

# 5G - Upgrade or potential catastrophe?

Cell phone tower by Schwarzweisz, Pixabay

There is much online consternation about the introduction of a 5G network. NZASE Science Communicator **Mike Stone** examines the facts and dispels some fallacies.

## The context

Just as Microsoft regularly releases new versions of Windows, mobile phone companies are releasing their latest version, called fifth generation or 5G (we are currently using 4G). 5G offers:

- **Faster speeds** for sending and receiving information (up to 10 times faster than 4G top speed of 0.1 Gigabytes per second (Gbps), because it uses multiple beams, compared with the wider, one-way beams of 4G.
- **Less time** between pressing the button and the function starting (latency) – self-driving cars need to make decisions as fast as possible.
- **Simultaneous connection** for many more devices.
- **Transmission of huge amounts of data**, which suits data-hungry applications such as virtual reality (VR), enabling remotely driven cars; live streaming of emergencies attended by first responders; online medical consultations; and multi-player games.

5G core functions will be initially be used by businesses, emergency services and intensive gamers. Over time, however, 5G is likely to become the norm. This will enable much faster download of high-definition video, replace home wireless, support widespread wearable technologies, home control systems, and help your car drive you places.

## Security concerns

There are, however, security concerns, as with any connectivity, especially wireless. Because 5G connects not just our laptops and mobile phones, but also vehicles, medical professionals, livestock, and even our power grid, any security breach may have serious or far-reaching consequences. Because of these concerns, the Government Communications Security Bureau (GCSB) will be involved because ensuring impenetrable infrastructure is one of its functions.



Cell phone tower by Alistair Mcintyre, Pixabay

## Implementing 5G

5G has been introduced in other parts of the world - the UK, the USA and some other countries recently upgraded to 5G, but the roll-out is still in its early stages. In the USA, 5G launched in Chicago in April with two handsets, and was found to transmit at speeds up to 1.4 Gbps. Telstra launched 5G in May 2019 in 10 Australian centres with their first 5G smartphone, the Samsung Galaxy S10 5G.

Vodafone will roll out 5G in four NZ centres before the end of the year, on equipment provided by Nokia. Spark hopes to roll out in mid-2020 but faces two challenges:

- GCSB's misgivings about Chinese company Huawei, which is providing the equipment
- After the Waitangi Tribunal decision that iwi have rights to radio spectra, Māori have lodged





Cell phone towers by Stux, Pixabay

claims to spectra with the government.

While NZ will use the 3.5 GHz frequency band locally and internationally, some countries

are experimenting with 28 GHz, but it is not yet in commercial use.

## Myths about 5G

There are a lot of myths about 5G – claims that are at best unsubstantiated and at worst fabricated. As a teaching activity, teachers could give students the footnote websites and ask them to describe the myths about 5G and the evidence that they are false. This [guide to spotting bad science](#) may also be useful.

5G will...	Reason for claim	Scientific evidence countering claim
<b>Damage our health</b>	5G signals are referred to as radiation, which associates them with ionising rays like X-rays. Ionising rays remove electrons from atomic orbits, causing atoms to become charged or ionized. Opponents claim 5G signals can damage cells, <sup>1</sup> causing brain tumours, infertility and autism. <sup>3</sup>	Radio waves are non-ionising and have existed for more than a century; as they cannot remove electrons there is no evidence they can damage cells or cause cancer. <sup>3,4</sup> No study has found a link between mobile phones and cancer in humans. <sup>6</sup> Government guidelines for wireless technology are strict and evidence-based. <sup>2,6</sup>
<b>Kill birds</b>	337 starlings and two woodpigeons were supposedly killed at The Hague between Oct 19 and Nov 3, 2018, as a result of 5G network testing (reported by John Khules in FB posts, thence in <i>Health Nut News</i> ). <sup>7</sup>	5G was tested in the general area on June 28, 2018, but not in October or November and there is no evidence the test was connected to the bird deaths. Levels of electromagnetic (EM) fields in the test were too low to be the cause. <sup>7</sup>
<b>Affect bees</b>	Electromagnetic (EM) fields supposedly impair cryptochromes, protein pigments that bees need for the health of bee colonies and their ability to navigate. <sup>8</sup>	There is no evidence that 5G kills bees. Many cases of bee colony collapse disorder are far from any mobile phone signals. <sup>9</sup>
<b>Use a millimetre wave</b>	5G will transmit in the mmWave spectrum (higher frequency radio waves 28–100 GHz, with a very short wavelength). <sup>10</sup>	UK and NZ are rolling out 5G in the 3.4 GHz range of the EM spectrum (similar to 2-4G, 0.8-2.6 GHz) and will use existing mast sites. But even mmW meets guidelines. <sup>6</sup>



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<b>Interfere with weather satellites</b>	When satellites look down to water vapour they might pick up 5G instead, leading to incorrect forecasting for major weather events, endangering the public. 5G networks operating at frequencies around 24-28GHz are close to the 23.8GHz frequencies of water vapour sensors. <sup>10</sup>	The planned 5G network announced by Vodafone NZ uses lower frequencies of 3.5GHz and will not affect weather satellite technology. <sup>9</sup>

## Footnotes

- The Inquirer**: UK MPs claim 5G radiation is carcinogenic.
- UK Mobile communications company EE Ltd**: Is 5G safe
- UK technology publisher Wired** on the 5G conspiracy theory
- American Council on Science and Health**
- Radio NZ**: Inside the anti-5G movement
- 2018 NZ government report** on the health effects of non-ionising radiation (83 pages).
- Snopes fact-checking site** on 5G testing and birds
- Conspiracy and pseudoscience website**  
Principia Scientific International
- US HuffPost**: Cell phones don't kill bees
- Zero Hedge**: Is 5G worth the risks?
- NIWA meteorologists** say 5G will not affect weather forecasts.

## Other sources

- Tech Radar** (USA) - What is 5G.
- NZ Science Media Centre** - 5G: Hype vs reality
- Consumer** - Why 5G isn't a health hazard.

## Ngā Kupu

- Ahokore** - Wireless, wifi
- Hihi autōhiko** - Electromagnetic radiation
- Hihi irirangi** - Radio waves
- Hihinga** - Radiation
- Pūrākau** - Myth
- Taunakitanga** - Evidence
- Waea pūkoro** - Cell phone

From Te Aka Maori  
Dictionary and Paekupu



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