



## Connecting Rural New Zealand

Established in 2017, the Rural Connectivity Group (RCG) is solely focused on building telecommunications infrastructure to deliver wireless broadband and mobile services to rural New Zealand. The RCG is using funding from the Government's Rural Broadband Initiative Phase 2 and the Mobile Black Spot Fund, as well as contributions from Spark, Vodafone and 2degrees. Our job is to build a 4G mobile network in areas with no broadband coverage or poor broadband coverage and areas of no mobile coverage. Our programme of work will enable as many Kiwis, businesses, and tourists, to have access to critical wireless broadband and mobile services in rural New Zealand.

The sites we build will be shared by New Zealand's three mobile network operators— Spark, Vodafone and 2degrees – and provide services from all three mobile companies to ensure competitive wireless broadband and mobile services to rural customers. In a world first the infrastructure we build will allow all three operators to share the radio access network equipment and one set of antennas. This allows the RCG to build one facility to provide services to areas of need as opposed to each operator building their own facility to provide services.

- To find out more about the RCG visit <https://www.thercg.co.nz/>
- To find out more about the Government's RBI2 and MBSF programmes visit <https://www.crowninfrastructure.govt.nz/about/>

**The RCG have developed this information sheet to explain how our mobile network operates and to explain NZ legislation governing telecommunications infrastructure and mobile networks.**

### How does a mobile network operate?

Mobile networks use the same radio technology that has been in use for over 100 years, for a range of everyday services. Some common examples of devices that also use radio technology include:

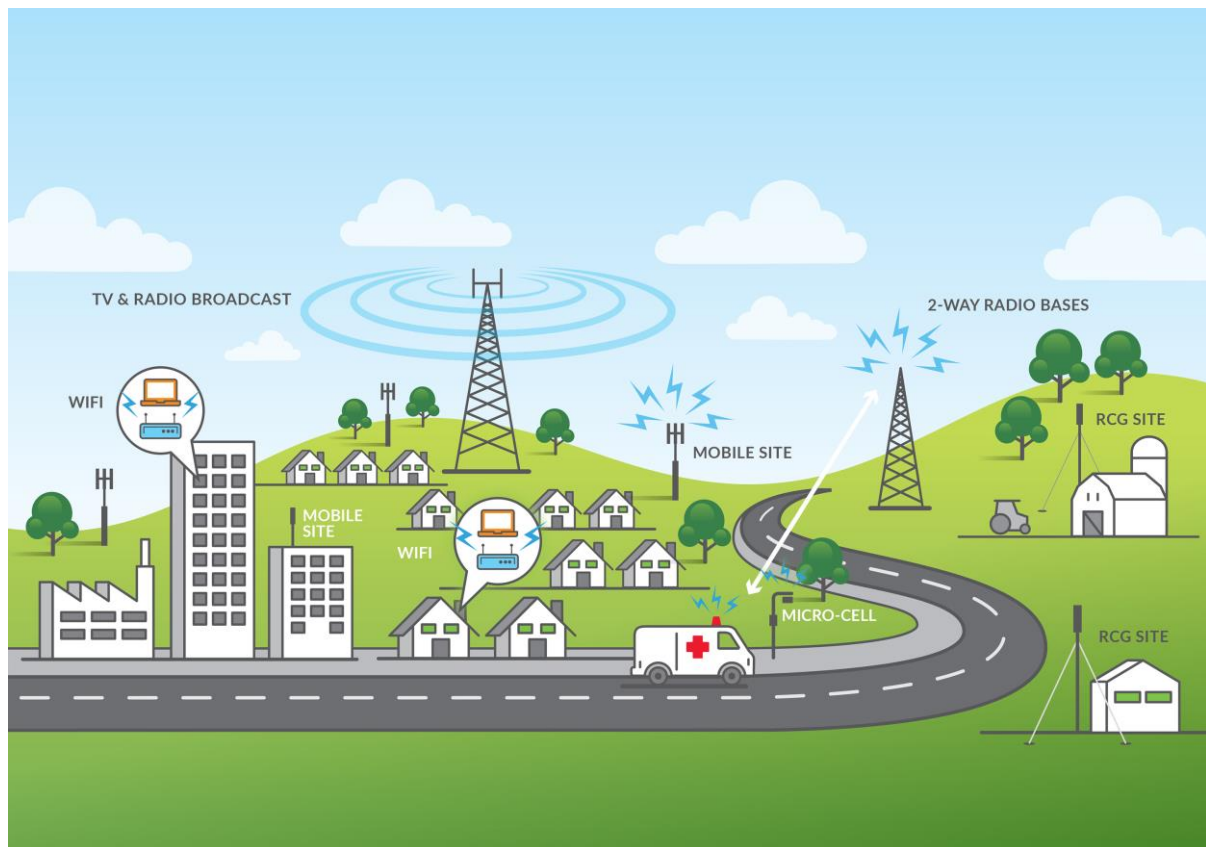
- AM and FM radio
- television broadcasting
- WiFi
- Bluetooth
- cordless phones
- radio-controlled toys
- baby monitors

Just as the devices above use radio signals, mobile devices (mobile phones, iPads, routers, laptops) work by sending and receiving low power radio signals. The signals are sent to and received from antennas that are attached to radio transmitters and receivers, commonly referred to as mobile cell sites, mobile towers or mobile facilities. These mobile sites are linked to the rest of the mobile and fixed phone networks (via the national telecommunications network) and pass the call on to those

networks. That is how you are able to make a call on your mobile phone standing in a paddock in Taihape to call your friend on a farm in Winton, Southland.

Unlike television and radio transmitters (that transmit at full power continuously), mobile network equipment uses just enough power control to maintain call quality. What that means is, if you are close to the mobile site your phone has a good signal and therefore does not have to utilise much power. If you are on the edge of coverage your phone will have to work harder to maintain enough signal strength.

## Wireless Communications in Everyday Use



For further information on how radio technology operates please visit the **Ministry of Health** website at this link:

- <https://www.health.govt.nz/your-health/healthy-living/environmental-health/radiation-environment/cellsites>

## Why do we need more mobile cell sites?

These days having access to the internet is regarded as a basic human right and the government supports the development of the RCG rural network to provide broadband and mobile services to rural residents. The RCG are building mobile cell sites in rural locations where there is no broadband coverage or poor broadband coverage and no mobile services. We are also building mobile cell sites at tourist locations across New Zealand and in locations to improve mobile service along State Highways to improve public safety.

The increase in demand from all New Zealanders for wireless broadband and mobile service means an increased need for telecommunications infrastructure to support the increased demand. Quite simply our appetite to get and stay connected means we need more mobile cell sites to allow that to happen.

Sometimes mobile cell sites are needed in areas where coverage already exists. New sites are required to improve service quality, increase broadband speeds, fill in coverage holes, and to provide enhanced services to users.

## **What technology is on RCG mobile cell sites?**

RCG mobile cell sites provide 4th Generation (4G) mobile technology to provide high data capacity for rural wireless broadband and to allow mobile devices to download and upload large data files with fast access to the internet. As well as providing a new range of services 4G networks are far more efficient in their use of radio spectrum and generate less energy than earlier generation mobile technology. In tourist locations and along State Highways 3G technology will also be available to ensure all types of mobile phones can make and receive voice calls and 111 emergency calls.

## **What determines the location of an RCG mobile cell site?**

The programme of work that the RCG is delivering is determined by the government's Rural Broadband Initiative Phase 2, the Mobile Black Spot Fund and the Provincial Growth Fund. The RCG is contracted to deliver mobile cell sites that will deliver services to the maximum number of rural residents within that local area.

Suitable locations for new mobile cell sites must fulfil the technical network requirements for improved coverage for users, sites need to be near where power is available, or could be readily achieved and also where transmission linking (linking the site back into the national telecommunications network) can be achieved. The RCG takes the technical requirement of a site build and balances the reasonable expectations of the community and any impacts on the local environment. There are a number of other important criteria to take into account, including compliance with the Resource Management Act (RMA), Local Authority District Plans, and Heritage NZ legislation

## **Why can't cell sites be put far away from where people live?**

Mobile cell sites need to be located close to the users and require line of sight to be effective. The energy of radio signals reduces very quickly over distance and obstacles such as trees, vegetation, hills and even buildings can impact the efficiency of the radio signal. It is not effective for mobile cell sites to be located far away from the users they serve, as both the mobile cell site equipment and the mobile device must generate significantly higher radio power levels to maintain two-way communication. This reduces efficiency and available capacity in the network. Cell sites are instead designed to serve much smaller defined geographical areas which, as well as reducing radio power levels, enables the efficient reuse of the limited available radio spectrum. Unlike one-way broadcast systems such as TV which use much higher-powered transmitters to broadcast over a wide area, cell sites need to be located closer to users to work effectively.

## **What are electromagnetic fields or EMF?**

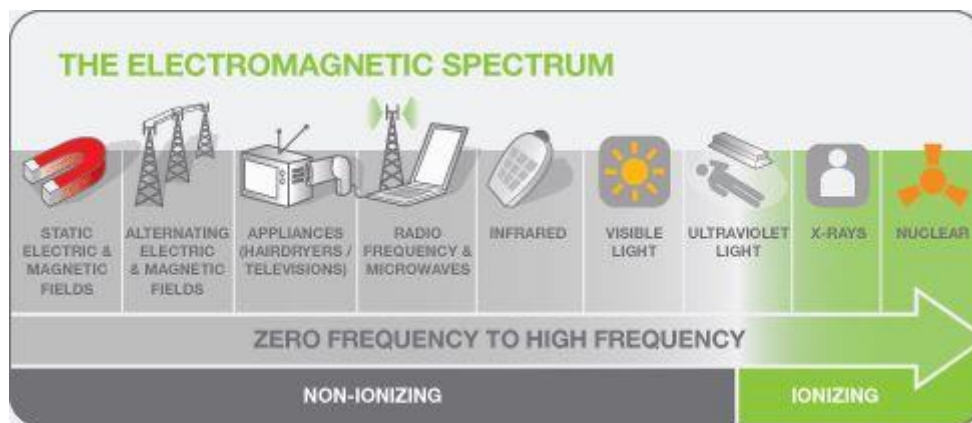
EMF is short for electromagnetic fields or sometimes known as electromagnetic radiation (EMR) or electromagnetic energy (EME). Electromagnetic fields are present everywhere in our environment –

the earth, sun and ionosphere (part of the Earth's upper atmosphere) are all-natural sources of electromagnetic fields. In fact the sun is the largest source of EMF in our natural environment.

Electric and magnetic fields are part of the spectrum of electromagnetic energy which extends from static electric and magnetic fields, mains power frequencies (50/60Hz) through to radiofrequency, infrared, and visible light to X-rays.

Many electrical appliances don't just create EMF – they rely on them to work. Television and radio, mobile and cordless phones, remote control handsets, baby monitors, Wifi and the communication systems used by emergency services all communicate using Radio Frequency EMF.

The diagram below explains the electromagnetic spectrum and where technology items sit in the non-ionising and ionising spectrum range.



**It is very important to understand the difference between non-ionising and ionising radiation within the electromagnetic spectrum as they perform in very different ways.**

## Non-ionising radiation

Electromagnetic fields which cannot break down molecular bonds in cells or tissues are called **non-ionising radiation**. Visible light is a type of non-ionising radiation, which we are exposed to daily from natural and artificial sources such as the sun and indoor lighting. Radio Frequency EMF is also a source of non-ionising radiation, which does not carry enough energy to break down chemical bonds within cells and tissues. The RCG network is in the safe zone of non-ionising radiation.

## Ionising radiation

At the very high frequency end of the electromagnetic spectrum, electromagnetic waves carry such large quantities of energy that they can ionise particles of matter and consequently break down the chemical bonds between molecules. This type of radiation is potentially harmful to health, and is only used in a small number of specific applications: **X-rays used for both diagnostic and therapeutic purposes (radiotherapy), gamma-rays (emitted by radioactive materials) and cosmic radiation** all have the ability to break molecular bonds.

To learn more about EMF visit the **World Health Organisation (WHO)** website:

- <https://www.who.int/peh-emf/about/WhatisEMF/en/>

## New Zealand Standards for electromagnetic field emissions.

Standards are part of everyday life today, but many people don't realise they exist. The homes we live in, the cars we drive and appliances we use are all built to standards, developed by experts so they work correctly and are safe for the public to use. In New Zealand the following standards have been developed specifically to apply to telecommunications infrastructure:

- ***New Zealand Standard NZS 2772.1:1999***
- ***National Environmental Standards for Telecommunication Facilities (NES) 2016***

## What organisations establish standards regarding EMF exposure?

### **International Commission on Non-Ionising Radiation Protection (ICNIRP)**

Decades of research into EMF and health has produced a large body of scientific literature which national and international standards organisations can review to establish safe exposure limits.

The **World Health Organisation (WHO)** formally recognised the **International Commission on Non-Ionising Radiation Protection (ICNIRP)** to develop international EMF exposure guidelines. The ICNIRP guidelines are based on careful analysis of recognised scientific literature and are designed to offer protection for all ages, including children, against identified health effects of EMF and with a large built-in safety margin.

The **ICNIRP** guidelines form the basis of the New Zealand radiofrequency field exposure standard NZS 2772.1:1999. The recently updated NES 2016 requires that all mobile network operators (such as RCG, Spark, Vodafone and 2degrees) comply with NZS 2772.1:1999, ensuring that the same standard applies across all local authorities.

The New Zealand radiofrequency field exposure Standard NZS2772.1:1999 follows the ICNIRP recommendations and is endorsed by the **Ministry of Health (MoH)**. A second standard, AS/NZS2772.1:1999, says how the exposures should be assessed.

You can read more about the New Zealand standards for electromagnetic emissions by visiting the below website.

- <https://www.health.govt.nz/our-work/environmental-health/non-ionising-radiation/radiofrequency-field-exposure-standard>

## How is the NZ Standard adjusted in accordance with the latest research?

As set out above, the NZ Standard is based on the **ICNIRP** guidelines which are endorsed by the **World Health Organisation (WHO)**. The New Zealand Standard has a similar basis to many developed countries including the United Kingdom, Australia, France, Germany, USA, Canada, and South Africa.

In March 2020 ICNIRP published new guidelines for the protection of humans exposed to radiofrequency electromagnetic fields. The guidelines were updated to cover 5G technologies, as well as AM and DAB radio, WiFi, Bluetooth and the currently used 3G/4G mobile phones.

The New Zealand Interagency Committee on the Health Effects of Non-Ionising Fields (the Interagency Committee) reviews the latest relevant research biannually and reports to the Director-General of Health. The Interagency Committee is tasked with providing the Director-General of Health with high

quality, independent scientific and technical advice on any potential health effects from exposures to radiofrequency fields and if any changes are required to the NZ Standards.

## Can emissions from mobile phones or cell sites cause health problems?

The **World Health Organisation (WHO)** and the **New Zealand Ministry of Health**, has said there's been no clear evidence from thousands of scientific studies that cell sites present risks to health. The **WHO** notes the following: "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."

The below links will take you to further information about EMF and wireless technologies.

- <https://www.who.int/peh-emf/publications/facts/fs304/en/>
- <https://www.who.int/en/news-room/fact-sheets/detail/electromagnetic-fields-and-public-health-mobile-phones>

## How does the Resource Management Act (RMA) apply to mobile cell sites?

The National Environmental Standards for Telecommunications Facilities (NESTF) 2016 under the Resource Management Act, allow telecommunication network operators (adhering to certain criteria) to construct, operate and maintain poles, cabinets and antennas (either on existing poles or on brand new poles), within the road reserve as a permitted activity. Each facility must adhere to criteria relating to radio frequency levels, the height, size and location of the equipment and the noise levels emitted from the cabinets to be a permitted activity. Where the criteria is not met under the NESTF then the local council District Plan rules apply. Sometimes a resource consent is required.

Each District Council Plan has a unique set of rules applying to telecommunications facilities and the Council will decide according to their rules if the activity is to be processed non-notified, limited notified or publicly notified.

Regardless of the planning activity status of the facility, the Rural Connectivity Group will be open with the local community about the proposed facility, its purpose and location and will communicate directly with any residents that may be nearby.

To read more about NESTF 2016 follow this link:

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

## How do I have a say in where a mobile site will go?

A cell site can be located on a property with the agreement of the landowner (private or local authority). The design and location of the cell site must comply with the Resource Management Act (1991) (RMA) together with any relevant parts of the local District Plan. For individual consent applications your local Council determine through their standard process if and who are affected parties. Based on that decision there may be a formal submission process during which Council would notify the affected parties.

Anyone can have a say in the way their local District Plan rules are put together through the District Plan submission process. To find out more about your councils District Plan you can visit their website.

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