



## Spark giving a much-needed boost to digital services in Mangawhai



Spark is undertaking a nationwide upgrade programme to our mobile network across New Zealand. The upgrade will see Spark continue to provide a world class digital service, with seamless connectivity and quick access to data for users when at home, at work or out and about.

We're looking to future proof our network as New Zealanders continue to use their devices in a vastly different way than that of even a few years ago; demand for mobile services is growing by 80% year-on-year, with national data usage increasing by nearly 70% since 2010.

To meet this new demand for services in a 'digital era' Spark has started to work with local councils and landowners to build infrastructure on both private land and road reserve.

We know that households now have multiple devices per head with an average of 6\* devices per home. Smartphones, iPads, and connected watches, the new digital curriculum, as well as customers adopting wireless broadband to stream video content like Netflix and Lightbox in their homes has led to this increase in demand.

The Mangawhai area has seen an unprecedented growth for digital services; in the last four years alone, the community's usage of data has increased by over **700%** and predictions suggest that this figure will only grow.

Currently mobile and digital service is delivered to Mangawhai by a single sector of an existing Spark site up on a hill towards Langs Beach, off Cove Road. This single sector is one of New Zealand's busiest sites delivering voice (3G), data (4G) and wireless broadband services to users. The site has now reached maximum capacity.

That means that if Mangawhai does not receive additional infrastructure to cope with the demand being placed upon it in the form of permanent site community users, including emergency services, will inevitably experience issues like dropped calls, black spots and loss of connectivity to services.

To support the existing single sector and provide a temporary solution to meet demand placed on the existing site, Spark is seeking the agreement of Council to install a temporary facility in the township of Mangawhai.

This temporary facility will be deployed to provide mobile and digital service during the Rugby World Cup 2019 (RWC) and the fast approaching summer period whilst Spark works with Council towards securing agreement for a permanent solution for the community users of Mangawahi.

**NOTE:**

From early December 2018 to late January 2019 (summer season) Spark deployed a temporary cellsite - COW (Cellsite On Wheels) to support the increase in data usage by community users. This was installed in the carpark of the Mangawhai Club. During that period there were no complaints regarding quality of mobile and digital service from users, complaints from the public, nor users of the car park, (namely the Managwhai Club and the Bowls Club), from whom the Mangawhai Club sought consent from for the lease period f the temporary infrastructure.

**What are the regulations for permanent telecommunications equipment?**

The National Environmental Standards for Telecommunications Facilities (NESTF 2016) came into effect on 1 January 2017 replacing the NESTF 2008. NESTF is a national planning framework legislating for network operators, such as Spark, to install telecommunication equipment in road reserves, rural areas and upgrade exiting poles without the need to apply for resource consent, provided specific standards are met.

*Where a resource consent is required Spark will work through that process with the local authority and meet our obligations under any granted consent.*

The NESTF 2016 legislation can be found by following this link:

<http://www.mfe.govt.nz/rma/national-direction/national-environmental-standards/national-environmental-standards-0>

### **Community notification and engagement**

Spark has worked with other telecommunications companies through the New Zealand Telecommunication Carriers Forum (TCF) and developed industry guidelines for informing the community about our activity. TCF guidelines have recently been reviewed and updated to fall in line with the NESTF 2016 legislation.

The TCF Guidelines can be found following this link: [www.tcf.org.nz](http://www.tcf.org.nz)

If you would like more information or to discuss any of the detail above please don't hesitate to contact Gill Evans Community Engagement Manager at Spark on [sparkinform@spark.co.nz](mailto:sparkinform@spark.co.nz)

*\*Source: International Data Corporation "Consumer Scape 360" survey*



## Health Minister David Clark dismisses 5G radiation exposure warnings

Newshub 28 Feb 2019

The Health Minister (David Parker) has dismissed concerns raised by 230 scientists around the world that 5G radiation could pose a significant health risk.

The group of scientists, including one from New Zealand and eight from Australia, have expressed "serious concerns" about increasing exposure to radiofrequency electromagnetic fields (RF-EMF) when 5G technology is rolled out.

5G, or fifth generation, is the next step in mobile internet connectivity, set to launch commercially in some countries in 2020. While it will offer faster speeds and more reliable connections, it will also require more antennas, thus increasing exposure to radiation.

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"Introducing electromagnetic energy that has the potential to interfere with such delicate, electrical structures (molecules and cellular structures) should be approached with caution," New Zealand science lobbyist Bruce Rapley said.

The group of scientists is concerned nobody will be able to avoid being exposed to wireless radiation once 5G is introduced, because it's estimated 5G-transmitters will need to be placed every 10 to 12 houses in urban areas.

"Based upon peer-reviewed, published research, we have serious concerns regarding the ubiquitous and increasing exposure to EMF generated by electric and wireless devices," the scientists' appeal to the United Nations and World Health Organization says.

The scientists said the effects include cancer risk, an increase in genetic damages, structural and functional changes of the reproductive system, learning and memory deficits, neurological disorders, and negative impacts on general well-being.

When asked if the Government has taken these concerns into consideration, Health Minister Dr David Clark told Newshub Ministry of Health officials don't believe there is anything to be concerned about.

"I am advised by Ministry of Health officials that the balance of research evidence suggests that exposure to the radiofrequency produced by any transmitter, including those that will be used by 5G services, do not cause health problems, provided they comply with international guidelines."

The Interagency Committee on Health Effects of Non-Ionising Fields monitors research into the health effects of electromagnetic fields. Its latest report published in December 2018 found that while magnetic fields have been linked to cancers, the risk is low.

"Although studies into brain tumour risks associated with mobile phone use have found a small association in the heaviest users, the researchers acknowledge that this could simply reflect biases in the data," the report says.

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**LAND USE CONSENT APPLICATION FOR THE  
PROPOSED RADIO FACILITY AT MANGAWHAI  
HEADS SOUTH COP**

**ASSESSMENT OF RADIO-FREQUENCY MATTERS**

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*This assessment has been prepared in accordance with the requirements of section 88  
of the Fourth Schedule to the Resource Management Act 1991.*

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<b>Date:</b>	13/11/2018

## **Introduction**

- 1 This report is an assessment of the radio-frequency (RF) fields from the proposed Spark New Zealand (Spark) Mangawhai Heads South COP radio communication facility, to be located at 221 Molesworth Drive, Mangawhai Heads.
- 2 The report confirms that the facility will be operated to comply with Regulation 4 of the Resource Management (National Environmental Standards for Telecommunication Facilities) Regulations 2016 (“NES”). Telecommunications facilities generating radio-frequency (RF) fields are a permitted activity under Part 3, Subpart 7 in regard to RF fields where the relevant provisions of the NES are complied with.
- 3 As with any radio transmission system, the transmit antennas of the proposed radio-communication facility are designed to deliberately emit RF electromagnetic energy from the antenna system. Radio-Frequency is a non-ionising energy with a low energy level.
- 4 Clause 55(2) of the NES requires telecommunication facilities generating RF fields to be operated in accordance with New Zealand Standard NZS 2772: Part 1: 1999. This is the current New Zealand Standard that describes exposure limits and measures to be taken when using RF energy.
- 5 The New Zealand Standard NZS2772.1:1999 consists of two parts; Part 1 sets out maximum RF exposure levels, and Part 2 sets out principles and methods of measurement.
- 6 All Spark radio communication facilities are designed and operated to comply with the New Zealand Standard.

## **Site specifications**

- 7 The RF equipment specifications of the proposed Mangawhai Heads South COP radio communication facility relevant to the RF calculations are set out in Table 1.

## **Estimated RF levels for the site**

- 8 The calculations used to confirm compliance were made in accordance with the requirements described in the New Zealand Standard NZS2772.1:1999.
- 9 The calculations used data supplied by the manufacturers of the transmitting equipment and the maximum power levels for which consent is sought (specified in Table 1).
- 10 The estimated RF exposure levels are determined by:
  - frequencies of operation; and
  - the directional performance of the transmit antennas; and
  - the sum of RF power at the antennas; and
  - the distance and orientation from the antennas

- 11 The calculated estimates are conservative because it is assumed that all of the proposed transmitters are operating at full power. Total transmitter power depends on the number, and location of the mobile phones using the site. Normally only a fraction of the proposed RF power will be transmitted from the site at one time.
- 12 From time to time, the direction in which the antennas are pointed may be adjusted, depending on network requirements. Estimate includes the maximum designed down-tilt of the antenna.

### **Summary**

- 13 Based on design information the RF exposure levels at the proposed Mangawhai Heads South COP radio communication facility vary from place to place but in no instance exceeds the New Zealand Standard NZS2772.1:1999 in readily accessible areas, and as such meets Clause 55(2) of the NES.
- 14 In addition, this report has been prepared in accordance with AS/NZS 2772.2.2016 Radiofrequency fields: Part 2: Principles and Methods of Measurement and Computation – 3kHz to 300GHz, and as such meets Clause 55(3) of the NES.
- 15 I confirm that the estimated RF exposure takes account of additional radiofrequency exposures arising from other nearby telecommunications facilities.
- 16 In the case of the proposed Mangawhai Heads South COP radio communication facility the cumulative RF exposure from this site and other existing radio sites in the vicinity do not reach or exceed 25% of the Standard at any place where the public can reasonably access and that no monitoring will be required in terms of Clause 55(5) of the NES.
- 17 I conclude that public exposure will, at all times, comply with the requirements of the New Zealand Standard, and complies with Part 3, Subpart 7 of the NES.

**Table 1**

**Proposed Mangawhai Heads South COP radio communication facility specifications**

	<b>Sector 1</b>	<b>Sector 2</b>	<b>Unit</b>
Power into transmit antenna 870 MHz:	42	42	Watts
Power into transmit antenna 1830 MHz:	120	120	Watts
Power into transmit antenna 2640 MHz:	80	80	Watts
Intended initial antenna direction:	1-120°	121-240°	Degrees E of GN
Antenna dimensions:	2.1	2.1	H (m)
	0.4	0.4	W (m)
	0.2	0.2	D (m)
Antenna midpoint height:	14	14	m
Antenna directivity 870 MHz [max]:	16.2	16.2	dBi
Antenna directivity 1830 MHz [max]:	17.8	17.8	dBi
Antenna directivity 2640 MHz [max]:	18.4	18.4	dBi

# 5G: hype vs reality – Expert Q&A

<http://www.scoop.co.nz/stories/SC1907/S00021/5g-hype-vs-reality-expert-qa.htm>



Wednesday, 10 July 2019, 11:12 am

Press Release: Science Media Centre

5G has been lauded as a game-changing technology, but will the network actually change our lives?

The latest upgrade to the mobile network has been making headlines with concerns about **health risks** and the **potential interference** with weather satellites relied on by forecasters.

Last December, the Ministry of Health's **technical advisory committee** on non-ionising radiation **reported that** it didn't think the latest research warranted any changes to the current health exposure standards for radiation within the radio section of the spectrum. The radio spectrum has long been considered safe and has been used to transmit our **TV, radio and mobile phone signals** over long distances for decades.

On the other end of the spectrum, the 5G hype machine has been going into overdrive, promising the new technology will **allow fleets of driverless cars** to navigate our streets and **surgeons to perform operations remotely**.

But beyond making our phones and internet faster, how will 5G change the lives of ordinary New Zealanders? And should we be worried about weather forecasting, cybersecurity threats, or getting cancer from the technology?

**The SMC approached experts to answer questions about what to expect from 5G technology. Please feel free to use these comments in your reporting.**

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**Dr Faraz Hasan, Senior Lecturer, Communication Engineering and Networks, Massey University, comments:**

**What is 5G? How is the 5G technology different from the 4G networks we have now?**

"Just like Microsoft regularly releases new versions of Windows, mobile phone technology is also releasing its latest version called 5G. The first version of mobile phone technology is

called the first 'Generation' or 1G, the one we are currently using is 4G, and the one that will become available in 2020 is called 5G.

"5G is better than 4G for the same reason that 4G is better than 3G – it's about how quickly you can send and receive information, and how many devices you can connect to the network simultaneously."

**There's been a lot of hype around 5G, what commercial applications are we most likely to see in New Zealand?**

"5G will be great for data-hungry applications, for example virtual reality. We often take virtual reality to mean online gaming, which is only 'one' of its dimensions. 5G's ability to handle large volumes of data can enable several 'virtually real' use cases like remotely driven cars, live streaming the scene attended by first responders, allowing online medical consultations, etc.

"In New Zealand, a clever amalgamation of artificial intelligence and 5G can help predict traffic congestion on roads and highways. 'Predictive maintenance' is the ability to predict the failure of manufacturing equipment before it happens! The key to making accurate predictions lies in the ability to quickly transfer lots and lots of data, which the current 4G technology cannot sustain.

"Large datasets acquired from hundreds of sensors spread across agricultural land can likewise help in monitoring and predicting important parameters like soil conditions, dampness, salinity, etc.

"5G can help extend the reach of the government's fibre optic infrastructure using wireless links, while maintaining fibre-like speeds and capacity. 'Wiring up' the customers who are intending to subscribe to the service has caused **some problems recently**, which can be avoided using 5G. If 4G services are used for the same purpose, the overall capacity of fibre will be adversely affected.

"It is expected that more applications will emerge as 5G becomes available at a commercial scale."

**What are the biggest cybersecurity concerns with the rollout of the 5G network in New Zealand? Do we need to be concerned about keeping our data safe?**

"Security issues will always remain associated with connectivity in general. The severity of these issues increases if connectivity is 'wireless'. Because we are interconnecting not just our laptops and mobile phones, but also vehicles, medical professionals, livestock, even our **power grid** with 5G, any breach in security may have far-reaching implications.

"The heterogeneity among the connected devices has never been experienced before. Unique security solutions each customised to a particular kind of device will be needed in the 5G era.

"Some people **are pointing out** that private information like a user's location may get compromised due to 5G. Because the range of a 5G base station will be small, the network can potentially know a more precise fix of a device's location just by knowing which base station it is connected to."

**The Government is proposing to use the 3.5 GHz band of the radio spectrum for 5G. Will this interfere with any other uses of the radio spectrum and will this be the only band they allocate?**

"The initial 5G deployment is expected to use the 3.5GHz band, locally and internationally. The government is in the process of dedicating this spectrum for 5G so it does not interfere with any other application. 5G transmissions on the proposed 3.5GHz band are not expected to interfere with water-vapour wavelengths either.

"The other frequency band of interest for 5G deployment is 28GHz, but it is not clear how long will it take NZ and the rest of the world to start using that band."

*No conflict of interest.*

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**Martin Gledhill, Director, EMF Services, comments:**

**What, in your view, are the most significant recent takeaways from international research into the biological effects of technology used in mobile phones and wifi?**

"Recent research confirms the validity of current exposure limits. It also shows that in everyday life, exposures are normally far below the limits."

**What new evidence would trigger a change in safety standards?**

"Any new research has to be assessed both on its own merits, and also in the context of the large amount of previous research that has been carried out. To change the safety standards, you would need well-conducted studies from independent research groups that provide consistent results showing an effect occurring at levels below those currently allowed. Preferably you would also have some idea of the mechanism underlying the effect (i.e. the processes by which the exposure causes the effect)."

**Are there any anticipated milestones that researchers in the field are looking out for?**

"Events that will be of particular interest are:

- Publication of a WHO review of the health effects research. I don't expect this to be out until next year at the earliest.
- 
- Publication of results from the **COSMOS study**. This is a long term study that is tracking the health of about 300,000 mobile phone users in six European countries (Denmark, Finland, France, Sweden, the Netherlands, and the United Kingdom). It has a great advantage over previous studies in that mobile phone use is ascertained at the start of the study and reviewed as time goes on (rather than relying on participants' memory of their use from many years previously). It will also use operator records to check phone use.
- 
- Publication of results from the **Mobi-Kids study**. This is an international study that looked at whether cellphone use is associated with brain tumour risks in children. There was a **New**

Zealand arm of the study, led by the Massey Centre for Public Health Research."

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**Is there anything significantly different about the 5G technology that may change the health risk compared to other mobile phone technologies or wifi?**

"No. 5G is just a new application of radio technology, and the knowledge gained from some sixty years of research is as applicable to 5G as any other form of radio technology. The radio frequencies to be used by 5G are similar to those that have been used for several decades."

*Conflict of interest statement: I work for government agencies, industry (including the telecommunications industry) and members of the public. In order to provide measurement services that accurately reflect exposure levels in the areas of interest, I use measurement equipment that is calibrated against national standards, and follow any appropriate measurement standards. Advice on health effects is guided by the findings of reviews of the relevant research that have been published by independent national and international health and scientific bodies. I do not sell any products that protect (or claim to protect) against exposures to electromagnetic fields.*

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**Prof Keith Petrie, Professor of Health Psychology, University of Auckland, comments:**

**What, in your view, are the most significant recent takeaways from international research into the biological effects of technology used in mobile phones and wifi?**

"The majority of studies show that there is no relationship between weak electromagnetic field exposure and symptoms or health. Some people report that they are sensitive to the electromagnetic fields used in mobile phone and wifi. Studies show that such people do experience symptoms, but only when they *know* they are being exposed. In double-blind conditions where they are exposed without knowing whether the electromagnetic field is on or off, no reliable effects are apparent.

"There are now a large number of such studies that show no convincing evidence to support that weak electromagnetic fields cause symptoms. The symptoms that people report are a result of the nocebo effect.

"There is also some evidence that media stories about sensitivity to electromagnetic fields can increase symptoms being attributed to such exposure."

**What new evidence would trigger a change in safety standards?**

"Strong evidence of health effects."

**Why does this topic keep coming up?**

"Worries about new technology causing health problems are not new. Throughout history, there are many examples of the introduction of new technology being followed by new symptoms and illness.

"There was a fear when telephones were introduced that they caused an increase in aural pressure, giddiness and pain. Similarly with radios that radio signals caused an increase in nausea. There were also fears that steam trains caused problems in the spine because the human body was not designed to go so fast. Following the introduction of visual display units in Scandinavia there were reports of skin problems and other symptoms.

"The internet has now brought a new dimension to worries about technology and unsubstantiated health worries can be spread instantly to those with similar concerns."

*No conflict of interest.*

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**Bruce Hartley, Systems Engineering Manager, Metservice, comments:**

**How does 5G interfere with satellite communications?**

"The implementation of 5G will potentially be made in many bands across the radio frequency spectrum. The current focus is on the frequency bands in the GigaHertz (GHz) area.

"Some frequency bands may affect either satellite communications, weather satellite data collection, or both.

"The impacts on satellite communications, earth-to-space and/or space-to-earth, are under the management of telecommunications service providers, and not a direct concern to MetService. Even if a communications link is affected, there are other technology or band usage options that can be applied to mitigate the issue. It is the impacts on weather satellite data collection that are a significant issue and of concern to MetService. This is because there is the potential for spurious emissions from equipment using 5G (e.g. transmitters such as cell towers, cell phones and smart devices) to "leak" out of the approved band(s) and into adjacent bands that are important for weather forecasting.

"It is normal for transmitter equipment to produce leakage, but this needs to be controlled by manufacturers and managed by regulators to minimise disruption.

"The leakage from one transmitter is not normally an issue. The problem occurs when many devices are transmitting at the same time and within the view of the weather satellite receiver.

"For example, for the 23.8 GHz water vapour channel, the weather satellite receivers are passive and the signals being monitored are coming from water molecules in the atmosphere. This channel cannot be changed and there is no way to amplify the monitored signal above the accumulated leakage."

**What can we do about potential interference with weather forecasting?**

"For weather satellite data collection the method of mitigation is to protect the various radio frequencies that are being measured by the weather satellites.

"This can be done by:

1) Not allowing any equipment to transmit in the nearby radio frequency spectrum i.e. using a suitably wide guard band; and

2) Restricting the amount of spurious emission/leakage allowed from any transmitting device so that the cumulative leakage will not significantly affect the data being received at the satellite.

"These methods are normally implemented by the radio spectrum regulatory body in a country, in New Zealand this is the Ministry of Business, Innovation and Employment Radio Spectrum Management.

"MetService participates in the Radio Sector Group, convened by Radio Spectrum Management, where MetService puts forward its viewpoints and submissions on any matters related to the frequencies it depends on.

"Given the way equipment is distributed across the planet and given that radio waves do not stop at a country border, it is a general practice that countries (and manufacturers) work towards the same or similar negotiated rules for usage of radio frequencies. This is done through the International Telecommunications Union."

**The government has recently released a discussion document on the frequency band that 5G will use in NZ. According to that document, 5G deployment is going to use the 3.5GHz band, which is not expected to interfere with the frequency band that is of interest for capturing water vapour data. Could you confirm this?**

"The 3.5 GHz band is one of several frequency bands that are being looked at for 5G use and this band is currently before Cabinet for approval. The 3.5 GHz band does not pose any other significant issues for MetService or the global meteorological community. The 26 GHz band is also being looked at for 5G use and this is the band that MetService are concerned about because of its close proximity to the water vapour channel (23.8 GHz)."

*No conflict of interest.*

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**Iman Soltanzadeh, Manager Forecasting Research & Development, Metservice, comments:**

**What implications does 5G have for weather forecasting? Are these restricted to New Zealand, or will they affect global forecasting?**

"To explain how the spurious emissions from 5G or other equipment affect the radio frequency bands measured by the weather satellites and therefore weather forecasting, it helps to clarify the importance of satellite measurements to atmospheric modelling.

"Assimilating weather satellite data into global and local weather models improves the results of the models and therefore increases the accuracy of forecasts. Studies show the influence of satellite observations in global models is higher in the Southern Hemisphere than the Northern Hemisphere, due to the lower numbers of surface observations in the Southern Hemisphere.

"Weather satellites mostly measure the energy reflected or emitted by gases and objects below them using passive sensors. One example, is water vapour which is a crucial gas for atmospheric modelling because it contributes directly to the prediction of storms and weather patterns. Compared to some other atmospheric gases, water vapour is harder to measure because it emits a very weak signal at 23.8 GHz. Any interference to this signal reduces the quality of the water vapour measurements, consequently reducing the quality of the weather predictions.

"This is a global issue that could affect many countries. The World Meteorological Organisation (WMO), national meteorological offices, and organisations dependent on weather around the world are raising their concerns and highlighting the impacts 5G could have in relation to the 23.8 GHz water vapour channel."

**Are there any changes to the methods we use to forecast that could overcome these issues?**

"Any radio frequency interference to data collected by global weather satellites that reduces the quality of atmospheric remote sensing and particularly water vapour measurements will reduce the quality of weather predictions. MetService can only reduce the impact of this risk.

"MetService are continually looking at incorporating more diverse sources of weather observation into our modelling systems and analyses to mitigate single points of failure. MetService are also investing in strengthening quality control of observations and improving model verification tools to minimise the impacts of low quality data and therefore maintain the quality of forecasts."

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# Nanogirl Michelle Dickinson: Are mobile phones really bad for our health?

18 May, 2019 5:00am  
4 minutes to read



Mobile devices are a 'Class 2B carcinogen', says the World Health Organisation, but so too are coffee, pickles and being a carpenter. Photo / Dean Purcell

By: [Michelle Dickinson](#)

## COMMENT:

5G is coming to New Zealand, and with the next mobile revolution seemingly endless opportunities for technological and business developments. While many of us are dependent on our smartphones to help connect us with the world, most of us aren't really sure how our phones work, what 5G is, and whether or not we should believe the health scares floating around social media.

"G" stands for Generation and if you look at your smartphone right now, it will probably display a 3G or a 4G symbol. This refers to the frequency band it uses to receive and transmit data. 4G is 10 times faster than 3G. 5G is predicted to be 1000 times faster than our current systems.

5G is simply the fifth generation of mobile internet connectivity. It differs to the previous generations through its use of higher frequencies, which enable its users to transfer wireless data faster. The improved speed will enable the creation of new technologies, for example, improving data transfer for smart cities, remote surgeries and autonomous vehicles, as well as super-fast downloads for playing virtual reality games and watching movies.

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The frequencies we refer to in mobile phone technology are all radio signals, and often referred to as RF or Radiofrequency radiation. For most people, anything with the word radiation in it sounds scary. It's not as intimidating as it might seem though - the word just means the emission of energy from any source.

Too much exposure to radiation is thought to be bad for us, and linked to cancer. This is why we are advised to limit the number of medical x-rays we have a year. X-rays are a form of ionising radiation, and repeated exposure has been seen to damage our DNA, which over time has been shown to increase the risks of developing cancer.

Radiation is split into two broad categories: ionising and non-ionising. Non-ionising radiation doesn't carry enough energy to "ionise", or strip electrons from atoms and molecules. It therefore doesn't have enough energy to damage our DNA. The radiation emitted from radios, mobile phones, phone towers and Wi-Fi routers – RF radiation - is non-ionising. It sits at the low-energy end of the electromagnetic spectrum and is much safer than high-energy ionising radiation like x-rays.

With every new mobile phone release comes renewed concern around the effect of this technology on our health, and fears surrounding mobile phone use and the possible effect of radiation on the human body are ongoing. This isn't helped by the World Health Organisation declaring that mobile devices are a "Class 2B carcinogen", which really sounds scary. To put things in perspective, however, other items in the 2B category include coffee, pickles and being a carpenter.

The WHO says that about 25,000 scientific articles have been published on non-ionising radiation over the past 30 years making scientific knowledge of the technology more extensive than for most of the household chemicals we use day-to-day. Current evidence does not confirm the existence of any health consequences from exposure to low-level electromagnetic fields from mobile phones.

The great news is that although the power levels involved in mobile and wireless telecommunications are already incredibly low, as the frequency goes up the depth of penetration into biological tissues goes down. This means that 5G is even less likely to

penetrate the body than the current technology that we use, so no need to invest in a new tinfoil hat.

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5G is going to have a massive and exciting effect on people's lives and businesses. Of course, just as we start to get our heads around what it can do, scientists and engineers are already working on the next big mobile thing.

- Dr Michelle Dickinson, creator of Nanogirl, is a nanotechnologist who is passionate about getting Kiwis hooked on science and engineering. Tweet her your science questions @medickinson.



## Does 5G pose health risks?

By Reality Check team BBC News

- 15 July 2019
- <https://www.bbc.com/news/world-europe-48616174?fbclid=IwAR1JQyNoKK16GfuSyWKdHKBbqFqpOoArbyZjwpS3SYeWZJQUgG5s0ugH4zQ>

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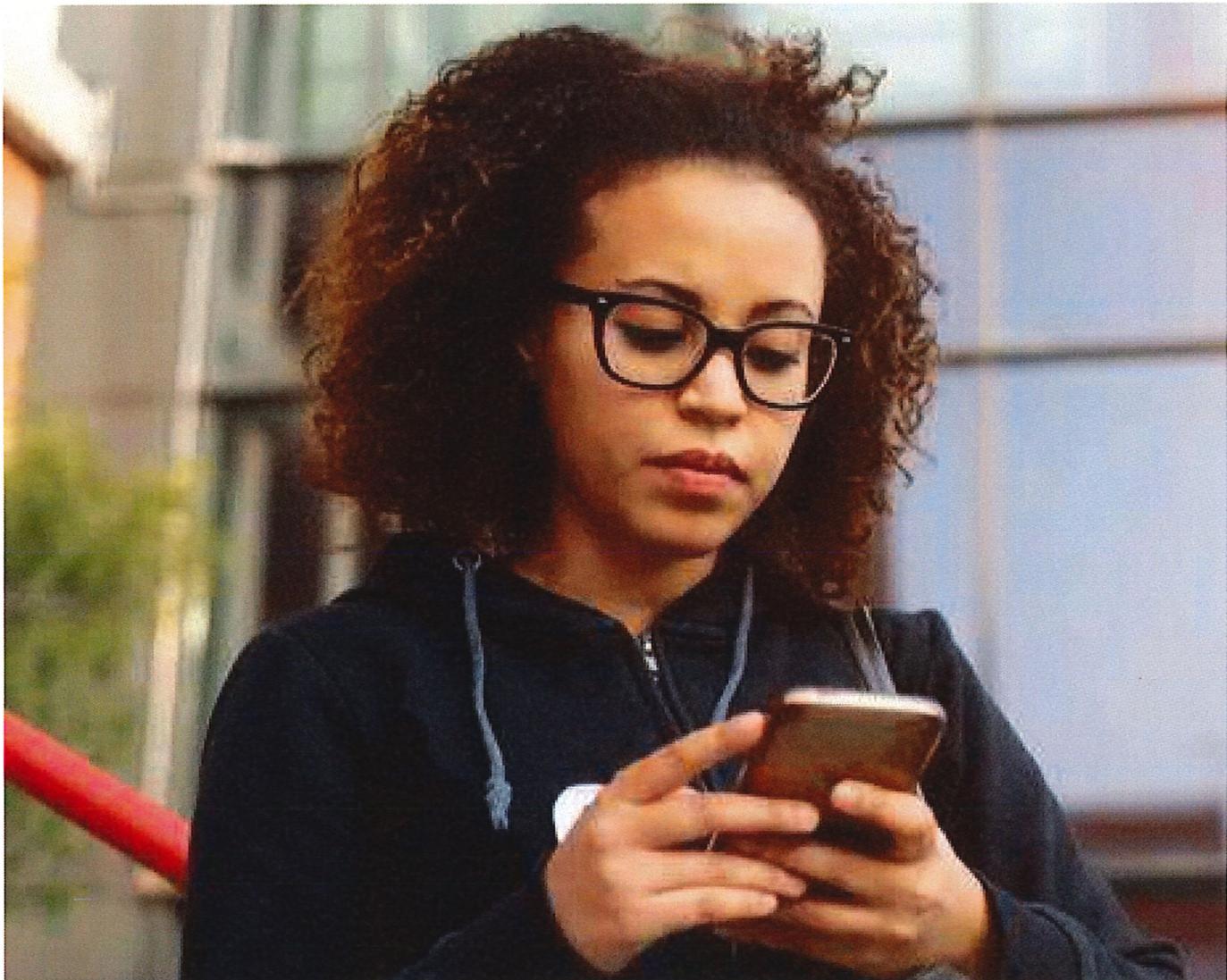


Image copyright [Getty Images](#)

The 5G mobile network has been switched on in some UK cities and has led to questions about whether the new technology poses health risks.

So what are the concerns, and is there any evidence to back them up?

## What's different about 5G?

As with previous cellular technologies, 5G networks rely on signals carried by radio waves - part of the electromagnetic spectrum - transmitted between an antenna or mast and your phone.

We're surrounded by electromagnetic radiation all the time - from television and radio signals, as well as from a whole range of technologies, including mobile phones, and from natural sources such as sunlight.

5G uses higher frequency waves than earlier mobile networks, allowing more devices to have access to the internet at the same time and at faster speeds.

These waves travel shorter distances through urban spaces, so 5G networks require more transmitter masts than previous technologies, positioned closer to ground level.



Image copyright [Getty Images](#) Image caption South Korea now has a nationwide 5G network

## What are the concerns?

The electromagnetic radiation used by all mobile phone technologies has led some people to worry about increased health risks, including developing certain types of cancer.

In 2014 **the World Health Organization (WHO) said that "no adverse health effects have been established as being caused by mobile phone use"**.

However, the WHO together with the International Agency for Research on Cancer (IARC) has classified all radio frequency radiation (of which mobile signals are a part) as "possibly carcinogenic".

It has been put in this category because **"there is evidence that falls short of being conclusive that exposure may cause cancer in humans"**.

Eating pickled vegetables and using talcum powder are classed as having the same level of risk.

Alcoholic drinks and processed meat are classed as higher risk.

A toxicology report **released in 2018 by the US Department of Health**, and pointed to by those expressing safety concerns, found that male rats exposed to high doses of radio frequency radiation developed a type of cancerous tumour in the heart.

For this study, rats' whole bodies were exposed to radiation from mobile phones for nine hours a day every day for two years, starting before they were born.

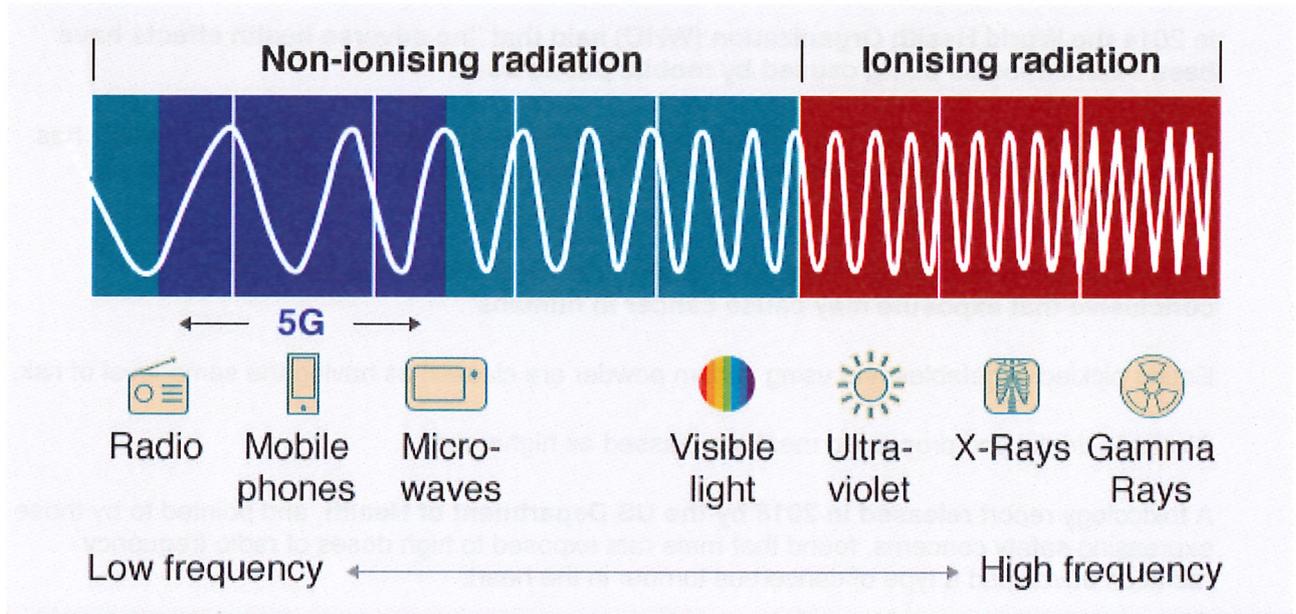
No cancer link was found for **the female rats or the mice studied**. It was also found that rats exposed to the radiation lived longer than those in the control group.

A senior scientist on the study said "exposures used in the studies cannot be compared directly to the exposure that humans experience when using a cell phone", even for heavy users.

Dr Frank De Vocht, who helps advise the government on mobile phone safety says "although some of the research suggests a statistical possibility of increased cancer risks for heavy users, the evidence to date for a causal relation is not sufficiently convincing to suggest the need for precautionary action".

However, there is a group of scientists and doctors who have written to the EU calling for the rollout of 5G to be halted.

# Where 5G fits in the electromagnetic spectrum



Source: SCAMP/Imperial College London/EBU

BBC

## Radio waves are non-ionising

The radio wave band - used for mobile phone networks - is non-ionising, "which means it lacks sufficient energy to break apart DNA and cause cellular damage," says David Robert Grimes, physicist and cancer researcher.

Higher up the electromagnetic spectrum, well beyond those frequencies used by mobile phones, there are clear health risks from extended exposure.

The sun's ultra-violet rays fall within this harmful category, and can lead to skin cancers.

There are strict advisory limits for exposure to even higher energy radiation levels such as medical x-rays and gamma rays, which can both lead to damaging effects within the human body.

"People are understandably concerned over whether they might elevate their risk of cancer, but it's crucial to note that radio waves are far less energetic than even the visible light we experience every day," says Dr Grimes.

"There is no reputable evidence," he says "that mobile phones or wireless networks have caused us health problems."

## Should we be worried about 5G transmitter masts?

5G technology requires a lot of new base stations - these are the masts that transmit and receive mobile phone signals.

But crucially, because there are more transmitters, each one can run at lower power levels than previous 4G technology, which means that the level of radiation exposure from 5G antennas will be lower.

The UK government guidelines on mobile phone base stations says **radio frequency fields at places normally accessible to the public are many times below guideline levels.**

## What about heating dangers?

Part of the 5G spectrum permitted under international guidelines falls within the microwave band.

Microwaves generate heat in objects through which they pass.

However, at the levels used for 5G (and earlier mobile technologies) the heating effects are not harmful, says Prof Rodney Croft, an adviser to the International Commission on Non-Ionizing Radiation Protection (ICNIRP).

"The maximum radio frequency level that someone in the community could be exposed to from 5G (or any other signals in general community areas) is so small that no temperature rise has been observed to date."

## Limits to exposure

The UK government says "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".

The frequency range of the 5G signals being introduced is within the non-ionising band of the electromagnetic spectrum and well below those considered harmful by the ICNIRP.

"The exposure that 5G will produce has been considered in great depth by ICNIRP, with the restrictions set well below the lowest level of 5G-related radio frequency that has been shown to cause harm," says Prof Croft.

The WHO says electromagnetic frequency exposures below the limits recommended in the ICNIRP guidelines do not appear to have any known consequence on health.

