the same way as domestic wifi networks – they enable a wifi enabled device such as a phone, tablet or laptop to connect to a broadband signal if it's within range of the access point.

In 2014 the UK had one wifi hotspot for every 11 people. They are operated by many different providers and can be found in public buildings such as museums, libraries, town halls and on public transport, as well as in private locations such as restaurants and cafes.

Many hotspots are operated by mobile providers, others by broadband providers, some are city-wide such as the CityConnect service provided by the City of York Council.[9] BT is replacing its phone boxes with InLink units which offer ultrafast wifi as well as device charging, a 999 service, information via a touchscreen tablet and 55 inch screens.

Most wifi hotspots require a user to register. While some are free, others are commercial services. Some place a restriction on what internet services they will allow. Free networks often serve advertising to users, use their details for marketing, or sell their details to third parties.

There are also risks of using public wifi as the security can be lax or non-existent. A properly set up wifi network will have encryption to protect users, but there's no guarantee that a public network will be using it. It's possible that hackers might try and use security vulnerabilities to snoop on users' traffic, steal their details, or, worse, distribute malware or viruses to their computer.

9 www.york.gov.uk/info/20151/community_innovation/695/city_centre_wi-fi

The role of a councillor

As a councillor you will know the real difference you can make to people's lives. You will also be aware of the balance you need to strike between the needs of your area, your residents, community groups, local businesses, your political party (if you belong to one) and the council. Digital connectivity presents many similar challenges to just about any other issue that you will need to deal with.

Understanding the digital connectivity in your local area

Residents will often contact councillors to talk about roads being dug up, mobile phone masts being erected, poor connectivity and a host of other issues related with digital connectivity. In your role representing your local area you will need to be an advocate for your residents and businesses or direct them to people who can answer their query.

Many county or unitary councils have in place a broadband delivery programme. District councils may also have officers or councillors responsible for economic development of which digital connectivity is an important strand. Contacting them is an excellent first step to better understanding the local digital connectivity context.

If your area suffers from poor digital connectivity, you might also wish to contact broadband and mobile providers to understand whether they plan to roll out improved connectivity to your area soon, or whether there are any barriers to this.

You can also consult Ofcom's latest connectivity coverage reports[10] to understand the connectivity within your area.

You might wish to complement this with a formal or informal consultation to gather information to improve your local understanding. For instance conducting an informal survey of mobile phone networks recording not-spots, collating lists of places where broadband is slow, finding out from local businesses if poor connectivity is hampering their ability to do business and so on. There are many ways to do this, either by knocking on people's doors, holding a public meeting, sending letters or leaflets or using an online service like SurveyMonkey.

10 www.ofcom.org.uk/research-and-data/multi-sector-research/infrastructure-research/connected-nations-2018

People you can contact:

- members of the council executive with digital connectivity as part of their portfolio. Portfolio titles can vary from council to council but could include ICT, digital transformation or Infrastructure
- council officers with responsibility – it will vary from council to council but might be in the digital, strategy, economic development or transformation teams
- Mobile UK who represent MNOs www.mobileuk.org.
- broadband providers, it might be Openreach, Gigaclear, Hyperoptic, Virgin, Cityfibre, Vodafone or TalkTalk. You can check who the right company might be: https://gosuperfastchecker.culture.gov.uk/connectivity-options/ .

You can then use this information to make a case to MNOs and internet service providers that they need to work harder to deliver the right services to residents in your ward or division.

You may also need to talk to broadband companies and MNOs to ensure they are fulfilling their responsibility contained in the Code of Best Practice on Mobile Network Development in England[11] to consult with local people and other stakeholders before they submit planning applications.

Questions to ask members of the public

- Do you know what broadband connection speed you get?
- Is your experience of using your broadband connection satisfactory?
- Can you receive a good mobile phone connection inside and outside your premises or at work?
- Have you talked to your neighbours about working together to form a consortium under a scheme like Virgin Media's Cable my Street or Openreach's Community Fibre Scheme, to attract a broadband provider to supply your street with faster speeds?
- Have you been consulted by the MNO or broadband company about their roll-out plans?

Questions to ask local businesses

- Do you have the digital connectivity you need?
- Do you know what broadband connection speed you get?
- Do you understand how a faster and/or more reliable broadband and mobile connection could help your business grow?
- Have you talked to other nearby businesses about forming a consortium to attract investment?
- Have you considered applying for the Government's Gigabit Broadband Voucher's Scheme?
- Would you be interested in becoming a broadband hub and connecting other local premises?
- Have you considered letting an MNO install a mobile base station on your premises?

11 www.mobileuk.org/cms-assets/documents/259876-147086.code-of-best-practice-2016-edition-pub

Community leadership

Community leadership is where a councillor can make a real impact in helping deliver good connectivity for the people they represent. Bringing people together to help apply for money from government and industry schemes can help unlock investment in digital infrastructure that might never happen otherwise. It can also play a vital role helping residents consider where it is most appropriate to build new digital infrastructure, such as a phone mast, to improve residents' and businesses' connectivity whilst conserving local landscapes.

Aggregating local demand[12]

> "Councillors will be vital in ensuring the rollout of broadband to the final five per cent of properties in the county – they will need to create communities to band together and bid for money from the Government's various schemes. This is work that officers can't do."
>
> **Paul Chatwin**, Superfast Staffordshire Programme Manager

Local communities may not be able to engage and negotiate confidently with all the different organisations involved in rolling out digital infrastructure: MNOs, Openreach, other infrastructure providers, engineering companies etc. There are many things that councillors can do to help their communities:

- **hold open and/or public meetings**, inviting residents, local community groups and representatives of telecommunications providers carrying out the rollout of digital infrastructure to ensure views are aired and there is good communication between all sides
- **put issues on the agenda** of community meetings
- **ensure that telecommunications companies engage** properly with communities in the areas where they are planning to work and liaise between all parties to ensure that issues are properly resolved
- **councillors in multi-tier authorities can work with other tiers** of local government to get them involved and lend their weight to local campaigns
- **Involve your local MP** so that they can ask a question in parliament or raise local issues with the Department for Digital, Culture, Media & Sport (DCMS) and add their voice to campaigning.

12 www.gov.uk/government/publications/community-led-broadband-schemes/case-studies#cotwalton-community-broadband-case-study

Many of the digital infrastructure companies have programmes that are designed to help communities aggregate demand for broadband such as the Openreach Community Fibre Partnership.[13] To help councillors navigate through all the different ways a councillor can help a community get better broadband, the Government has created a three-stage approach:

A. Check requirement – use the postcode checker to see whether superfast broadband is available or coming soon.

B. Agree approach – the Government lists six different approaches, work out which one suits your local community best.

C. Local action – the exact approach will depend on the model you choose.

There is detailed guidance on the Gov.UK website[14] and a list of successful broadband community partnerships.[15]

Supporting communities through the installation of new digital infrastructure

In order to roll out greater digital connectivity, telecommunications providers carry out thousands of roadworks every year to maintain and upgrade their infrastructure. These, by their very nature, can cause disruption for residents. It is important that the councils and councillors maintain pressure on contractors undertaking the work to do so efficiently, leaving the road in the same state as they found it. At the same time, it is important to keep residents informed about the disruption and make clear that the resulting faster connectivity will provide a longer-term benefit that far outweighs any short-term delays.

Councillors can also be contacted by residents about the location of a new mast in their areas. The maintenance of the local landscape is an important doorstep issue. People take great pride in their areas and poorly sited infrastructure can affect the look and feel of a community's home. That said, universal coverage will require new infrastructure to be built in sometimes untouched, sparse rural landscapes. Councillors can play an important role working with mobile infrastructure providers and residents to find the best places to site masts.

Health effects of mobile infrastructure

Some residents may have concerns around the health risks posed by new mobile infrastructure.

Public Health England (PHE) has published a webpage about exposure to the radio waves from mobile phone base stations, including those for 5G networks.[16] It explains the health-related reviews and assessments have been performed, as well as the practical measures that are in place to protect public health.

13 www.homeandbusiness.openreach.co.uk/fibre-broadband/community-fibre-partnership
14 www.gov.uk/government/publications/community-led-broadband-schemes/introduction-to-community-led-schemes
15 www.gov.uk/government/publications/community-led-broadband-schemes/case-studies
16 www.gov.uk/government/publications/mobile-phone-base-stations-radio-waves-and-health/mobile-phone-base-stations-radio-waves-and-health

Based on the accumulated evidence and reviews, PHE advises that the guidelines of the International Commission on Non-Ionizing Radiation Protection (ICNIRP) should be adopted and there is no convincing evidence that radio wave exposures below the ICNIRP guideline levels cause adverse health effects.

While a small increase in overall exposure to radio waves is possible when 5G is added to the existing network, the overall exposure is expected to remain low and well within the ICNIRP guidelines.

PHE continues to monitor the health-related evidence applicable to radio waves, including in relation to base stations, and is committed to updating its advice as required.

Code of Best Practice

Finally, should you wish to talk through the siting and build of infrastructure, it is useful to first refer to the Mobile Network Operators' 'Code of Best Practice on Mobile Network Development in England.'[17] It outlines how MNOs must develop their networks responsibly and undertake 'appropriate community engagement and suitable pre-application consultation with local residents, communities and their representatives'.

17 www.mobileuk.org/cms-assets/documents/259876-147086.code-of-best-practice-2016-edition-pub

CASE STUDY

East Hagbourne Parish Council

The challenge

When Councillor Cordelia Gover joined East Hagbourne Parish Council in Oxfordshire she thought her digital responsibilities would only extend to updating the village website. As it turned out, thanks to her new role, she became a digital connectivity expert and enabled her part of the village to be connected to full-fibre broadband.

When she started, East Hagbourne was a village of two halves. One end was getting superfast broadband whilst the other was crawling along on a less than 'decent' connection. Not satisfied with the status quo, Councillor Gover used her unique position as a representative at the centre of the community to try to solve the problem.

The solution

Councillor Gover contacted her local county council who helped link her up with a broadband provider to provide a quote for installing full-fibre broadband to her end of the village.

That created the first hurdle as the bill was £36,000, an unaffordable sum. Her contact at the council suggested they include the local primary school in the area they wanted to connect to unlock Openreach's Community Fibre Partnership scheme. This covered £30,000 of the installation cost. With the school on board this left a final hurdle of where to find the extra £6,000. This took time to solve as there was no public money available to cover the shortfall.

Councillor Gover discovered that among the houses being connected were two businesses being run from home. Councillor Gover approached both to ask them to apply for £3,000 Gigabit Vouchers to cover the remaining cost. They were happy to get on board and the scheme will break ground in the summer of 2019.

It's been a long haul but through her persistence, hard work, organisation, imagination and community leadership her community will get full-fibre broadband.

> "At the start of this project I didn't think it was fair that we should be penalised for living at the furthest end of a copper wire connection and that's what spurred me on."
>
> **Councillor Cordelia Gover**

The impact

The whole scheme for 92 properties will be completed at no cost to any of East Hagbourne's residents and will mean they are all capable of connecting to gigabit capable broadband.

Lessons learned

- Take action, speak to council officers and find out all the information you can about who supplies broadband and where.
- Research alternative sources of funding and talk to officers and broadband providers to see what is on offer.
- Be imaginative about where you look for solutions to problems – do local broadband providers have funding schemes, can you get Gigabit vouchers?
- Don't be put off if you're not a technical expert, ask basic questions and learn as you go along. Councillor Gover got passed by a broadband provider to the 'wayleaves' team and had no idea what a 'wayleave' was. You will quickly find that you know more than the people you represent.
- Be patient and persistent; don't give up even if you're continually passed from person to person. At one point, one of Councillor Gover's contacts left Openreach without handing over her issue to someone else and she had to start again.
- Be very organised: log every call on a spreadsheet, have the detail at your fingertips.
- Talk to your community. As this scheme covered a local road Councillor Gover was able to knock on their doors to ask her neighbours personally about their broadband speed. Other places might benefit from a public meeting or a survey.
- Manage expectations, don't promise things you may not be able to deliver.

Role of the councillor

- Community leadership – Councillor Gover spotted a problem, found the solution and was able to follow it through.
- Representing her area – Councillor Gover was able to have conversations with the school, the local businesses, the council and Openreach that her neighbours weren't about to have.
- Convening power - Councillor Gover was able to put together a consortium that achieved things that residents acting on their own couldn't.

Contacts:

Openreach Community Fibre[18]

Gigabit Broadband Voucher Scheme[19]

18 https://communityfibre.openreach.co.uk
19 https://gigabitvoucher.culture.gov.uk

Developing council policy and strategy

If your council needs to improve the broadband and mobile connectivity enjoyed by its residents, it will need to develop clear strategies and policies to do so. As a local councillor you can contribute to this in a variety of ways:

- **through the overview and scrutiny function** or on committees you are appointed to
- **getting involved** in advisory and policy groups
- **talking to executive members**, officers and senior officers
- **picking up on issues you receive** via case work
- **through your membership of a political group**, using that as a conduit to make party policy.

Councillors can bring in the skills they've developed on their professional lives – Rutland's Digital Strategy was heavily influenced by Councillor Oliver Helmsley (now the leader) and Councillor Gordon Brown who brought in an understanding of the importance of digital connectivity from their previous careers.

Questions to ask officers

- Are we doing everything we can to make it easier for residents, businesses or voluntary/third-sector organisations to get superfast broadband?
- Do we know what percentage of the council area is covered by superfast broadband or good 3G/4G coverage by all four major providers?
- Have we got a digital infrastructure strategy?
- Do we have a responsible officer ready to act as a contact for digital infrastructure providers and breakdown internal silos where needed?
- Are we talking to local broadband providers and MNO's to ensure we are smoothing the way for them?
- Have we thought of any innovative approaches to make it easier for broadband providers and MNOs to install their kit?
- Have we undertaken a cost/benefit analysis to work out the return on different commercial models for attracting broadband providers and MNOs?

The role of a council

The role of councils in driving the rollout of superfast broadband infrastructure is derived from their general duty to promote wellbeing as well as their role to lead local communities. This has led to councils taking innovative approaches to stimulating investment where the commercial market hasn't delivered.

Even where councils aren't directly involved in delivery programmes, in their role as planning and highways authorities they have a vital practical part to play in ensuring that existing rollout work is done efficiently and that new developments meet emerging standards for connectivity. It also varies depending on the type of council taking the action:

- **Education** – ensuring that schools are connected, using schools as hubs for full-fibre connections – county councils, unitary authorities, metropolitan and London boroughs.
- **Libraries** – similarly, ensuring that libraries are connected and can be used as hubs for full-fibre connections – county councils, unitary authorities, metropolitan and London boroughs.
- **Transport** – ensuring that traffic works are co-ordinated with plans to roll out digital connectivity infrastructure – county councils, unitary authorities, metropolitan and London boroughs.
- **Housing** – ensuring that all new builds are properly connected – district councils, unitary authorities, metropolitan and London boroughs.
- **Planning** – ensuring that planning policies are sympathetic to the needs of companies rolling out digital infrastructure and barriers are removed from the planning process. Also ensuring that developers are considering how best a new development can be provided with excellent mobile and broadband connectivity and the effect it might have on other houses' connectivity ie a tall building blocking a signal to other homes – district councils, unitary authorities, metropolitan and London boroughs.
- **Asset use** – council assets such as buildings, ducts, street furniture and CCTV networks can be used to host electronic communications network equipment.

It's important that councillors create the political will to drive officers' work, North Yorkshire County Council's approach of giving operators of mobile masts a seven year business rate holiday was driven through by Councillor Don Mackenzie the Executive Member for Access. A key part of his work was developing partnerships with district councils.

One example of where councils can help make a difference is via their roles as planning authorities. In recent years, it has become apparent that the standard of digital connectivity provided to some new build homes is below par and doesn't reflect the Government's national ambition to roll out world class digital infrastructure across the country. Without future-proofed full fibre being installed as standard, residents are unable to feel the benefits of decent connectivity such as the ability to work from home or video call loved ones.

Many councils have tried to tackle the problem by amending local planning policies in line with previous Government guidance, to make clear to developers the local expectation that all developments are adequately connected. Despite this, some councils have faced legal challenges from developers and in one successful appeal by a developer, the Planning Inspectorate ruled "the provision of broadband and telecommunications would not be necessary to make the development acceptable in planning terms."

To counter this issue, the Government is currently considering enacting legislation to obligate developers to install future-proof full fibre broadband into new homes. Until it is passed through Parliament, councils have a limited ability to force developers to ensure properties are connected. Despite this, it is still worth engaging developers about digital connectivity – both fixed and mobile.

There is a growing trend amongst infrastructure suppliers who serve new developments to ask for an exclusivity agreement on housing developments. This would prohibit any other infrastructure supplier accessing the site during the build stage and would mean any other suppliers would need to wait until all the roads had been adopted and any highways restrictions were lifted from the development before they could install infrastructure. This is usually two years after the development is finished but can be much longer. The best outcome for residents is for all infrastructure suppliers to be allowed access to new build sites while they are being built, to maximise choice for the end consumer.

Questions to ask developers

- Are you installing gigabit broadband to your premises?
- Are you talking to the owners of neighbouring buildings to see if you can act as a hub for gigabit broadband?
- Have you engaged Mobile Network Operators (MNOs) on how they will supply mobile connectivity to your development and/the potential effect of your development on other areas mobile connectivity ie might a tall building block mobile signal for a community
- Are you making your new premises available to MNOs to install mobile base stations?
- Will the design of your new building restrict mobile signals inside?

- Are you planning to use 5G technology to install Internet of Things sensors to make your building more efficient?
- Have you asked your new tenants about their broadband connectivity demands?
- Is the provider connecting your development doing so on an exclusivity basis meaning other providers can't come in an connect the development? Do you recognise this presents a poor retail offer for your future residents?
- Has the developer explore the shadowing effects of the building, particularly if it's high rise, affecting the signal that other residents will be able to receive?

Many councils across the country have taken proactive action to improve connectivity for their residents:

- **Cornwall** – Superfast Cornwall has built a fibre-based network covering 90 per cent of premises which are now able to connect to superfast broadband speeds of over 24 Mbps.[20]
- **Essex** – Superfast Essex has delivered superfast broadband to 110,000 homes and businesses.[21]
- **Milton Keynes** – Partnering with Vodafone and CityFibre to install full-fibre broadband.[22]
- **York City Council** – the UK's first Gigabit City.[23]
- **Rutland** – the Digital Rutland programme connecting more than 11,000 premises to superfast and full-fibre broadband.[24]
- **North Yorkshire** – A partnership between North Yorkshire County Council and BT.[25]

More information can be found about this in a roundup of government guidance to help councils overcome issues relating to broadband rollout published on the Government's Digital Connectivity Portal at: www.gov.uk/guidance/resources-for-local-authorities.

20 www.superfastcornwall.org
21 www.superfastessex.org
22 www.cityfibre.com/news/milton-keynes-ftth-announcement
23 www.digitalyork.org
24 www.rutland.gov.uk/my-community/digital-rutland
25 http://superfastnorthyorkshire.com/#home

CASE STUDY

Norfolk County Council

The challenge

By 2017, thanks to publicly funded roll out, people in Norfolk were enjoying dramatically improved access to the internet, with more than 90 per cent having access to superfast broadband, up from 50 per cent a few years previously.

However, trying to use their mobile phone was a different story. Although official maps produced by MNOs and Ofcom claimed that Norfolk had good 3G and 4G coverage, anecdotal evidence suggested a significant chunk of the county had no coverage at all. People couldn't access the internet from mobile devices and dropped calls were common, with one in five attempts to make a call unsuccessful.

The solution

While the council's 'Digital Innovation and Efficiency Committee' had spent £70 million of money from Government across three phases of the 'Better Broadband for Norfolk programme', the lack of public money for mobile meant they hadn't explicitly tackled their 'not-spot' problem.

Realising that the council could improve mobile connectivity by using its public buildings to host mobile cells and masts they decided to take an innovative approach to tackling the problem. Firstly, they needed to establish a truly accurate picture of mobile network coverage as Ofcom data was unreliable. They spent £25,000 on a 'drive study' to map reception across 3,500 miles of A, B and C roads as well as the main footpaths, the Broads and railway lines using handsets from all four MNOs. The study gathered six million data points which proved the official maps were inaccurate.

The impact

The council had already been talking to the MNOs for several years and armed with accurate data they were able to work out how they could fill the gaps in mobile coverage. They identified 200 of their buildings suitable for hosting mobile base stations and will help fast-track installation by streamlining planning, enabling MNOs to rent sites at a lower rate and granting wayleaves for free.

Lessons learned

One of the main lessons learned is the need to build on initiatives from all parties. Councillors involved in the programme believe it succeeded because the committee provided focus and political leadership as well as showing commitment to DCMS and local residents.

Appointing dedicated officers for both broadband and mobile ensured consistency and expertise.

Role of the councillor

- Represent your local area: councillors took action to find out how poor mobile coverage affected their constituents.
- Explain the issues: ensure that residents understand the implications of policy.
- Develop council policy: The council took an innovative approach to understanding the scale of the problem by conducting a drive study and then worked with MNOs to find a mutually acceptable solution.
- Planning and regulation: The council used their planning policy to ensure they were removing barriers from MNOs installing new base stations.
- Use a full range of influencing techniques: Councillor Strong explained to her residents that if they wanted mobile phone reception they would need to put up with masts in an Area of Outstanding Natural Beauty which helped them become more receptive to the idea of new mobile infrastructure being built in their area.

Future plans

As Norfolk's second biggest landowner, the council is using connectivity improvements to facilitate localised experiments such as enabling self-driving tractors to plough every last metre of a field, while low-power tags on agricultural machinery will protect against theft and smart livestock tags feed real-time data about animal health back to farmers.

An Internet of Things conference sponsored by the council in November 2018 has created a pilot project to install heat sensors in rural roads. This will enable Norfolk to target the use of gritters only where roads are icy, reducing their 150 gritter runs a year. The savings on one run (£40,000) will cover the cost of the sensors.

Checklist of actions a councillor can take to improve mobile connectivity

- check the mobile coverage in your areas via online maps published by Ofcom and the MNOs
- check if this reflects reality on the ground, if not, conduct your own informal drive study to get accurate data
- create political leadership by persuading the executive to set up a committee or appoint a cabinet member to own the issue
- put a qualified officer in charge to create stability
- work with the MNOs to create an approach to expanding mobile coverage
- consult with local residents to find out what they think.

Contact

Norfolk County Council Digital Innovation and Efficiency Committee.[26]
Data from Norfolk County Council Drive Study.[27]
Better Broadband for Norfolk Programme.[28]

26 www.norfolk.gov.uk/what-we-do-and-how-we-work/councillors-meetings-decisions-and-elections/committees-agendas-and-recent-decisions/digital-innovation-and-efficiency-committee
27 www.norfolk.gov.uk/what-we-do-and-how-we-work/policy-performance-and-partnerships/policies-and-strategies/digital-inclusion-strategy/mobile-coverage-in-norfolk
28 www.betterbroadbandnorfolk.co.uk

Developing a digital infrastructure strategy

A council's digital connectivity strategy should explain how encouraging and facilitating the deployment of full fibre and mobile networks can help local communities and help the council deliver its wider ambitions. It will also describe how digital connectivity could help to boost economic growth, digital inclusion and deliver a range of benefits including the more effective provision of local public services. Things that it could include are:

- **Identifying a senior leader to provide leadership**, engage with all stakeholders, and be a single point of contact for all companies and community groups. Most councils who have set up broadband delivery groups have placed an officer in charge reporting to a member of the executive or a committee chair.
- **Ensuring that different departments collaborate** with each other to make it easier for broadband companies and mobile network providers to install and upgrade their kit. This also applies to co-ordinating with utility companies so that street works can be combined with the deployment of fibre infrastructure. The Government calls this 'barrier-busting and has a 'Street Works Toolkit'[29] which has guidance on how to do this and some case studies of best practice from councils.
- **Setting up partnerships with other local public sector bodies** such as the NHS and to aggregate demand by combining connectivity needs when entering into procurements – Gloucestershire County Council and the county's clinical commissioning group have done this.
- **Clarifying who does what in two-tiered councils** and arranging committees to ensure the work gets done – the Coventry, Solihull and Warwickshire example shows how this can be done.
- **Exploring different models of collaboration with broadband and mobile companies** to ensure that local communities can feed their requirements back to the industry and to enable a collaborative approach between councils, communities, local businesses and the companies.
- **Working out how to make council buildings and assets available** to companies rolling out fixed-line or mobile networks. This includes mapping council assets and working out what to charge companies for access. North Yorkshire County Council decided to give companies installing mobile bases stations in areas with poor connectivity a seven year business rate holiday. The Government advice on this includes:
  - advice on mapping public sector assets[30]
  - advice on different commercial models [31]
  - an overview of access agreements[32]
  - councils are also encouraged to consider how the Government's Digital Infrastructure Toolkit can be applied to their buildings.[33]
- **Training officers and elected members** on issues relevant to the provision of digital connectivity.

29 www.gov.uk/government/publications/framework-for-uk-fibre-delivery-street-works
30 www.gov.uk/guidance/mapping-public-sector-assets
31 www.gov.uk/guidance/commercial-models
32 www.gov.uk/guidance/guidance-on-access-agreements
33 www.gov.uk/government/publications/digital-infrastructure-toolkit

Broadband and mobile companies – questions to ask

- Are you adhering to the Code of Best Practice on Mobile Network Development in England?
- Have you consulted clearly and properly with all the residents and businesses in my ward?
- Do you have a Regional Affairs Manager with strategic oversight of broadband roll out in my area that I could talk to?
- Will you respond to enquiries within ten working days?
- Have you held professional development workshops on technological and other developments for local planning authority officers and elected members?
- Is your coverage map accurate, and if not, why not?
- Will you be reinstating all roads and pavements etc to their previous state?
- How can I help you ensure that the council is dealing efficiently with your planning applications?
- Are you sharing your site and other infrastructure with other operators?
- Will you ensure that equipment is sympathetically designed and camouflaged where appropriate?
- Do you meet the Ofcom codes of conduct for broadband speed?
- How can the council help you rollout infrastructure more quickly?
- Are your rollout plans commercially viable?
- Do you have a problem gaining access to all the properties you need? Can the council help you with wayleaves?

Utility companies – questions to ask

- Do you have a policy or procedure for informing other utility companies and broadband/ mobile companies when you are digging up roads to allow them to install digital connectivity infrastructure at the same time?
- Do you have a relationship with the council's barrier busting team?
- Would it be a cost saving to join forces with a broadband or mobile company to let them install digital connectivity at the same time as you carry out traffic works?
- What do you see as the main barriers to sharing traffic works with other utility companies?
- What benefits are there for you in making your infrastructure available for sharing?
- What additional incentives would you like to see in place to encourage more sharing?

CASE STUDY

Coventry, Solihull and Warwickshire

The challenge

Despite its proximity to one of England's biggest urban areas – the West Midlands –by 2012, Warwickshire County Council found that its digital connectivity lagged behind its physical connectivity. Towns and villages outside the main population centres had very poor connectivity and little prospect of being connected to superfast broadband.

With the prospect of Government money being made available the council wanted to ensure they got a slice of the pie.

The solution

Councillors in Warwickshire quickly realised that they would be more successful bidding for Government money if they created a partnership with other neighbouring authorities.

Thus they formed the Coventry, Solihull and Warwickshire partnership between Warwickshire County Council, Coventry City Council, Solihull Metropolitan Borough Council and the six district authorities in Warwickshire.

> "Our partnership is delivering for people across all three councils because we have made it a priority to treat everyone fairly. We've made sure that we've asked for the same amount of money from everyone and ensured we have delivered the benefits to all councils equally."
>
> **Councillor Kaur, portfolio holder for the programme**

The project has also included councillors at all levels. One way parish and district councillors have got involved is by becoming digital champions, helping at the local level by talking to local communities and working out where to put infrastructure like cabinets.

Since 2013 the partnership has spent nearly £36 million across three contracts, delivering broadband to more than 76,000 premises that wouldn't have been reached by commercial companies on their own.

The impact

- By March 2020 98 per cent of people in the partnership area will be able to get at least superfast broadband at a minimum of 30Mbps.
- People moving into new housing developments expect to be connected even though broadband is not considered in planning conditions in the UK at present. The programme has ensured that new homes being built in Warwickshire are provisioned by encouraging dialogue with developers to work with network providers during construction.
- Rural businesses who used to have to travel to urban areas just to send an email now have the internet to their premises.
- Elderly people who've retired to the countryside are using services like Skype to keep in touch with family members.

Lessons learned

- The project worked by keeping all the various project partners involved.
- work hard to get buy in from all partners, listen to them and work out how to deliver to their needs
- ensure proper partnership working
- make sure that everyone contributes a fair share and gets the same out of the project
- recognise that politics can be an issue, so be diplomatic
- don't be afraid to repeat your message, eventually it will be heard.

Role of the councillor

The portfolio holder for infrastructure kept leaders of other councils continually engaged to keep the momentum going and ensure the project kept delivering.

Future plans

Having rolled out broadband into rural communities the partnership is now developing services that will use the connectivity to improve services to communities, especially those using adult social care.

The aim is to enable people to look after themselves, to get on with their lives and help them deal with the decline of rural services such as bus routes. They are developing tailored voice services and training people to use tablets to pay bills and do their shopping.

They're also using improved connectivity to spur plans to train children in coding and support industry such as 'Silicon Spa' – the gaming companies based in Leamington Spa, and Jaguar Land Rover who are testing batteries and autonomous vehicles in Warwickshire.

Checklist

- think big, talk to your council neighbours, they may have the same problems as you and be able to form a consortium
- involve everyone, councillors with local knowledge can help delivery in their communities.

Contact

www.cswbroadband.org.uk

Resources and contacts

Mobile UK

Mobile UK is the trade association for the UK's mobile network operators - EE, O2, Three and Vodafone: www.mobileuk.org

Code of practice: www.mobileuk.org/codes-of-practice.html

INCA

INCA is the trade association for the UK's broadband providers.

www.inca.coop

Broadband Stakeholder Group

The Broadband Stakeholder Group is the UK Government's advisory forum for telecoms policy.

www.broadbanduk.org/contact

Ofcom

Ofcom is the regulator for the broadband and mobile industries: www.ofcom.org.uk

Ofcom Mobile and Broadband Speed Checker: https://checker.ofcom.org.uk

App – www.ofcom.org.uk/phones-telecoms-and-internet/advice-for-consumers/advice/ofcom-checker

The LGA

www.local.gov.uk/topics/economic-growth/digital-connectivity

Localism@local.gov.uk

The Government Digital Connectivity Portal

The Digital Connectivity Portal provides guidance for local authorities and network providers on improving connectivity in local areas.

www.gov.uk/guidance/digital-connectivity-portal

Glossary

Broadband speeds

Broadband speeds are expressed as an amount of data downloaded per second, usually in megabits per second (Mbps).

- Megabits and megabytes: Megabits (Mb) and megabytes (MB) are units for expressing a quantity or amount of data
- Eight megabits (Mb) is equal to one megabyte (MB)
- Eight gigabits is equal to one gigabyte (GB).

Decent broadband
Ofcom defines a "decent" broadband as a connection capable of delivering a download speed of at least ten Mbps and an upload speed of at least one Mbps.136 This is the specification for the Government's Universal Service Obligation (expected to be available in 2020).

Superfast broadband
Superfast broadband does not have a single definition. The UK Government defines it as speeds greater than 24Mbps, whereas Ofcom and the European Commission define it as speeds greater than 30Mbps. The Scottish and Welsh Governments also use the higher definition.

Ultrafast broadband
Ultrafast broadband does not have a single definition. The UK Government defines it as speeds of 100Mbps and higher, whereas Ofcom defines it as speeds greater than 300Mbps.

Gigabit-capable connection
The UK Government defines a "gigabit capable" connection as one that can support 1 gigabit per second (Gbps) download or upload speeds. One Gbps is equal to 1000 Mbps.

Broadband technologies

ADSL

ADSL (asymmetric digital subscriber line) technology delivers broadband using copper telephone lines – the connection speed will depend on which type of ADSL is being used; and the quality and length of the line from the telephone exchange to the premises. The further away from the telephone exchange, the slower the connection.

Fibre optic cable

Fibre optic cables are made of glass or plastic. They transmit data using light. Fibre optic cables can transmit more data with faster speeds and significantly less signal loss with distance compared to copper wires.

Fibre to the Cabinet (FTTC)

Fibre to the Cabinet (FTTC) is the main technology used for superfast broadband roll-out in the UK. FTTC connections use fibre optic cables to carry the signal from the telephone exchange to street cabinets and then existing copper lines are used from the cabinet to premises.

FTTC technology can provide speeds of up to 80 Mbps. However, the maximum speed that a premises can receive reduces the further away it is from a cabinet, with superfast speeds (above 24 Mbps) available up to approximately 1000m from the cabinet.

G-fast

G-fast is a broadband technology being deployed in a pilot commercial roll-out by Openreach. G-fast is a variant of FTTC technology, which allows ultrafast speeds (up to 300 Mbps) to be delivered using the same copper telephone lines that are used in FTTC technology.138 It works by expanding the frequency range over which signals are transmitted, allowing for higher speeds. Higher frequencies slow sharply with distance however so only premises within 350 meters of the cabinet are expected to benefit. G-fast is installed by fitting an 'extension pod' onto existing cabinets, and therefore can be installed quickly at low cost.

Cable broadband

All cable broadband in the UK is provided by Virgin Media. Cable networks use a combination of fibre optic cables to street cabinets and high-grade co-axial cables (which are also used for cable TV) from the cabinets to premises. Co-axial cables experience less signal loss over distance compared to copper wires. The latest standard DOCSIS3.One allows for speeds of around one Gbps (1000 Mbps) by cable.

Full-fibre [Fibre to the Premises or Home (FTTP/FTTH)]

Fibre to the Premises (FTTP) or Fibre to the Home (FTTH) is a technology where the fibre optic cable runs all the way to the premises or home. FTTP/FTTH can provide download speeds of one Gbps (1000 Mbps). This is also referred to by the Government as full-fibre.

Fixed wireless
Fixed wireless uses specific frequencies of the radio spectrum to transmit signals through the air in a similar way to mobile phone networks, doing away with wires. Depending on the number of users served by the wireless connection, it is capable of delivering superfast speeds. Most wireless ISPs only offer limited coverage in specific areas, for example rural villages.

Satellite broadband
Satellite broadband is an option for those who live in rural areas where traditional fixed-line based broadband services aren't available. It uses a satellite dish to provide access to broadband services. The main advantage of satellite broadband is that it can be provided virtually anywhere in the world, as long as there is a clear line of sight to the satellite (south for the UK).

Other

Bandwidth
The maximum amount of data that can be transmitted along a channel – similar to the amount of water that can be squeezed through a pipe.

BDUK
Broadband Delivery UK

Contention ratio
The degree to which bandwidth is shared between different end-users at the same network node. When more end-users share the same bandwidth within a network this can lead to a slowdown in performance.

Connection charge
The fee a broadband provider charges customers when it installs a new line to connect their premises to its network, or the fee a broadband provider charges customers when it takes over the fixed broadband line serving their premises. This fee is often waived or reduced if customers also take up certain retail broadband packages with the provider.

Download speed
Also downlink or downstream speed. Rate of data transmission from a network operator's access node to a customer, typically measured in Megabits per second (Mbps).

DCMS
Department for Digital, Culture, Media and Sport.

Exchange
The local telephone exchange is the building where all consumers' copper telephone lines are connected to enable telephone calls to be switched, and where network equipment is installed which enables consumers' data traffic to be routed via an operator's core network to its destination.

Fixed broadband
Broadband delivered over a fixed line to the customer's premises.

Latency
The time it takes a single packet of data to travel from a user's PC to a third-party server and back again. The figure is most commonly measured in milliseconds, and a connection with low latency will feel more responsive for simple tasks like web browsing.

Upload speed
Also uplink or upstream speed. Rate of data transmission from a customer's connection to a network operator's access node, typically measured in Megabits per second (Mbps).

This Glossary has been derived from the following documents:

Ofcom: Implementing the Broadband Universal Service Obligation

and is published under the Ofcom licence:

www.ofcom.org.uk/research-and-data/multi-sector-research/infrastructure-research/connected-nations-2017/data-downloads/terms-of-use

and 'Superfast broadband in the UK' published by the House of Commons Library and is published under the Open Parliament Licence:

www.parliament.uk/site-information/copyright/open-parliament-licence

Appendix

Government policy – an overview

The Government has set ambitious targets to connect the country to superfast broadband and the latest mobile phone networks.

It wants 15 million homes to be connected to full-fibre networks by 2025 with coverage across all parts of the country by 2033. It also has a target for the majority of the population be able to get a 5G mobile signal by 2025.

The Government's approach is that private companies such as Openreach, Virgin Media and the Mobile Network Operators (MNOs) will take the lead rolling out the networks but they will step in with funding schemes to connect communities where it is not commercially viable for the commercial companies to do it on their own.

The Government's programmes have been delivered via Broadband Delivery UK (BDUK) which has spent more than £1.6 billion.

Current and Planned full-fibre network deployments

CityFibre/ Vodafone	CityFibre and Vodafone intend to make full fibre available to one million premises across 12 cities by 2021. The areas covered include Milton Keynes, Peterborough, Aberdeen, Edinburgh, Stirling, Huddersfield and Coventry, with an option to extend this to a further four million premises in other cities by 2025. The initial build is expected to cost up to £500 million over 20 years, and the first services are expected to go live in Milton Keynes towards the end of 2018.
Openreach	Openreach has the UK's largest full-fibre network, offering services to around 600,000 premises nationally, often in rural areas. It recently raised the full-fibre roll- out target under its 'Fibre First' programme to three million premises in up to 40 UK towns, cities and boroughs by 2020 (including new sites and publicly-funded projects). The first phase of the roll-out (in Birmingham, Bristol, Cardiff, Edinburgh, Leeds, Liverpool, London and Manchester) started in February 2018.
TalkTalk/ Infracapital	TalkTalk/Infracapital has announced a £1.5 billion plan to deploy full-fibre networks to three million premises in mid-sized towns and cities. The roll-out is expected to start in 2019.
Virgin Media	Virgin Media has committed to make full fibre available to two million premises by the end of 2019 as part of its Project Lightning programme.
Hyperoptic	Hyperoptic focuses on deploying full fibre to large residential and office buildings in urban areas. It has already covered 400,000 premises and aims for 500,000 by 2019 and five million by 2025. In July 2017 it secured an additional £100 million in funding to accelerate the build of its full-fibre network.

KCOM	KCOM's £85 million full-fibre deployment in the Hull East and East Yorkshire expansion area is entering its final phase, with more than 160,000 premises already able to receive full fibre and over 200,000 premises due to be covered by 2019.
Gigaclear	Gigaclear's full-fibre network covers 65,000 rural homes and businesses across 20 UK counties, and the company plans to make full fibre available to 500,000 premises by 2023. Gigaclear is supported by its 80 per cent shareholder Infracapital and by Railpen (the Railways Pension Fund).
CityFibre/ TalkTalk	Under the joint venture between CityFibre and TalkTalk, around 15,000 homes and businesses in York have access to full-fibre services. The network includes infrastructure originally built to serve the city council. Sky was a partner in the venture until TalkTalk bought out its stake in 2016. TalkTalk is currently building out full fibre to a further 40,000 premises in York, to be completed by the end of 2019.

Data from Ofcom's Communications Market Report 2018

You can check the rollout of full-fibre broadband by council on the Ofcom website.[34]

Government policies and funding schemes for broadband

The Government has a variety of policies to support investment in both superfast and full-fibre broadband.

Better Broadband scheme	Premises with broadband speeds of less than 2 Megabits per second (Mbps) that won't be upgraded in the next year can get a voucher worth up to £350 for basic broadband installation. https://basicbroadband.culture.gov.uk
Gigabit voucher scheme	Small and medium-sized businesses can get vouchers worth up to £2,500 to support the installation of a full-fibre broadband connection. https://gigabitvoucher.culture.gov.uk
Community Schemes	There are six different approaches to create community schemes to bring broadband to local areas. https://gosuperfastchecker.culture.gov.uk/community-led-schemes
Rural Broadband Infrastructure grant	Grants totalling £75 million are available to councils where broadband services at speeds of 30Mbps or faster are not available or planned. The funding will be used to support full fibre wherever possible. www.gov.uk/guidance/rdpe-growth-programme-rural-broadband-infrastructure-grant
The Universal Service Obligation	The USO is expected to be implemented in 2020 and will give everyone in the UK the right to request a broadband connection of at least 10Mbps if they haven't got access to one already and won't get one in the next year. The USO will fund installation costs of up to £3,400 per premises and consumers and business can make up the shortfall if it exceeds that. www.ofcom.org.uk/phones-telecoms-and-internet/advice-for-consumers/broadband-uso-need-to-know

34 https://app.powerbi.com/view?r=eyJrIjoiZTg4NDMyZjctNWJhZS00MjNjLWIxYzMtZjkwYzljNDk2NzdmIiwidCI6IjBhZjY0OGRlLTMxMGMtNDA2OC04YWU0LWY5NDE4YmFlMjRjYyIsImMiOjh9

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