

# 5G

INFORMATION  
PACK FOR MEDIA

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MINISTRY OF BUSINESS,  
INNOVATION & EMPLOYMENT  
HĪKINA WHAKATUTUKI

[New Zealand Government](#)

# What is 5G, and how does it use radio waves?

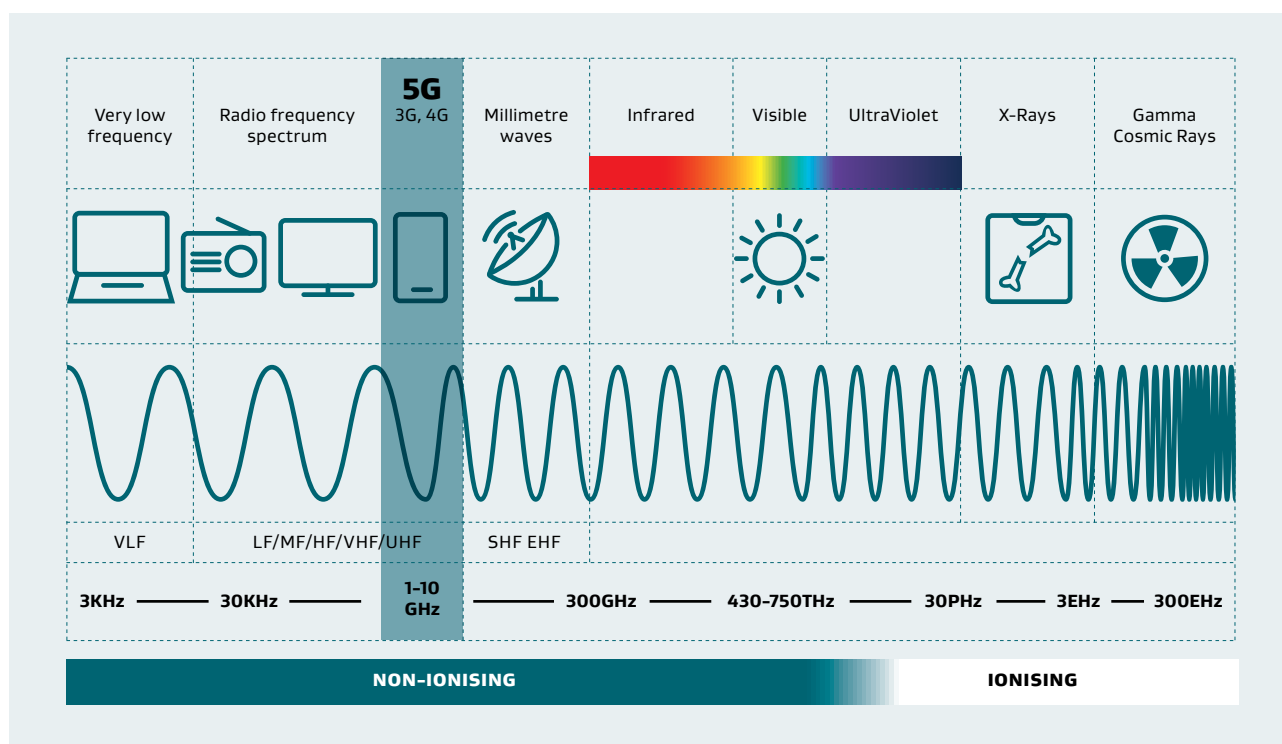
The electromagnetic spectrum has a variety of uses in New Zealand and internationally, including for radio and cellular mobile technology. Devices and equipment like computers, radios, mobile phones, phone towers and Wi-Fi routers emit electromagnetic radiation. Cellular networks use dedicated radio spectrum frequencies for the connection between the cell site and the handset (cell phone).

## 5G is simply a new application of radio technology

Releases of new cellular mobile technology have occurred approximately every decade since the 1980's. The next (fifth) generation (5G) is expected to be a significant step up from 4G networks in terms of speed, capacity and operational flexibility.



The initial plan for the 5G roll-out is that it will use frequencies similar to those used by current mobile phones. In the future, higher frequencies around 26 GHz will become available, enabling even faster data transfer. These frequency bands have been used for household appliances, communications and radar for over 60 years. More information about the frequencies for 5G is available on page 2 of this pack.



## What is the difference between ionising and non-ionising radiation?

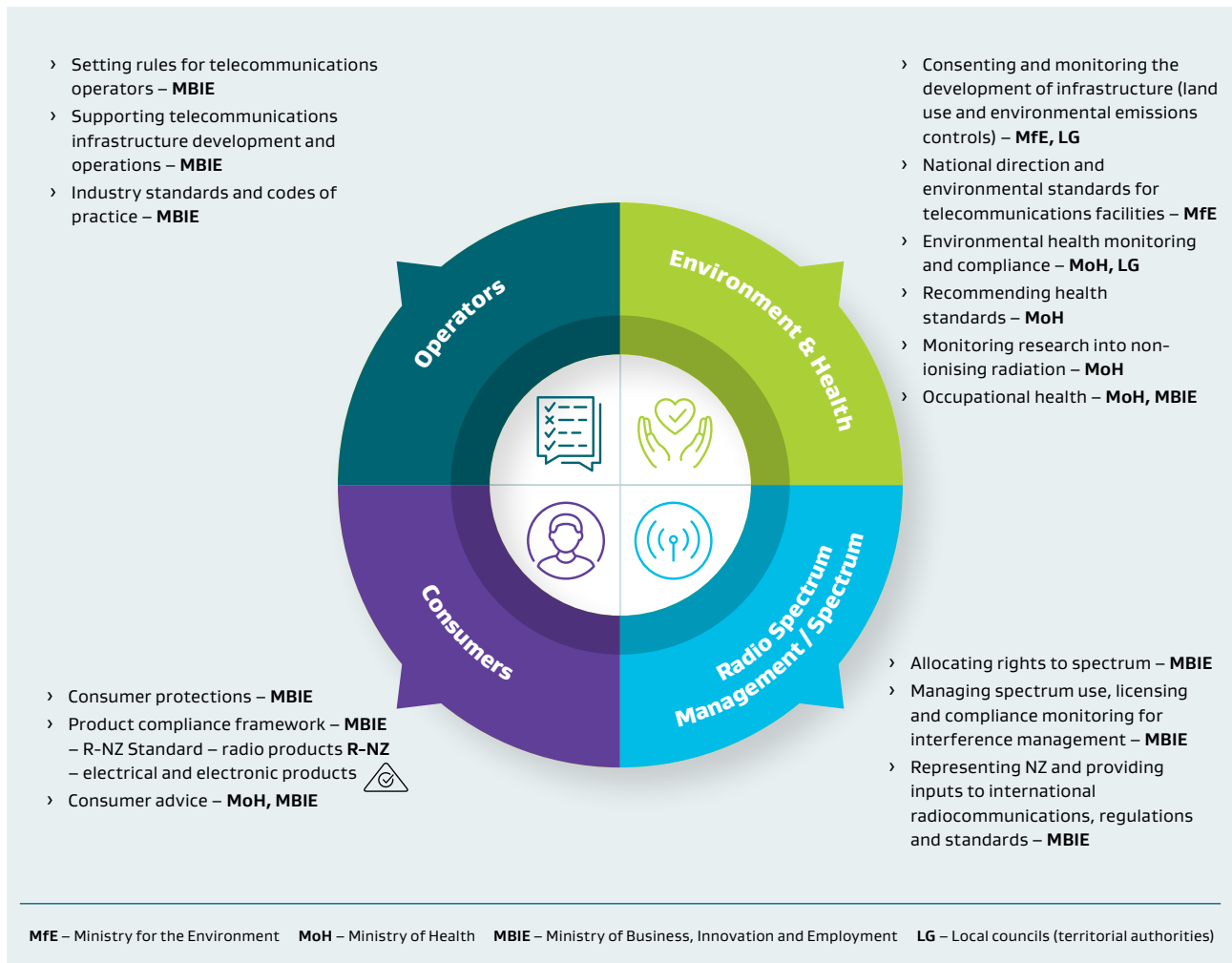
Radiation is split into two broad categories: ionising and non-ionising. Non-ionising radiation doesn't carry enough energy to "ionise", or strip electrons from atoms and molecules, and therefore it does not have enough energy to damage our DNA. The radiation emitted from radios, mobile phones, phone towers and Wi-Fi routers (RF radiation) is non-ionising. The nature of this kind of radiation, and the way it interacts with the body, is quite different to ionising radiation like x-rays. The New Zealand Radiofrequency Exposure Standard sets maximum exposure limits for the public to protect Kiwis of all ages. For more information on the New Zealand Standard, see page 3 of this pack.

## How does 5G work and why is access to radio spectrum frequencies so important?

- › Cellular networks use dedicated radio spectrum frequencies for the connection between the cell site and the handset (cell phone). The government allocates these frequencies when new technology or demand arises. Each radio service is allocated a frequency to prevent it interfering with other services.
- › The government has announced that the 3.5 GHz band will be the first spectrum allocated for 5G.
- › Mobile network operators will use a combination of frequency bands to provide 5G services including the 3.5 GHz band and other bands they already have access to.
- › Higher frequencies around 26 GHz (sometimes referred to as millimetre waves or mmWaves) will be introduced later for 5G services, especially where high data rates or capacity are needed. Millimetre waves have been widely used for many years for point-to-point communication links.
- › There is a common misconception that higher frequency signals are more harmful. In fact, the most important parameter when it comes to exposure to radio waves is the intensity of the radio wave. Exposures from 5G cell sites will be similar to those from the current technologies. However, if there is high demand in a particular area then more sites will be installed. Because each site will be serving a smaller area, they will operate at lower power which will have the effect of lowering exposures compared to 3G and 4G technology.
- › The frequencies to be used by 5G cell sites and devices are similar to those that have been used by existing technologies for many years, and are covered by the limits in New Zealand Radiofrequency Exposure Standard. (more information on the New Zealand Standard is provided on page 3 of this pack). Standards New Zealand coordinates the process to develop and review a New Zealand Standard such as this, which includes convening expert committees and undertaking public consultation on draft standards. You can find out more about Standards New Zealand here: [www.standards.govt.nz](http://www.standards.govt.nz)

## What does the government do to protect Kiwis from harmful radiofrequency exposure?

There are a number of government agencies and local bodies involved in the roll out of 5G in New Zealand. The responsibilities of these agencies and local bodies include setting regulations for the NZ telecommunications industry to operate within, allocating radio spectrum for network operators to use for 5G, monitoring research into health effects, and setting radiofrequency exposure limits for the public.



## More information about the agencies and bodies involved in 5G

- › The Ministry of Business, Innovation and Employment (MBIE) is responsible for establishing the telecommunications regulatory environment, including setting the rules within which the telecommunications companies operate and the product compliance framework. MBIE is also responsible for making frequency bands available for new uses, including bands for the 5G network. You can read more about MBIE's roles here: [www.mbie.govt.nz/science-and-technology/it-communications-and-broadband/](http://www.mbie.govt.nz/science-and-technology/it-communications-and-broadband/) and here: [www.rsm.govt.nz/business-individuals/buying-electrical-and-electronic-products-in-new-zealand/what-to-look-for-when-youre-buying-a-product/](http://www.rsm.govt.nz/business-individuals/buying-electrical-and-electronic-products-in-new-zealand/what-to-look-for-when-youre-buying-a-product/)
- › MBIE has laid the groundwork preparing for 5G through industry workshops and has run a public consultation process to discuss 5G spectrum bands and their future allocation. MBIE is also working with interested parties on technical and regulatory issues relating to 5G.
- › All radio transmitters in New Zealand must either be licensed by a radio licence, spectrum licence or general user licence, or have an exemption from licensing. MBIE oversees this licensing process. Details of individual spectrum licences issued for each radio transmitter are searchable in a public register, the Register of Radio Frequencies: [www.rsf.rsm.govt.nz/smart-web/smart/page/-smart/WelcomePage.wdk](http://www.rsf.rsm.govt.nz/smart-web/smart/page/-smart/WelcomePage.wdk)
- › The Ministry of Health is responsible for expert advice on health effects from electromagnetic fields and closely monitors international research, including the frequencies expected to be used for 5G technologies. This includes recommending exposure limits for the New Zealand Radiofrequency Exposure Standard (NZS2772.1). You can read more about their role here: [www.health.govt.nz/our-work/environmental-health/non-ionising-radiation](http://www.health.govt.nz/our-work/environmental-health/non-ionising-radiation)
- › The Ministry for the Environment is responsible for regulatory controls under the Resource Management Act (RMA) 1991, including the National Environmental Standards for Telecommunications Facilities (NESTF). You can read more about their role here: [www.mfe.govt.nz/rma/national-direction/national-environmental-standards/national-environmental-standards](http://www.mfe.govt.nz/rma/national-direction/national-environmental-standards/national-environmental-standards)
- › Local government's role is to implement and enforce the national direction for telecommunications facilities through policies and plans under the Resource Management Act 1991. The Resource Management (National Environmental Standards for Telecommunication Facilities) Regulations 2016 (NESTF) require that all cell sites, including those that use 5G technologies, comply with the standards. This includes the New Zealand Radiofrequency Field Exposure Standard, which set maximum exposure limits for the public.

## Ensuring products and equipment are safe

- › There's a range of international and Australia/New Zealand standards that the telecommunications industry adheres to, to ensure the products and equipment they are using are safe.
- › In New Zealand, all network providers rolling out a 5G network must comply with the Resource Management Act (RMA) 1991, including the National Environmental Standards for Telecommunications Facilities (NESTF). These regulations include compliance to the New Zealand Radiofrequency Field Exposure Standard which sets maximum exposure limits for the public. The current NZ exposure standard already covers 5G.
- › The limits in the exposure standard are more than 50 times lower than the levels at which adverse effects might occur. These limits protect people of all ages, including children.
- › The exposure standard's limits are recommended by the International Commission on Non-Ionizing Radiation Protection, which the World Health Organization recognises for its independence and expertise in this area. The Commission has reviewed and reaffirmed these limits periodically (most recently in 2017). It bases any changes to them on the findings of health research, and not the requirements of telecommunications or other industries. Many countries (including Australia, Canada, France and Germany) use exposure limits similar to those in NZ.
- › Exposures from 5G transmitters will be similar to those from the current technologies. However, if there is high demand in a particular area, more sites will be installed. Because each site will be serving a smaller area, they will operate at lower power which will have the effect of lowering exposures.
- › When a mobile network operator proposes a new cell site, they must submit pre-commencement reports to the local council to show that the requirements in the NESTF and the exposure standard will be met for each cell site covered by the NESTF. This includes taking into account exposure from other telecommunications facilities in the vicinity as well. If the report shows that the cell site will generate exposures at or above 25% of the public exposure limit, further reporting to the local council is required. If a facility or network operator cannot comply with requirements in the NESTF, the proposed facility will be "non-complying".
- › Checks that telecommunications equipment comply with the exposure limits are carried out by mobile network operators (in line with joint standards referenced in the NESTF).
- › Information on the cell sites in your area can be obtained from your local council.

## How different is 5G infrastructure from 3G and 4G?

The key difference with 5G compared to previous generations of mobile technology is that 5G will normally use beam-forming antennas. However, beam-forming is already used to a limited extent by some 4G sites. See below for more detail on how a beam-forming antenna operates:

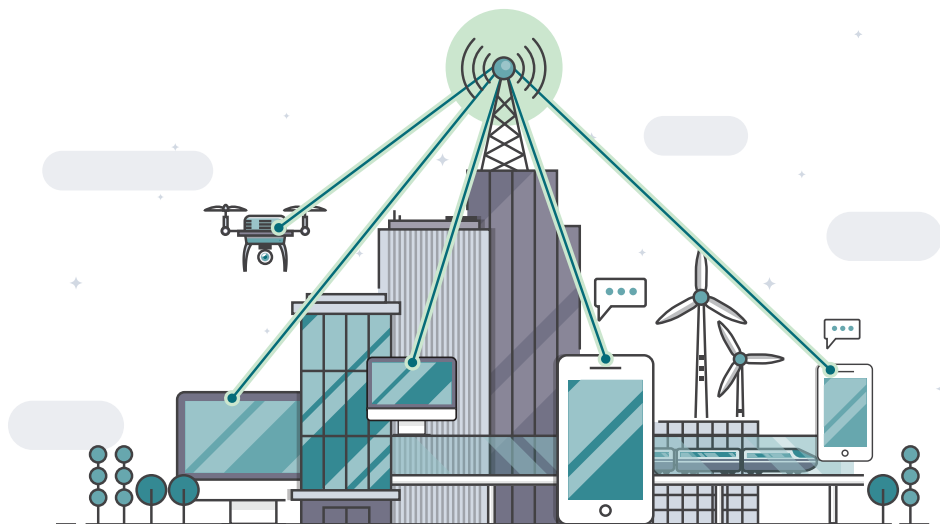
### Conventional antenna

Conventional cell site antennas (for example those currently used for 3G and 4G) produce a single fan shaped beam covering a sector about 120 degrees wide. Regardless of where the receiving device is (for example, a person using their cell phone in their home), the radio beam is sent to the entire area served by the antenna.



### Beam-forming antenna

The difference with a beam-forming antenna is that it produces a larger number (say, 48) of narrow beams that are directed to a small area. This means that instead of covering the entire area with the beam, it is targeted to the receiving device in use.



## Monitoring health research to keep everyone safe

- › 5G is simply a new application of radio technology. Existing research on the possible health effects of radiofrequency fields applies as much to 5G as to any other radio system in use.
- › To keep up to date with research, the Ministry of Health convenes an expert advisory committee, known as the Interagency Committee on the Health Effects of Non Ionising Fields. The Committee meets every six months and provides the Director General of Health with high quality, independent scientific and technical advice. The Committee has considered the issue of 5G deployment and has concluded there is nothing in the latest research that would indicate the need to change current policy settings relating to the health effects of radio waves.
- › In addition, the Ministry participates in a World Health Organization project to assess the health effects of electromagnetic fields.
- › At this point there is no indication that exposure to radiofrequency from cellular mobile technology exceeds guidelines or will do so once 5G is implemented.
- › For more information please see the latest Ministry of Health 5G factsheet here: [www.health.govt.nz/system/files/documents/topic\\_sheets/5g-and-health-aug19.pdf](http://www.health.govt.nz/system/files/documents/topic_sheets/5g-and-health-aug19.pdf)
- › The Ministry of Health has also produced an expert Q & A on 5G available here: [www.health.govt.nz/your-health/healthy-living/environmental-health/radiation-environment/cellsites-and-5g/5g-questions-and-answers](http://www.health.govt.nz/your-health/healthy-living/environmental-health/radiation-environment/cellsites-and-5g/5g-questions-and-answers)
- › The Ministry of Health has also produced an addendum to the Interagency Committee on the Health Effects of Non-Ionising Fields: Report to Ministers 2018, providing advice on 5G radiofrequency fields. This is published on the MoH website alongside the 2018 report to Ministers here: [www.health.govt.nz/publication/interagency-committee-health-effects-non-ionising-fields-report-ministers-2018](http://www.health.govt.nz/publication/interagency-committee-health-effects-non-ionising-fields-report-ministers-2018)
- › For further information about 5G, including 5G and health, the Office of the Prime Minister's Chief Science Advisor has created an information sheet '5G in Aotearoa New Zealand' that you can download here: <https://www.pmcsa.ac.nz/our-projects/hot-topics/5g-in-aotearoa-new-zealand/>