

## 5G and Health Implications

5G has begun its rollout across the UK. Already, three out of the four main operators have deployed 5G in multiple UK cities, with the fourth one operator planning imminent deployment.

As with previous technology (cordless phones, 2G, 3G and 4G) 5G networks rely on radio waves transmitted between an antenna or mast through to your smartphone.

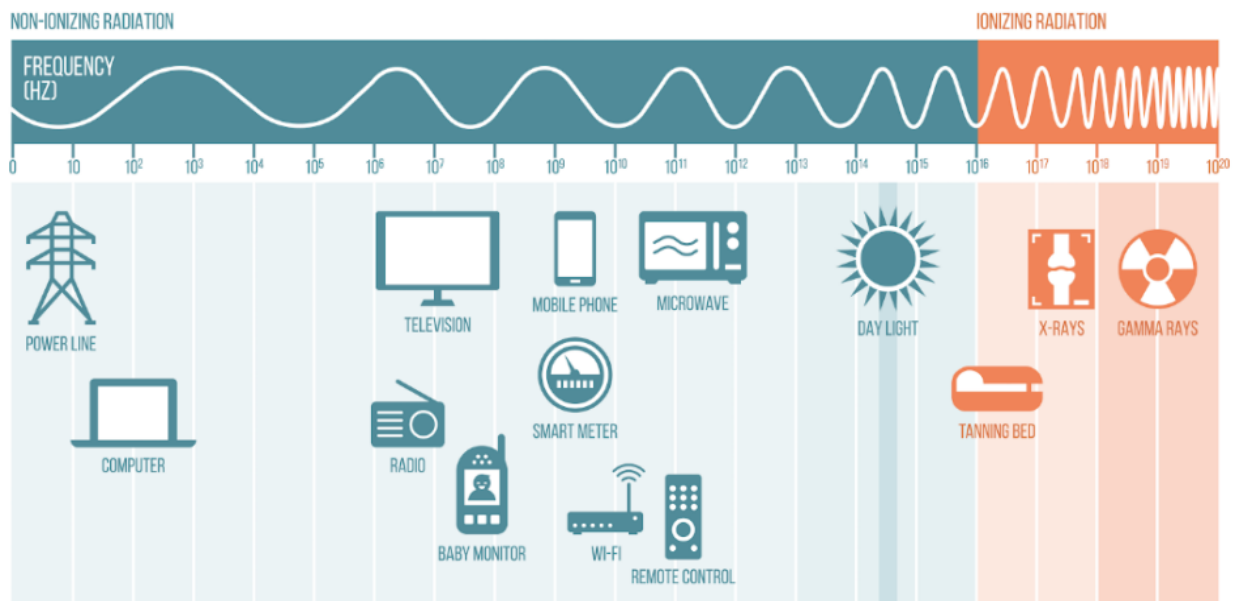
### What is 5G?

5G is the term used to refer to the next generation of mobile technology. This technology offers new capabilities over existing mobile technologies, including faster speeds, little delays, greater capacity, and improved performance.

We are all constantly surrounded by radio waves from a range of technologies, such as television and computer screens and even natural sources such as sunlight. Broadly speaking, the higher the frequency being used, the easier it is to move large amounts of data (such as streaming video), but the shorter the range, the harder it is for those signals to reach a consumer inside buildings. So, television broadcasts (received through external aerials) use higher frequencies than radio does, and Wi-Fi uses higher frequencies still.

This new mobile technology represents the latest evolution of mobile communications, ushering in an era of lightning fast movie downloads, widespread virtual reality, and self-driving vehicles. However, questions have been raised as to whether 5G technology will pose a risk to health.

## THE ELECTROMAGNETIC SPECTRUM



Source: <https://www.justaskgemalto.com/us/can-5g-affect-my-health/>

### What are the concerns?

With this increase and additional use of radio frequency, there is concern about the potential health effects, such as developing cancer.

A key factor in whether radio wave radiation becomes unsafe is whether it is classified as ionizing or non-ionizing. **Non-ionizing radiation (NIR)** is radiation not strong enough to break chemical bonds and cause health risks, for example, the way that microwaves

cook food. All lower frequencies - such as ultraviolet, infrared, visible light and radio waves - fall into the non-ionizing category, with only frequencies that are above ultraviolet - such as X-rays and gamma rays - classifying as ionizing.

5G networks will eventually probably use more transmitter masts than the current 4G networks do, some of which (due to higher frequencies being used to carry lots of data) may have to be closer to ground level to be able to reach consumers' mobile devices. The concern here is that the more masts deployed and installed closer to ground level (such as on streetlamps and telegraph poles), the closer the radiation.

However, with more transmitters, each one can run at lower power levels than previous 4G technology, which means that the level of radiation exposure from 5G masts will be lower than those currently in use providing 2G, 3G and 4G.

The UK government guidelines on mobile phone base stations says [the power of] radio waves at places that are normally accessible to the public are many times below guideline levels.

Additionally, it is expected that 5G networks will make greater use than 4G networks of a technology called Multiple-Input and Multiple-Output (MIMO), which uses multiple antennas to increase the amount of data that a consumer's mobile connection can deliver to them.

5G networks are expected to also make greater use of a technology called Beamforming, which direct power towards the mobile device whose user has demanded the data rather than radiating the power equally in all directions, even towards consumers who aren't using mobile phones. At device level, where there have been concerns in the past, devices are restricted to work within strict electromagnetic fields (EMF) limits set globally and monitored by the World Health Organisation.

Both MIMO and Beamforming, already starting to be used by 4G networks, result in connections to mobile devices being made in slightly different ways to how the much slower 2G and 3G networks did.

### **What experts have to say**

Ofcom has recently [published their results](#) from the safety measurements of the electromagnetic field (EMF) emissions from 5G equipment.

Ofcom stated that they have "carried out measurements of representative samples of cellular base stations which indicate that, even in the vicinity of cellular masts, measurements are consistently found to be very significantly below these levels. Ofcom's sample measurements of emission levels allow those with an interest to assess compliance with the ICNIRP guidance."

The measurements were across 16 5G sites across 10 cities, that focus on areas where mobile use is likely to be highest.

Ofcom have also [launched a consultation](#) on the proposed measures to require compliance with international guidelines for limiting exposure to electromagnetic fields (EMF). **The closing date for responses is 15 May 2020. Please submit responses using the [consultation response form](#).**

[Public Health England](#) have said that the "exposure to radio waves is not new and health-related research has been conducted on this topic over several decades".

"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 such there should be no consequences for public health".

These guidelines are from the [International Commission on Non-Ionizing Radiation Protection](#) (ICNIRP) which provides guidance on the health and environmental effects of NIR to protect people and the environment from harmful exposure.

The World Health Organisation (WHO) who also recognise the work of the ICNIRP, have stated on [their website](#) 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.”

More information can be found at:

- Ofcom: <https://www.ofcom.org.uk/manage-your-licence/radiocommunication-licences/mobile-wireless-broadband/exposure-electro-magnetic-fields>
- Public Health England: <https://www.gov.uk/government/publications/mobile-phone-base-stations-radio-waves-and-health/mobile-phone-base-stations-radio-waves-and-health>
- World Health Organisation: <https://www.who.int/news-room/fact-sheets/detail/ionizing-radiation-health-effects-and-protective-measures>
- Mobile UK: <https://www.mobileuk.org/health-and-safety>