Cornerstone Community Information Sheet

Safety Guidelines on electromagnetic fields from antennas

Radio frequency fields are a type of electromagnetic field. Virtually everyone in the modern world is exposed to electromagnetic fields generated by man-made sources. These include TV and radio transmissions, communications by the emergency services, medical and factory equipment, electronic car keys, baby-listening devices, WiFi and any household appliance that uses electricity.

Various regulations and guidelines apply to the construction and operation of radio base stations, including those that serve to protect health and safety.

All installations are designed to comply with the precautionary International Commission on Non-Ionizing Radiation Protection (ICNIRP) public exposure guidelines as adopted in a European Union recommendation. The UK Government and the UK Health Security Agency support this view.

Mobile phone base stations are generally composed of a cabin or cabinet, which houses the electrical equipment that generates the radio signal, a supporting structure such as a tower or pole and a set of antennas. Only the antennas emit radio waves. As one moves away from the antenna, the strength of the radio wave falls off very rapidly and as the strength decreases, so does the radiofrequency exposure level. Closer to the antennas, there is an area, or volume, where it is possible that ICNIRP guidelines for the public may be exceeded. This is known as the ICNIRP Public Zone and measures are taken, in the form of antenna positioning, signage and physical barriers, to prevent inadvertent access to this area by the public.

The extent of the zone will vary from site to site and is dependent on power input, distribution of the radiofrequency fields and the frequency range.

Clear signage at mobile phone operator sites will indicate restrictions on access and these restrictions should always be observed. The signage provides the relevant contact details for further advice.

How the guidelines are established

Many countries have adopted international guidelines suggested by ICNIRP. These guidelines, which have the formal backing of the World Health Organisation, were developed following a thorough review of the science and took into consideration **both thermal and non-thermal effects**. They are designed to protect all sectors of the population, 24 hours a day, wherever they are in relation to a radio base station. The guidelines are made up of two parts: the first is based on established and proven science; the second part incorporates a safety factor. In this way, the guidelines come with a built-in precautionary element.

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In 2020 the ICNIRP updated their safety guidelines, Dr Eric van Rongen stated 'When we revised the guidelines, we looked at the adequacy of the ones we published in 1998. We found that the previous ones were conservative in most cases, and they'd still provide adequate protection for current technologies…However, the new guidelines provide better and more detailed exposure guidance in particular for the higher frequency range, above 6 GHz, which is of importance to 5G and future technologies using these higher frequencies'.

https://www.icnirp.org/cms/upload/presentations/ICNIRP_Media_Release_110320.pdf

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RADIO PLANNING AND PROPAGATION (V.4 November 2019)
An introduction to how radio networks are planned and the limitations associated with the technology

When planning cellular telecommunications networks engineers use specialist software to predict, with a high degree of confidence, the behaviour of cellular transmissions. This then enables the operator to calculate how many cell sites are needed to provide the level of coverage and capacity required by their customers.

Radio signals at the frequencies used for cellular radio propagate in a manner that is broadly similar to light. Generally anything that casts a shadow to light will attenuate radio waves. The strength of radio signals detected at a receiving device naturally reduces the further away it is from the transmitter. In general, the attenuation (or decay) in signal power is affected by a number of variables. The main factors are:

- signal frequency (attenuation increases with frequency),
- distance (from the transmitter),
- terrain (such as hills),
- clutter (such as buildings, foliage, vehicles, and water) and
- atmospheric conditions (such as rain).

A reduction in the strength of the radio signal increases the likelihood of dropped calls and reduced data rates for internet browsing, for example.

Clutter

Any physical object obstructing the propagation of radio signals causes a reduction in the signal strength reaching a customer's device. A common term for these objects is 'clutter'. The more obvious examples are buildings and geographical terrain such as hills and trees.

Buildings cause a varying amount of signal reduction depending on their height, construction, thickness of walls, number of windows etc. Glass causes a lower reduction in signal than brick/concrete walls.

Customers will inadvertently be aware of this by finding that sometimes they need to go near windows, a higher floor of a building or even outside in order to achieve a stronger signal for their mobile devices.

Generally, the higher the signal frequency the more it will be impacted by clutter.

Tree Clutter

The effects of trees on signal degradation can be significant. Signal absorption and shadowing effects vary according to vegetation and density, and are caused by the main tree trunk, branches, and leaves.

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Cell sites located in or near trees will have signals significantly reduced. As a result, a number of extra sites may need to be built locally in order to counter-effect this.

Signal variation throughout the seasons is also a practical concern. Leaves on trees in the spring and summer can cause shadowing and reduce radio voice quality and increase the number of dropped calls.

As a result, the bottom of an antenna should a) be above the top level of the trees, b) allow greater height due to the antenna downtilt at build or for future requirements and c) allow some room for future growth of the trees.

When a cell site utilises point-to-point microwave dishes to communicate with other cell sites in the network any obstruction between these dishes will result in failed line of sight communications. As a result, dishes need to be placed above the top level of the trees.

Propagation Models

In essence these are mathematical formulae used to characterise radio wave propagation, in order to determine the signal strength at a receiving device.

Coverage Planning Tools

Radio planning engineers plan cellular networks using highly sophisticated computer programs that incorporate propagation models. Armed with data on cell site location, cell site configuration, maps, terrain etc. they are used to *predict* areas of coverage deficiency (so called 'coverage holes'), new site requirements and configurations.

Network Changes

Over time the topography and clutter in an area may change. For example, building developments, housing and tree growth can all change. As the signals received from local phone masts can degrade, as they are dependent on these factors. These reasons along with increased usage of mobile devices, customer complaints, network consolidation (mast sharing) and new technologies (5G) require a re-evaluation of a network operator's telecommunications infrastructure.

Mast sharing can result in some masts no longer being needed. As a result, they are decommissioned and physically removed. Mast sharing will however sometimes result in the need for a taller more substantial structure.

Technical surveys undertaken for reasons above may highlight that antenna height increases are required – this is more likely for sites with low antenna heights around 15m AGL, particularly street furniture sites. More details on these reasons below.

While thus far this document is generic to mobile telephony masts it should be noted that each mast has to be dealt with on a case-by-case basis.

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Site Height increases

There are a number of reasons why an operator may request a height increase on existing structures. The main ones are described below.

Maintaining existing coverage
The antennas inside, for example, street furniture sites are generally of 2 physical build designs – 'Single Stack' and 'Dual Stack'. The former describes when the set of antennas are all at the same height. The latter describes a site with 2 sets of antennas one above the other.

The 'Dual Stack' is by far the preferred option. This is due to a number of factors including greater flexibility & control for different technologies and providing optimum service performance to customers.
Site upgrades such as network consolidation between Vodafone and Telefonica and/ or new 5G technologies facilitate a Single Stack structure being upgraded to a Dual Stack structure. In a straight swap scenario at equal height the new lower aperture antennas would be lower than they were originally - resulting in significantly reduced coverage. To ensure existing coverage is maintained the whole structure needs to be increased in height.

Clutter changes

A more extreme example is when the local clutter or tree lines have changed, or are such that the mobile signals are blocked, resulting in lower quality calls and downloads for mobile device users. To provide sufficient services to customers height increases on existing masts or additional new masts are required. The former is the preferred option in many cases.

5G Technologies

5G New Radio technologies operate in higher frequency bands than older technologies. Since it operates at higher frequencies where attenuation of the radio signal is naturally higher, and the effects of clutter are greater it will normally require a higher structure to achieve the same coverage footprint. Furthermore, unlike traditional technologies 5G uses adaptive beamforming technologies to increase capacity and data speeds to the user. For effective beamforming the antenna will normally need to be mounted higher than conventional antennas. These factors drive a require for an increase in antenna height in 5G

International Commission on Non-Ionizing Radiation Protection (ICNIRP) Compliance
The addition of new technologies and mast sharing affects ICNIRP compliance, one of the health and safety requirements for a cell site, a higher minimum mast height is required in some cases.

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Planning for a better network

We sometimes need to upgrade existing sites or develop new sites to ensure network quality. This factsheets explains how we do this within the town and country planning system.

Base stations use radio signals to connect mobile devices and phones to the network, enabling people to send and receive calls, texts, emails, pictures, web, TV and downloads. Without base stations mobiles and devices will not work.

To keep up with growing demand from mobile phone users we need to upgrade existing base stations or build new base stations. An upgrade can be done in a number of ways, often by redeveloping the site to enable an increase in the number of technologies, or increasing the number or height of the antennas.

However, even after these upgrades, in some busy areas the demand for services can still exceed the capability of the local base stations. There are also some parts of the country where we do not have adequate coverage. In these situations we need to look into developing a new base station. This would improve the network coverage, resulting in improved network experiences for local customers.

There are three types of planning permission for mobile phone base stations. The type required by Cornerstone depends on the size of the proposed base station or upgrade as well as where in the UK the development is planned. In England, Wales and Scotland Cornerstone can apply for full planning permission, for prior approval through the General Permitted Development Order (GPDO) or send a notification to the local planning authority. In Northern Ireland Cornerstone can apply for full planning permission or send a notification only.

When full planning permission is required a planning application will be submitted by Cornerstone, this will be published on the local planning authority's website. Cornerstone and the local planning authority will consult with the local community. The level of consultation Cornerstone engage in is dependent on several factors including the history of telecommunications development locally. Consultation is the process by which Cornerstone and the local planning authority seek advice, information and opinions about the proposed development. Cornerstone generally undertakes consultation before submission of any application whilst the local planning authority consults once the application is submitted.

Development within the GPDO category must follow the prior approval procedure. The Council is given the opportunity to say whether it wishes to approve details of the siting and appearance of the proposed installation. These are the only factors that can be considered under an application for prior approval. Cornerstone and the local planning authority will consult with the local community in the same way as with full planning permission.

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Written notifications are for minor developments only. Cornerstone will notify the local planning authority in writing of the intention to install telecommunications apparatus. The development however, is permitted in advance by law. Cornerstone does not need to produce an application for this type of development. Consultation, both by Cornerstone and the local planning authority, is generally limited due to the minor nature of these works.

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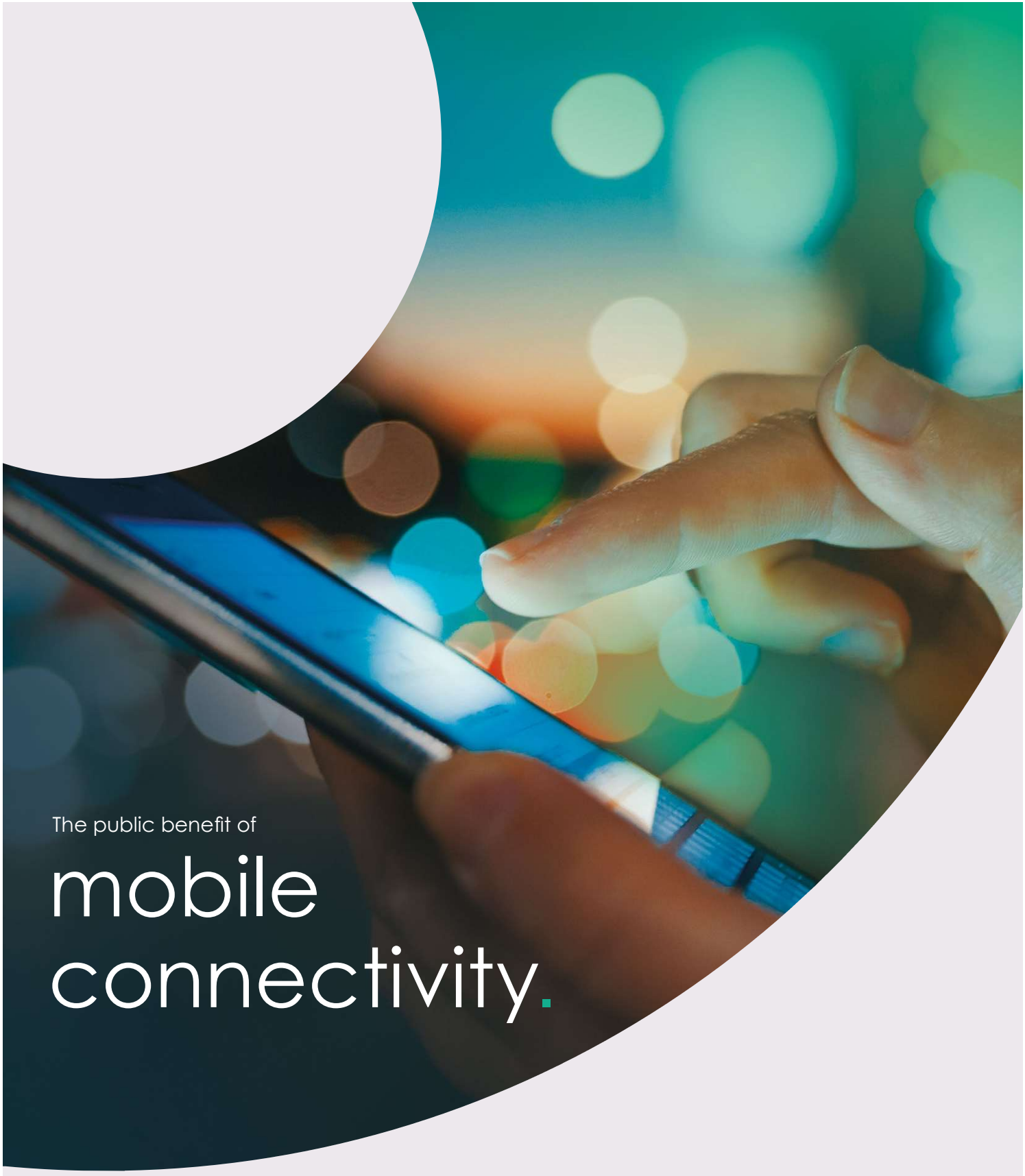


The public benefit of

mobile connectivity.

cornerstone

The evolution of **mobile connectivity.**

The demand for faster and improved mobile connectivity continues to grow. Most of us rely on having mobile phones and devices 24/7, which provides us with many benefits.

Since the launch of 2G in 1991, the mobile generation is firmly established. Not only has it provided a way to communicate with each other and exchange information, but it has given individuals and businesses an innovative platform to do much more. Over the years, we have seen 3G and 4G, and now we have been introduced to 5G. The differences between the generations have provided us with higher speed, better connection, and many more advanced features on our mobiles. Now with 5G, we can expect to experience an even more extensive range of telecommunication services.

1G

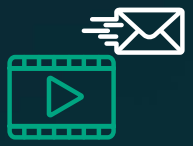
Mobile voice only

2G

Calls and texts

3G

Data services



4G

High-speed internet access

5G

Faster connection, enhanced data services

Connecting you to what matters.

Access to a reliable mobile network has become a necessity for many of us. Some of the key benefits it provides us with are:

- Connecting with family, friends, and colleagues at any time around the world
- Giving the ability to manage our personal information 24/7
- Keeping us always entertained and informed with the latest news
- Creating more productive and cost efficiencies for businesses

The economic benefit

- Businesses offering online services can extend their products to a broader audience
- Local areas and businesses can benefit from tourists and visitors as hotels, attractions, and restaurants can be booked online from anywhere in the world
- Business owners and services like doctors can provide a faster and more cost-effective service by offering both online appointments and ordering
- Digital connectivity facilitates economic growth, something which the Government is keen to progress and promote

The social benefit

- Mobile communications can help people to stay in touch wherever and whenever, which can help improve social wellbeing
- Contacting emergency services is easier, especially in remote areas
- Using a mobile wherever you go can provide better personal security
- Having access to social networking sites and applications can keep people entertained with their lifestyles and interests
- Mobile connectivity helps promote smarter and productive ways of working. For example, working from home can help minimise commuting which can provide better work and home life balance
- Access to personal information 24/7, e.g. bank accounts, can offer efficiency and convenience

5G is the next generation of mobile connectivity, providing us with a new level of experience. It will offer immense opportunities, given the faster and more reliable connectivity that it will provide. We will experience new technologies that will help us become more efficient and save costs as an individual or business.

What can we expect from 5G?

- Driverless vehicles – this will give drivers autonomy to do other things while driving
- Advanced healthcare facilities – performing surgeries remotely will be made possible, along with freeing up more GP time through better online facilities
- Enhanced Virtual and Augmented reality (AR) – used in gaming and entertainment already, with 5G, live interactions will be taken to the next level
- Greater Internet of Things (IoT) transformation – with better connected devices, the IoT will enable us to control devices more independently
- Cutting-edge agricultural operations – operating farming machinery and tools remotely will promote smart agriculture, saving time and increasing productivity for farmers

These are just some highlights of how the public benefits from mobile phones and what 5G will offer. But what's also essential is reliable mobile coverage and connectivity. Without this, we are at risk of not being able to use our phones or maximise it's potential if we experience poor coverage or no signal.

What do we need to enable mobile connectivity in the UK?

To maintain and improve mobile connectivity, it is crucial to recognise that this is only possible with the continuous deployment of mobile infrastructure throughout the UK. Mobile infrastructure (or masts as you might know them) can be placed on rooftops, greenfield sites, and street-works.

As the UK's leading mobile infrastructure services company, Cornerstone works with landowners, institutions, and public authorities to place mobile equipment on sites to enable telecom operators to deliver mobile services to the public.

With more advanced technology now available, placing mobile infrastructure has become even more necessary. To achieve this is a collaborative effort between telecoms, the legal & property industry, and landowners, and requires everyone to work together.

Recognising this, the Government introduced an updated version of the Electronic Communications Code (ECC) in December 2017, to help support the roll-out of mobile infrastructure. Ofcom also issued an ECC Code of Practice to help guide operators and landlords with site dealings and negotiations. Since the introduction of the new ECC, many landlords have been agreeing leases using the Code principles. This has helped operators and landlords, guiding them through the process and ultimately playing a key role in enabling mobile connectivity.

Working together

The future for digital connectivity in the UK lies in many of our hands. The telecom operators are constantly developing new technologies to provide better mobile services to the public in rural and urban areas. However, landlords play a crucial part in building the network too, allowing mobile infrastructure to be placed on their site. Without infrastructure, providing a mobile network to the public isn't possible, which would affect all of us as individuals and businesses.

We need to continue to work together to enable the opportunities that mobile technology brings to all of us.

Proud to be delivering sites for the future of UK mobile connectivity.

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The importance of local authority collaboration to deliver mobile connectivity

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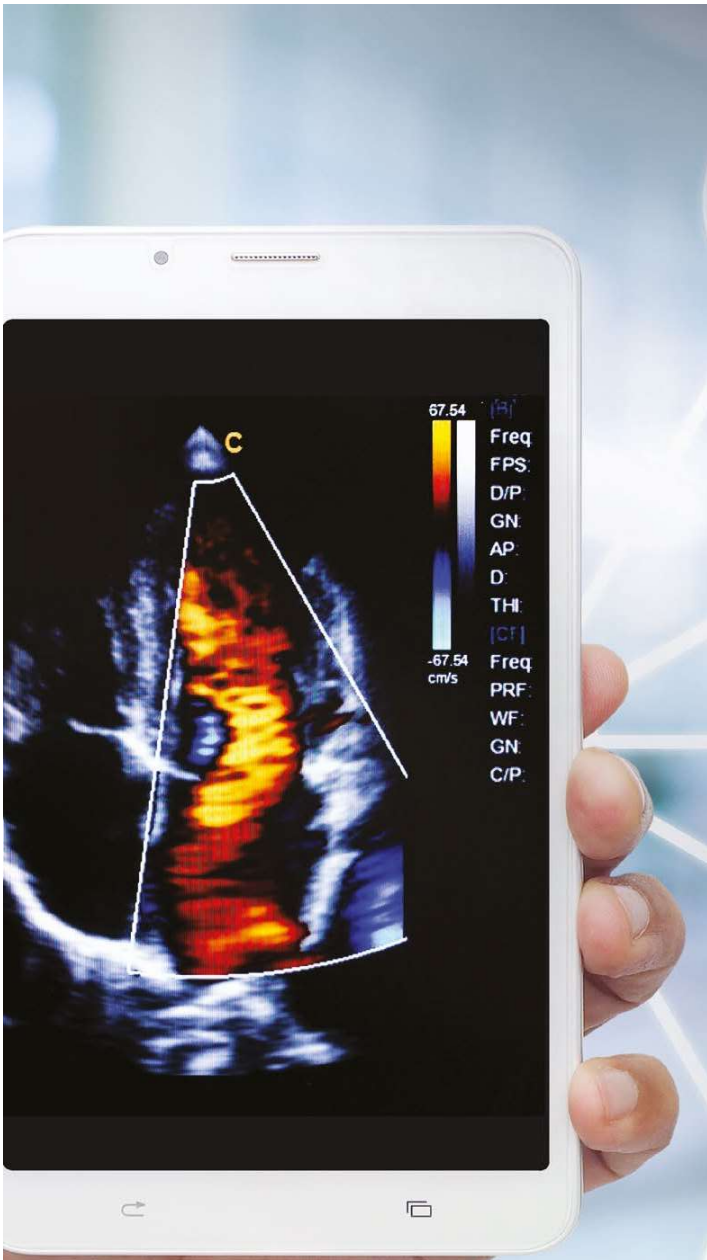


Recognising the benefits of digital connectivity for local authorities and regional 'combined authorities'.

Mobile connectivity offers countless benefits to individuals, communities and businesses across the UK. It has become part of our daily lives, allowing us to do many things like communicating with family and friends, manage businesses online, get remote access to services such as doctor appointments or banking, or shopping for our groceries.

Recognising the rapid increase of smartphone usage over the years, many local authorities and organisations have introduced their services online for their residents and local businesses.

Furthermore, with the opportunities that 5G will bring, the need for digital connectivity will be in greater demand. Trials have already begun across the UK to demonstrate the potential of 5G and how it can drive improved productivity and efficiency.

In June 2019, West Midlands 5G partnered with BT and University Hospitals Birmingham to trial the UK's first 5G Connected Ambulance. Real-time communication between the paramedics and the hospital doctors enabled the effective diagnosis of the patient at an early stage of care.

The trial showcased how a paramedic performed a remote-controlled ultrasound scan on a patient in an ambulance over a public 5G network. These trials show how digital connectivity and technology can reduce patient waiting times and save lives. (Source: WM5G)

Mobile connectivity.

Covid-19 has emphasised these benefits and dependence on mobile connectivity

Helps local councils to offer online services such as school admissions and local information for residents.

Helps local businesses to offer a broader range of services, boosting the local economy.

Councils can introduce technologies like smart lighting.

Supports local companies by facilitating working from home.

Enables councils to introduce smart refuse collection services, which saves costs.

Promotes economic growth by attracting investment from business, which creates jobs and regional prosperity in line with national and local economic strategies.

Helps local councils to offer online services such as paying council tax bills which provides a more efficient service.

Offers social benefits such as being able to connect with vulnerable family and friends or contact the emergency services 24/7.

Supports Internet of Things (IoT), resulting in quicker and more efficient services for businesses and residents.

Mobile infrastructure underpins Smart City initiatives, opening the door to Government funding for local authorities.

Working together to deliver mobile connectivity.

Delivering reliable mobile services across the UK by telecom operators requires the effective deployment of mobile infrastructure. As the UK's leading mobile infrastructure services company, Cornerstone works with landowners, institutions, and public authorities to place mobile equipment on rooftops, greenfield sites and street-works.

Preparing for the next generation of mobile technology is at the forefront of telecom operators' and the government's agenda. Recognising how it will improve businesses and individuals' daily lives, Cornerstone is working collaboratively with the different government bodies and local authorities to ensure that we are all supporting each other and sharing best practices for deploying 5G in the UK.

Central and devolved governments of the UK appreciate and understand the significance of modern digital connectivity to the socio-economic wellbeing of the UK and the devolved nations. This is clearly outlined in documents such as the 'Future Telecoms Infrastructure Review' and 'Statement of Strategic Priorities.'

The UK Government has also tried to facilitate a positive environment for 5G rollout by establishing testbeds via the Urban and Rural 'Connected Communities' projects.

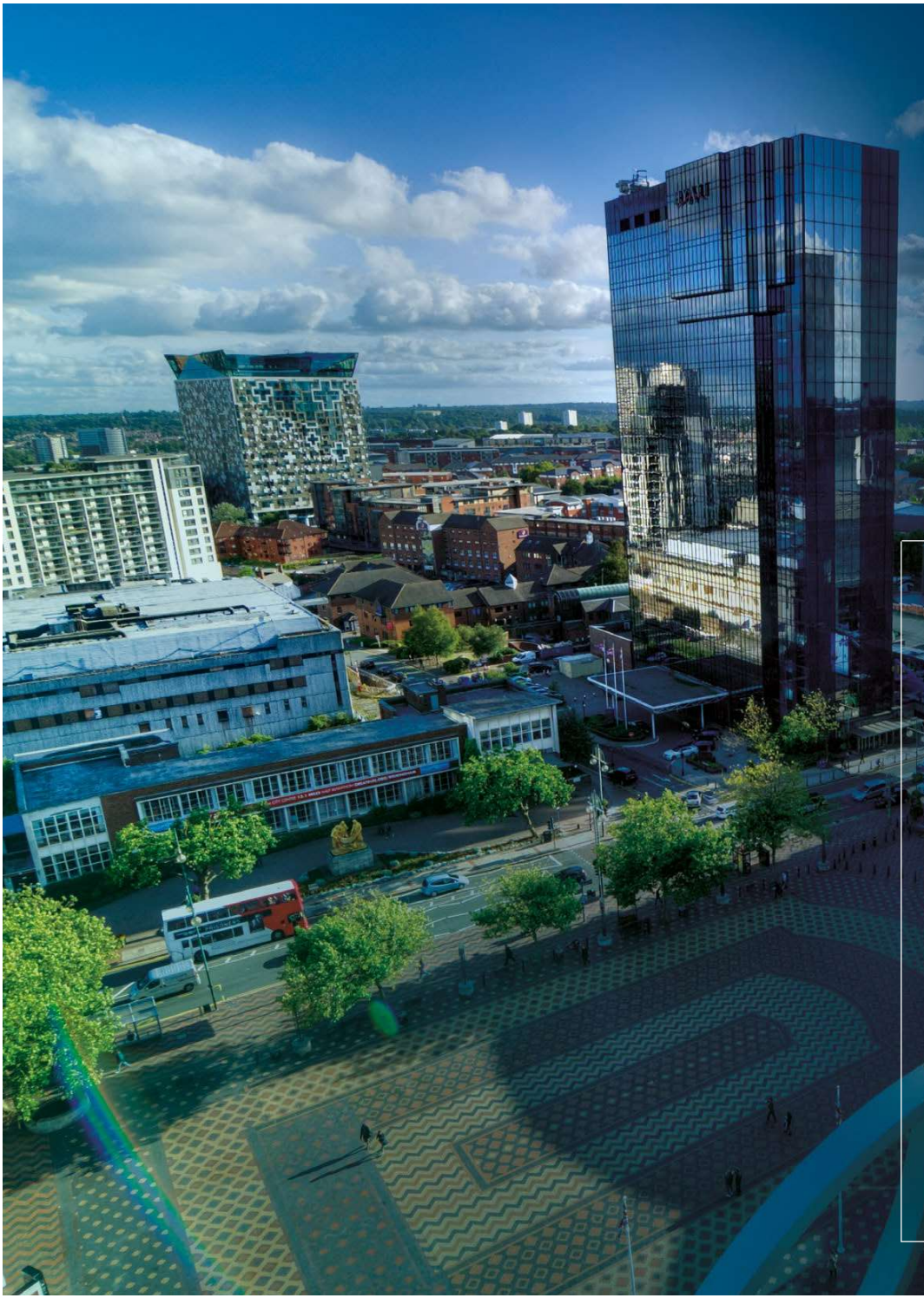
These central government initiatives closely align with efforts in the devolved nations such as Scottish Government's 5G and Digital Strategy documents and 'Mobile Action Plan.'

The Welsh Government has implemented a similar 'Mobile Action Plan.'

Most notably, the UK Government and the four main UK Mobile Network Operators (MNO's) have now agreed the 'Shared Rural Network', worth £1bn of investment, to deliver rural mobile connectivity. The deal will lead to increases in coverage in some areas by more than a third, with the most prominent coverage improvements in rural parts of Scotland, Northern Ireland and Wales.

Digital connectivity is vital for the UK's post-COVID economic recovery plan. Digital infrastructure will be fundamental to the UK Governments 'Project Speed' initiative, aimed at cutting down the time it takes to develop, design and deliver vital infrastructure projects. In July 2020, the UK Government published their Permitted Development Legislation Consultation Response for England, aimed at removing restriction on mobile telecoms infrastructure deployment, with new legislation expected later in the year.

There is clearly an appetite for improved coverage at government level. Still, these initiatives and investments towards a national network must be delivered at a local level - local collaboration is critical.



Case studies of successful collaboration between Cornerstone & public authorities

Cornerstone is highly involved in significant engagement with various local and combined authorities across the UK. This engagement and collaboration have resulted in numerous positive relationships and practical benefits that are mutually advantageous in delivering new mobile telecommunications services to an area.

The following are a few examples and outcomes of that collaborative working.

WM5G.

WM5G is wholly owned by the West Midlands Combined Authority (who represent Birmingham, Wolverhampton, Coventry, Dudley, Sandwell, Solihull and Walsall local authorities). It works in partnership with public and private sector organisations to deliver 5G. WM5G was set up as part of the West Midlands, winning the DCMS 'Urban Connected Communities' 5G testbed project.

- WM5G has worked closely with a member Council to facilitate an agreement for a 20-year estates moratorium, that prohibited the use of Council property to host telecoms equipment, to be abolished.
- Birmingham City, Wolverhampton City and Dudley Councils, are all in advanced discussions in agreeing on a Template Code Agreement with Cornerstone, to utilise Council owned assets to host telecommunications infrastructure.
- WM5G has worked holistically with its 7-member local authorities to ensure that they each have Digital Co-ordinators and Champions in place to streamline their telecommunications service rollout and 'bust barriers.'
- WM5G has facilitated meetings between Cornerstone and the elected Planning Committees of Birmingham and Solihull Councils.
- WM5G has facilitated 'pre-rollout' strategic engagement between Cornerstone and senior officers within the 7-member local authority planning departments. This has provided a collaborative relationship where all parties can raise site-specific issues to find mutual solutions.

Greater Manchester Combined Authority.

Greater Manchester Combined Authority (GMCA) represents the 10 Councils of Bolton, Bury, Manchester, Oldham, Rochdale, Salford, Stockport, Tameside, Trafford and Wigan.

- Engagement with GMCA has made it possible for Cornerstone to have a positive influence on various strategic planning and economic development policy documents that will assist in guiding development across Greater Manchester. These include the Greater Manchester Spatial Framework, GM Industrial Strategy, GM Infrastructure Framework and the GM Digital Blueprint.
- GMCA has facilitated pre-rollout engagement with the Development Managers of the 10 GM local authorities. This has assisted in building relationships for collaboration on mutual solutions that assist delivery of 5G connectivity.
- GMCA hosted a conference titled 'Accelerating the rollout of 5G across Greater Manchester.' This provided a platform for the industry to discuss various elements with stakeholders over multiple departments, across all 10-member local authorities. Discussion points included planning, estates, health concerns and the practical benefits to local authorities and their constituents.

Glasgow City Council.

Glasgow City Council has been extremely pro-active in their attitude to 5G rollout and digital connectivity.

Glasgow CC has established their own 'in-house' 5G delivery department to streamline various departments and engage with the industry.

- Glasgow City Council has been working with their own Estates department and engaging with third party landlords to open assets and create siting options that Cornerstone can use to place the necessary infrastructure. This will deliver improved mobile connectivity to the businesses and residents of Glasgow.
- Glasgow City Council's 5G delivery department has facilitated a workshop between Cornerstone and numerous officers from the Planning department. This is to discuss rollout, material benefits, technical constraints that dictate siting and design, and generally assist in building a collaborative relationship.
- The Glasgow City Council 5G delivery department has been pro-active in their engagement in acting as a facilitator between Cornerstone Planning and Heritage officers at the Council around a specific site. The site in question was significant to the socio-economic framework of Glasgow City Centre, as the site provided service to Queens Street Station, George Square and the many numerous businesses, tourists and residents who use this part of the city centre every day. The engagement led to a mutually suitable solution and grant of Listed Building Consent for the necessary infrastructure to maintain service provision.

How can local authorities work collaboratively with Mobile Network Operators to deliver the future of mobile connectivity?

Without the continuous installation of mobile infrastructure, the UK would lag in providing constant mobile connectivity and coverage. We need a national network of base stations.

It's therefore vital that local authorities offer their support at a very early stage to ensure that the process of mobile infrastructure deployment can be delivered as effectively and quickly as possible.

With the emergence of toolkits such as the DCMS Digital Connectivity Portal, Code of Best Practice and the MobileUK 'Councils and Connectivity2' document, there is an abundance of guidance on how local authorities should work collaboratively with MNOs to deliver mobile connectivity.

In Aug 2020, DCMS updated their guidance on access agreements between property owners and network operators for the deployment of digital infrastructure. Local authorities are being encouraged by ministers to consider the wider social and economic benefits for bringing connectivity to an area.

The guidance forms part of the government's plan to ensure people can access better broadband and mobile connectivity more quickly and is considered crucial to the UK's coronavirus recovery.

Visit https://www.gov.uk/guidance/guidance-on-access-agreements for more information

The key steps

- Building a collaborative partnership – this saves both local authorities and MNO's time and money to deliver infrastructure that residents and businesses depend on, in a quicker and more streamlined approach
- Facilitate 'barrier busting' – this encourages an 'open door' on both sides to discuss issues and solutions
- Understand the relationship between infrastructure rollout and local/regional/national aspirations around economic and digital goals
- Work with embedded 'Digital Champions' – they holistically 'join the dots' between various Council departments and elected members – Planning, Estates, Highways, Econ Development departments. They can help develop a digital infrastructure strategy
- Local authorities make assets available and work with MNOs to agree on Template Code Agreements – this helps to identify mutual ways of working around acquiring Public Estate and speeds the delivery of service to local people, saving legal and estate agent costs
- Engage with Planning departments – this facilitates pre-application discussion, a greater understanding of socio-economic material considerations and technical elements/constraints associated with infrastructure that governs design. In effect, this then results in better proposals coming forward into an application, improved planning approval rates and fewer appeals
- Assist LPAs in training planning committee members about telecoms developments
- Promote positive local planning policy and digital strategies in line with national policies
- Assist with pro-active working around procedural issues, for example, the problems created by the COVID-19 pandemic

With early engagement and cooperation between authorities and telecom operators, we can build a better-connected society quickly and cost-effectively.

Let's join the future together.

For more information, please contact us on Community@ctil.co.uk

in working together.

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SPEED UP BRITAIN

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HEALTH AND MOBILE PHONE BASE STATIONS

We recognise that the growth in mobile communication has led, in some cases, to public concern about perceived health effects of mobile technology, in particular about siting masts close to local communities. Quite naturally, the public seeks reassurance that masts are not in any way harmful or dangerous.

We are committed to providing the latest independent peer-reviewed research findings, information, advice and guidance from national and international agencies on radiofrequency (RF) electromagnetic fields.

Cornerstone ensure that our radio base stations are designed and built so that the public are not exposed to radio frequency fields above the guidelines set by the International Commission on Non-Ionizing Radiation Protection (ICNIRP). In fact, radio base stations operate at low power and emit levels of radiofrequency fields many times lower than the ICNIRP general public guidelines.

RESEARCH REVIEWS

The World Health Organisation notes that "In the area of biological effects and medical applications of non-ionizing radiation approximately 25,000 articles have been published over the past 30 years. Despite the feeling of some people that more research needs to be done, scientific knowledge in this area is now more extensive than for most chemicals: (http://www.who.int/peh-emf/about/WhatisEMF/en/index1.html).

The scientific community have collated, summarised and assessed these publications into research reviews. The most influential in the UK being the Mobile Phones and Health Report (also known as the Stewart Report). These research reviews are used by Governments to develop policy on exposure to radiofrequency signals.

The Stewart Report concluded that the balance of evidence did not suggest that exposures to radio frequency fields below international guidelines could cause adverse health effects. One of the recommendations of the Stewart report was a research programme to address uncertainties regarding mobile phone base stations and health. This programme was called the Mobile Telecommunications and Health Research (MTHR) Programme. The final report from this programme was published in February 2014. The report noted that the research conducted found no evidence of adverse health effects from the radio waves produced by mobile phones or their base stations.

Since the Stewart Report, over 30 further reviews have been carried out, carefully considering many hundreds of pieces of research. Most have made similar recommendations and have come to comparable conclusions: that research should continue to address any gaps in the knowledge and that overall, the possibility of adverse health effects from mobile communications remains unproven.

In April 2012 the Health Protection Agency's independent Advisory Group on Non-ionising Radiation (AGNIR) published a report entitled "Health Effects from Radiofrequency

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Electromagnetic Fields". This report concluded that there is no convincing evidence that mobile phone technologies cause adverse effects on human health.

The World Health Organisation (WHO) noted that "A large number of studies have been performed over the last two decades to assess whether mobile phones pose a potential health risk. To date, no adverse health effects have been established as being caused by mobile phone use" WHO factsheet 193: Electromagnetic fields and public health: mobile telephones, 2014.

In 2019 Public Health England (PHE) noted that "Exposure to radio waves is not new and health-related research has been conducted on this topic over several decades. In particular, a large amount of new scientific evidence has emerged since the year 2000 through dedicated national and international research programmes" https://www.gov.uk/government/publications/5g-technologies-radio-waves-and-health/5g-technologies-radio-waves-and-health

ICNIRP GUIDELINES

The radiofrequency public exposure limits for EMF fields were developed by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) http://www.icnirp.org following evaluation of all the peer-reviewed scientific literature, including thermal and non-thermal effects. ICNIRP is a non-governmental organisation formally recognised by WHO. Established biological and health effects have been used as the basis for the ICNIRP exposure restrictions. These guidelines have been adopted for use in the European Union and the UK.

In 2017 ICNIRP reaffirmed that their safety guidelines provide protection against all known health effects of radiofrequency signals.

COMPLIANCE WITH INTERNATIONAL EXPOSURE GUIDELINES

All Cornerstone installations are designed and constructed in compliance with the precautionary ICNIRP public exposure guidelines as adopted in EU Council Recommendation of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz). These guidelines have been set following a thorough review of the science and take into consideration both thermal and non-thermal effects. They protect all members of the public 24 hours a day. In addition, precautionary measures have been taken into account when setting relevant guideline limits for the public (i.e. in the UK a safety factor of 50 times is applied to the public exposure guideline).

When measured, field strengths are many times lower than the precautionary ICNIRP general public guidelines.

An ICNIRP certificate is provided with every planning application and this verifies that the mobile phone base station, when operational, will meet the precautionary ICNIRP guidelines. We also provide further documentation to clarify that the ICNIRP certificate addresses emissions from all mobile phone network operators' equipment at the proposed site.

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Further Information:

World Health Organisation EMF Project
http://www.who.int/peh-emf/en/

International Commission on Non-Ionizing Radiation Protection (ICNIRP)
http://www.icnirp.org/

Public Health England (formally HPA)
https://www.gov.uk/government/collections/electromagnetic-fields

Or contact:

Community, Cornerstone
The Hive 2, 1530 Arlington Business Park, Theale, Berks, RG7 4SA
Email: community@cornerstone.network

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Cornerstone Community Information Sheet

Health Summary

Radio base stations and handsets use electromagnetic fields (EMFs) to transfer information and make communication possible with mobile phones and devices. EMFs are used for television and radio transmissions, by the police, fire and ambulance services, by taxi firms and public utilities. EMFs are also used for a wide range of personal and commercial equipment from electronic car keys, WiFi equipment and baby monitoring devices to shop security tag systems. They are also produced by household electrical appliances like the fridges, vacuum cleaners or electric shavers.

The UK Health Security Agency (UKHSA) have noted that "Exposure to radio waves is not new and health-related research has been conducted on this topic over several decades. In particular, a large amount of new scientific evidence has emerged since the year 2000 through dedicated national and international research programmes" https://www.gov.uk/government/publications/5g-technologies-radio-wavesand-health/5g-technologies-radio-waves-and-health. After a thorough review of the available scientific findings, the World Health Organisation reported: "To date, the only health effect from RF fields identified in scientific reviews has been related to an increase in body temperature (> 1 °C) from exposure at very high field intensity found only in certain industrial facilities, such as RF heaters. The levels of RF exposure from base stations and wireless networks are so low that the temperature increases are insignificant and do not affect human health" World Health Organisation, Fact Sheet 304, Base stations and wireless technologies, 2006. In addition, the WHO notes that "Based on a recent in-depth review of the scientific literature, the WHO concluded that current evidence does not confirm the existence of any health consequences from exposure to low level electromagnetic fields". http://www.who.int/pehemf/about/WhatisEMF/en/index1.html. In 2020 the World Health Organisation published information on 5G commenting that: "Provided that the overall exposure remains below international guidelines, no consequences for public health are anticipated" https://www.who.int/news-room/q-a-detail/5g-mobile-networks-and-health.

The Advisory Group on Non-ionising Radiation (AGNIR) summarised that "although a substantial amount of research has been conducted in this area, there is no convincing evidence that RF field exposure below guideline levels causes health effects in adults or children." "Health Effects from Radiofrequency Electromagnetic Fields – RCE 20", 2012

In 2019 the UK Health Security Agency noted: "It is possible that there may be a small increase in overall exposure to radio waves when 5G is added to an existing network or in a new area. However, the overall exposure is expected to remain low relative to guidelines and, as such, there should be no consequences for public health" https://www.gov.uk/government/publications/5g-technologies-radio-waves-andhealth/5g-technologies-radio-waves-and-health.

Radio base stations are designed to comply with the stringent, precautionary public exposure guidelines set out by ICNIRP (International Commission on Non-Ionizing Radiation Protection). These guidelines have been developed following a thorough review of the science including both thermal and non-thermal effects. UK radio base station installations have been surveyed by independent bodies and found to be hundreds and sometimes thousands of times below these guidelines.

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In 2020 ICNIRP updated their safety guidelines noting that: 'we looked at the adequacy of the ones we published in 1998. We found that the previous ones were conservative in most cases, and they'd still provide adequate protection for current technologies'
https://www.icnirp.org/cms/upload/presentations/ICNIRP_Media_Release_110320.pdf

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Cornerstone Community Information Sheet

5G Services

As 5G technology is deployed across the country more and more services will become available and our lifestyles, economy and even the way we commute will be transformed. Additional base stations and upgrades to existing ones will be needed to meet this demand and improve the quality of service.

Practical uses of 5G

Two areas where these benefits are becoming evident are education and health,

The relationship between 5G and education is evolving at a massive rate with educators exploring the relevance of Virtual Reality (VR) technologies for education and training. Crucially, VR can support remote learning, allowing students a presence in the classroom even when working elsewhere.

5G's ability to deliver real-time information (low latency), ultra-fast speeds (critical for high-definition images and video), increased capacity and heightened security will also allow learning on the job, thanks to technologies such as Augmented Reality (AR) goggles, which can give engineers real-time instructions on how to fix a machine on a production line, for example.

Health care is undergoing a rapid transformation, patients across the country are now becoming accustomed to relying on remote healthcare services such as virtual GP appointments, and ordering online deliveries of essential medical supplies.

5G will prove critical in providing the infrastructure required to deliver remote health services over the next decade. 5G's fast and secure services will be fundamental in scaling the patient benefits of remote healthcare and keeping medical records protected and private. Trials have shown that connecting ambulance crews to expert resources using 5G allows paramedics to work with doctors and conduct specialist procedures in real time whilst on the road.

Health concerns

Various international assessments have concluded that below the International Commission on Non-Ionizing Radiation (ICNIRP) Guidelines there is no evidence of adverse health effects for wireless networks (including 5G).

In January 2019 the Finnish Radiation and Nuclear Safety Authority (STUK) concluded that:

In the light of current information, exposure to radio frequency radiation from base stations will not rise to a significant level with the introduction of the 5G network. From the point of view of exposure to radio frequency radiation, the new base stations do not differ significantly from the base stations of existing mobile communication technologies (2G, 3G, 4G).' https://www.stuk.fi/aiheet/matkapuhelimet-ja-tukiasemat/matkapuhelinverkko/5g-verkon-sateilyturvallisuus

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In the UK Ofcom, the regulator for the communications services, undertook measurements of electromagnetic fields (EMFs) around 5G base stations. In 2020 they noted: "In all cases, the measured EMF levels from 5G-enabled mobile phone base stations are at small fractions of the levels identified in the ICNIRP Guidelines" https://www.ofcom.org.uk/__data/assets/pdf_file/0015/190005/emf-test-summary.pdf

In Norway the Norwegian Radiation and Nuclear Safety Authority (DSA), noted:

'The overall research shows that the radiation from wireless technology is not hazardous to health, as long as the levels are below the recommended limit values. This is the prevailing view among researchers in many countries today, and it is supported by the EU Scientific Committee. We have used cell phones and radio transmitters for decades and much research has been done on how this affects our health. Risk factors of importance to public health have not been found. With the knowledge we have today, there is no need to worry that 5G is hazardous to health.' January 2019 https://www.dsa.no/temaartikler/94565/5g-teknologi-og-straaling

In the light of concerns about 5G signals from some members of the public the UK Health Security Agency (UKHSA) commented in 2019:

"It is possible that there may be a small increase in overall exposure to radio waves when 5G is added to an existing network or in a new area. However, the overall exposure is expected to remain low relative to guidelines and, as such, there should be no consequences for public health" https://www.gov.uk/government/publications/5g-technologies-radio-waves-and-health/5g-technologies-radio-waves-and-health.

In 2020 the ICNIRP updated their safety guidelines to include further restrictions for frequencies used for 5G services. ICNIRP Chairman, Dr Eric van Rongen stated 'the new guidelines provide better and more detailed exposure guidance in particular for the higher frequency range, above 6 GHz, which is of importance to 5G and future technologies using these higher frequencies. The most important thing for people to remember is that 5G technologies will not be able to cause harm when these new guidelines are adhered to.' https://www.icnirp.org/cms/upload/presentations/ICNIRP_Media_Release_110320.pdf.

In 2020 the World Health Organisation commented on 5G stating: "Provided that the overall exposure remains below international guidelines, no consequences for public health are anticipated" https://www.who.int/news-room/q-a-detail/5g-mobile-networks-and-health.

In common with all mobile phone base stations, Cornerstone sites with 5G technology will be checked and certified for ICNIRP compliance.

For further information please contact

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