

Community concerns over 5G: Needless anxiety or wise precaution?

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Fifth generation (5G) wireless technology, as the name indicates, is the next generation wireless communication network from 3G, 4G and 4G LTE. 5G will use the spectrum for the existing 4G frequency range (600 MHz to 6 GHz) and also the millimetre wave bands (24–86 GHz). Once fully implemented it would predominantly operate in the millimetre (mm) radiofrequency band which would allow much higher data transfer, as much as 100 times faster than 4G cellular networks. This would be used for future autonomous vehicle transport networks by enabling rapid data transfer between vehicles and nearby fixed infrastructure to avoid collisions or hit pedestrians.

5G also provides the foundation for the Internet of Things (IoT) by being able to support an estimated one million wireless connected devices per square kilometre, including smart household appliances such as refrigerators, washing machines, dryers, entertainment equipment, TVs, lighting fixtures, thermostats, home security systems, etc. 5G is planned to provide the foundation for the smart city concept where virtually everything we use will be wirelessly connected.

Consumers will be able to download ultra high-resolution videos and movies on their 5G smartphones in seconds. It will enable virtual and augmented reality video games, which promises to immerse the viewer in a virtual world of high-resolution digital imagery.

In the industrial sphere, 5G has been referred as ushering in the fourth industrial revolution by enabling industries to utilise artificial intelligence to improve industrial efficiency and reduce labour costs by removing the human element in much of the manufacturing process.

The downside of 5G mm waves, however, is that the signals do not penetrate objects readily such as buildings and foliage. This necessitates a far denser network of 5G small cell antennas which will be mounted on power poles, light poles, street furniture, bus shelters and so on, which in many cases will be close to homes, workplaces and public areas.

In some cases, internal antennas in buildings will also be needed for reception. This will result in higher radiofrequency exposures to occupants in these areas. The high number of small cells needed for an effective 5G network is causing community disquiet and that, combined with many scientific unknowns about the possible

biological effects of prolonged exposure to 5G mm waves, is resulting in increasing community opposition in Australia and internationally.

Counter to this, however, are statements by so-called experts that there is a total lack of risk with 5G technology and that community concerns are being fuelled by misinformation without any scientific validity. This paper examines this viewpoint, termed “technological fundamentalism” as an unquestioning faith in the ‘goodness’ of advanced technology. Anyone who questions this ‘goodness’ is portrayed as an ill-informed fear monger.

An example of this is seen in the statements put out by the University of Sydney’s Professor Simon Chapman, who, when discussing 5G community protests, stated that:

“Mobile phone alarmists are a relentless (small) lobby group who are risk-phobic about almost every new form of communication. Every time there’s a new generation of cell phone or electronic technology, they crank out the same fear-mongering stuff. Cult-like, they wake every morning, to spread the word about the deadly rays they believe are being foisted on the world by the evil telecommunications industry. They follow in the hallowed footsteps of those in history who raised health alarms about railway travel, electric light, ordinary phones, radio, TV, electric blankets, computers, microwave ovens, wind turbines and solar roof cells etc. Some are also anti-vaccination (eg: this is one of their US queen bees).”

Another example is from Adam Verrender, a PhD student at the University of Wollongong, who claimed on ABC News on January 9, 2019 that community concerns over 5G are being “fuelled by misinformation, scepticism and a complex psychological phenomenon known as the nocebo effect”.

Concerning problems

Despite the above dismissive assurances about a lack of risks from 5G networks there are a number of very concerning problems with 5G that give weight to community concerns.

In April 2019 a department of the Directorate-General for Internal Policies of the European Commission (EC) published a detailed analysis on the deployment of 5G networks. Titled, ‘5G Deployment: State of Play in Europe, USA and Asia’, the report’s authors state that “5G is more complex than previous wireless technologies and should be considered as a long-term project to solve technical challenges and develop a clear business case”. To quote in part from the executive summary (my underlining below):

“As 5G is driven by the telecoms supply industry, and its long tail of component manufacturers, a major campaign is under way to convince governments that the economy and jobs will be strongly stimulated by 5G deployment... The notion of a “race” is part of the campaign but it is becoming clear that the technology will take much longer than earlier



generations to perfect... This is because the technologies involved with 5G are much more complex. One aspect, for example, that is not well understood today is the unpredictable propagation patterns that could result in unacceptable levels of human exposure to electromagnetic radiation."

To understand what is meant by those unpredictable propagation patterns mentioned in the EC report, it is worthwhile examining an Ericsson presentation, titled 'Impact of EMF limits on 5G network roll-out'. The presentation was given at an International Telecommunications Union's Workshop in Warsaw, Poland on December 5, 2017. In part, the presentation concluded that with increased human exposure levels from 5G antennas, radiofrequency exposure compliance in some nations will be difficult.

At a recent scientific conference by the Australian Radiation Protection and Nuclear Safety Agency, two expert presentations gave reason to pause in the rapid roll out of 5G networks. The first was by Dr. Dariusz Leszczynski, adjunct professor of biochemistry, University of Helsinki, Finland and chief editor of *Frontiers in Radiation & Health*. His presentation, '5G Millimetre-Waves Health & Environment', examined the serious limitations of biomedical research on millimetre waves but nonetheless from studies that are available, it should cause great concern. He specifically called for urgent research on 5G millimetre waves because of the rapid ongoing deployment of 5G technology.

Another presentation was by Dr. Andrew Wood, School of Health Sciences, Swinburne University of Technology, Melbourne. Titled 'What is the current status of research on mm-Wave frequencies', Wood mentioned two areas of uncertainty with 5G radiation:

- Skin and eyes are regions of concern in regard to 5G frequencies (6-60 GHz) and beyond.
- Could be resonant enhancement absorption due to skin structures.

In 2017 an international 5G Appeal was launched by scientists and medical doctors who are calling for the European Union to halt the roll out of 5G due to serious potential health effects from the technology. As of April 24, 2019, 231 scientists and medical doctors have signed the appeal.

A problem specific to 5G mm emissions is that they can be disrupted or blocked by trees and foliage, especially after rain. This creates a potential problem for suburban streetscapes. Will residents have to choose whether they prefer tree-lined streets or great download speeds? The potential problem of trees and 5G reception has not escaped Telstra's notice. To quote from Telstra's managing director of networks: "Telstra is also funding research into whether uniquely Australian obstacles - including flora - will disrupt 5G signals Something that seems to be unique to Australia ... is how gumtrees impact those radio signals and the way they get from the radio tower to the end user."

Another little researched potential hazard with 5G networks is that the extremely fast data transmission rates, unique to 5G in comparison with 4G and earlier, may be sufficient to generate what is called Brillouin precursors. This is a very fast pulse of radiation, which when it enters the human body, may generate a burst of energy that can travel much deeper into the body than predicted by conventional models.

Similar concerns were raised in a recent paper published in *Health Physics* in December 2018 by Neufeld and Kuster. The authors suggest that permanent biological damage from tissue heating may occur even after short exposures to 5G mm wave pulse trains (where repetitive pulses can cause rapid, localised heating). The authors stated that there is an urgent need for new thermal safety standards to address the kind of health risks possible with 5G technology.

Concluding thoughts

What is apparent in this controversy is that the public's perception of risk and that of some experts defending the technology is at wide variance. The assurances of a complete absence of risk from 5G networks coming from these experts is not reflected in what is known about the many uncertainties which exist with 5G technology and speaks more about their own ignorance than that of concerned communities. A real danger of these 'expert' assurances of a lack of risk to health from 5G is the discouragement of the necessary research needed to determine the extent of any such risk.

A longer, referenced version of this paper is posted at www.tinyurl.com/maisch-5g

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