



ORSAA macht Eingaben und gibt Zeugenaussagen für die Bundesparlamentarische Untersuchung zur drahtlosen 5G-Kommunikation im Februar 2020 ab

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**Submission to the Australian Federal Parliament's House of Representatives
Standing Committee on Communications and the Arts: Inquiry into 5G mobile telephony**

This submission by ORSAA¹ addresses the deployment, adoption and application of 5G technologies in Australia. It specifically refers to the committee's terms of reference: Investigate the capability, capacity and deployment of 5G. ORSAA has identified the following serious issues in relation to the proposed deployment of 5G in Australia:

Harm to human health and likely wider harm to the environment, as well as alterations of atmospheric physical and ecological systems.

At the turn of the century the Australian Senate conducted an inquiry into the health effects of electromagnetic radiation (Commonwealth of Australia, 2001) when the scientific evidence for harm was uncertain. Since then, the evidence for harm has become clearer, so that parliaments across the world have been calling for precaution due to the serious risks (e.g., European Parliamentary Assembly, 2011). These risks are described in more detail below.

Environmental Health Risks

When addressing the risks, the exposure agent associated with 5G must be considered; i.e., Radio Frequency (RF) radiation which is part of the electromagnetic (EMR) spectrum that uses man made, continuous, pulsed and modulated signals based on frequencies from long AM radio waves through to millimetre length microwaves (just below infra-red and visible light). The prevalence of this agent (RF-EMR) in our environment has increased enormously in recent decades with toxic effects demonstrated for living organisms and serious possible harm posed for environmental systems. Furthermore, energy requirements are estimated to increase by at least a factor of three. With Australia's existing energy supply problems being unknown, it is unclear how we will be able to cope with this demand.

Risk with respect to cancer

The entire RF-EMR spectrum (including AM/FM range radio waves, and microwaves) was classified by the WHO's International Agency for Research on Cancer (IARC) as a Group 2B Possible Carcinogen in 2011 (International Agency for Research on Cancer, 2011). The US National Toxicology Program has recently provided clear evidence of carcinogenicity and DNA damage associated with exposure to RF-EMR (National Toxicology Program, 2018; Smith-Roe et al., 2019). This new evidence strengthens thousands of scientific studies that have been conducted over the decades which show adverse biological/health effects of RF-EMR (e.g., EMF-Portal, 2019; Markov, 2018; ORSAA, 2019). The IARC (2019) has recently announced that RF-EMR needs to be re-evaluated with high priority. According to the latest findings by the World Cancer Research Fund (2018) Australia now has the world's highest incidence rate of cancer.

¹ The Oceania Radiofrequency Scientific Advisory Association (ORSAA) is the only independent scientific organization in the Australia-New Zealand region investigating the health risks of low-intensity radiofrequency electromagnetic radiation (RF-EMR), mostly microwave range RF-EMR generated for wireless communications and surveillance. Within a few years of inception, ORSAA has established the world's largest freely available categorised database of peer-reviewed scientific research on RF-EMR biological/health effects: www.orsaa.org. This database is intended to facilitate an evidence-based approach to risk assessment of wireless technologies. The ORSAA database currently contains over 3000 scientific studies sourced from all over the world. ORSAA is not funded by commercial entities and therefore without any financial conflicts of interests.

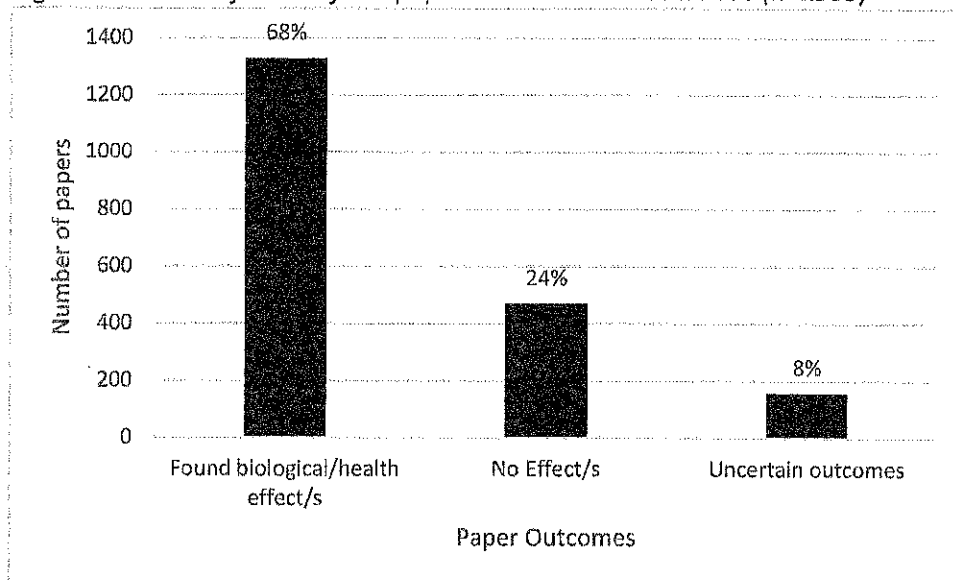
Risk of other adverse health effects

The broad categories of RF-EMR effects found in the scientific literature are compiled within the ORSAA database (www.orsaa.org). The papers in these categories reveal the following major health risks:

- neurodevelopmental disorders in children
- neurodegenerative diseases in adults such as dementia, multiple sclerosis, Parkinson's disease
- neuropsychiatric/neurobehavioural problems including memory problems, anxiety, depression, insomnia and resulting fatigue
- lowered fertility and serious damaging effects on reproductive tissue and sperm
- immune diseases/disorders such as allergies, atopic dermatitis and autoimmune diseases
- metabolic diseases arising out of sustained disruption to basic cellular functions such as mitochondrial dysfunction.

A cross sectional study of 1,955 scientific experimental studies within the ORSAA database (laboratory studies and population-based studies examining biological and health effects of RF-EMR exposures) revealed that the majority of papers (68%) show significant biological or health effects, as summarized in Figure 1 below. Notable are the large numbers of papers showing harm caused by oxidative stress, a pathological phenomenon which is involved in many chronic diseases such as cancer, heart disease, diabetes and which underlies mental illnesses such as depression and Alzheimer's disease. Furthermore, oxidative stress provides a clear mechanism for how existing mobile technologies can cause harm to health, which lays to waste the claims that no scientific mechanism has been found.

Figure 1: *Pattern of results from papers in the ORSAA database (n=1955)*



This clear weight of evidence refutes the widely-held claim that wireless technologies pose no health risks. Typical RF-EMR exposures experienced by Australians on a daily basis fall within the permitted 'safety' levels as advised by ARPANSA. However, the evidence shows that typical exposures can induce oxidative stress in cells leading to many chronic health conditions in the exposed population. These findings call for an immediate *reduction* in the allowable RF-EMR exposure levels (Bandara & Weller, 2017). Instead, with no heed to the current evidence, the industry is marching on to add 5G frequencies into the mix.

Evidence for health effects from 5G frequencies

While the existing large volume of scientific studies show clear health risks with the frequencies used in the first phase of 5G deployment, very little research has been done so far on the health effects of millimetre waves to be used for the second phase of 5G (6 to 86 GHz). The existing review papers (Oughton, Frias, Russell, Sicker, & Clevely, 2018; Russell, 2018) reveal the current known effects of these waves:

- 1 Despite shallow penetration (compared to lower frequencies) 5G millimetre waves pose harm to the largest organ of the body, the skin, with the possibility of permanent tissue damage (Neufeld & Kuster, 2018).

- 2 Effects on eyes (including cataracts), heart rate, immune system and DNA have been shown.
- 3 Millimetre waves can also affect important components of skin such as nerves, immune cells, blood vessels causing systemic effects involving internal organs. It has been found that sweat ducts of skin act as helical antennae for millimetre waves.
- 4 Due to the pulses from 5G phased arrays, the moving charges within the body become tiny antennas. They then reradiate waves called 'Brillouin Precursors' deeper into the body (Albanese, Blaschak, Medina, & Penn, 1994), which become dangerous with rapid changes in power or phase of the waves (Xiao & Oughstun, 1999) as will occur with 5G.

Risk of harm to birds, bees and insects

Microwave radiation is already having effects on birds, bees and pollinators (Bandara & Carpenter, 2018; Lázaro et al., 2016; Warnke, 2009). Moreover, insects will maximally absorb 5G radiation due to the length of their bodies being measured in millimetres and the subsequent resonance effects (Thielens et al., 2018). Therefore, 5G radiation could have catastrophic effects on the already endangered insect populations worldwide, which has implications for Australian agriculture and for global food supplies.

Harm to earth's atmosphere

Together, the earth, the ionosphere and the lower atmosphere form a global electric circuit that controls the biological rhythms of humans, birds and animals. These rhythms are essential for life, affecting blood pressure, the sleep-wake cycle, reproductive, cardiac, and neurological systems. To enable 5G, tens of thousands of satellites will be placed in both the ionosphere and magnetosphere, sending signals at millions of watts. When these powerful man-made signals are imposed on the natural background EMFs they are likely to alter the electromagnetic environment significantly, and may be very damaging to all life on earth (Firstenberg, 2018). In addition, the engineering literature is clear that the high frequency waves proposed for stage 2 of 5G communications will create quantum level changes in the rotational energy of water (at 22.3GHz, 33GHz, 323 GHz) and oxygen molecules (at 60 GHz). Given these molecules are the basis of life, the effects of altering the fundamental characteristics of water and oxygen are likely to be inimical to life on earth.

Unsustainable: significant increases in energy burden promoting global warming

While industry expects that each 5G device will use less power, it also expects that there will be millions more connections and devices. The maths therefore predicts that overall, power consumption of 5G will make greater demands on the earth's resources than ever before. The Centre for Energy Efficient Communications White Paper (2015) points out that wireless systems use 15 to 23 times more energy than wired systems, and that up to 90% of this energy is used by wireless network technologies. Furthermore, according to Zhengmao Li of EVP China Mobile, the challenges of 5G deployment are that 5G needs three times the number of base stations for the same coverage as LTE, and furthermore the power consumption of one 5G base station is three times the power consumption of 4G LTE (Jones, 2019). A recent online report which surveyed more than 100 telecommunications decision makers (Vertiv, 2019) found that 5G technology will likely increase total network energy consumption by 150 to 170 per cent by 2026.

... 5G is going to be significantly more energy-intensive than previous generations of wireless connectivity .. extra efficiency measures will need to be taken to ensure a worthwhile investment..

(see Maisch (2019) for a full summary of this report).

With humankind facing a global warming and global energy crisis, the move to expand energy consumption for more unnecessary technology is both reckless and irresponsible.

The deployment of 5G is not financially secure

The engineering literature on 5G raises concerns about the ability of industry to finance 5G deployments and infrastructure. As well as the increased costs of energy consumption, 5G base stations cost four times the price of LTE (Jones, 2019). It appears that the push to encourage 5G cities and the driverless car industry is a strategy by industry to bring countries on board in order to cover the costs of 5G deployment:

...small cell deployments provide significant capacity but at considerable cost, and hence are likely only in the densest locations, unless MNOs can boost revenues by capturing value from the Internet

of Things (IoT), Smart Cities or other technological developments dependent on digital connectivity.
(Oughton et al., 2018 p.1.)

This issue has also been raised by the ex-CEO of Internet Australia (Patton, 2019).

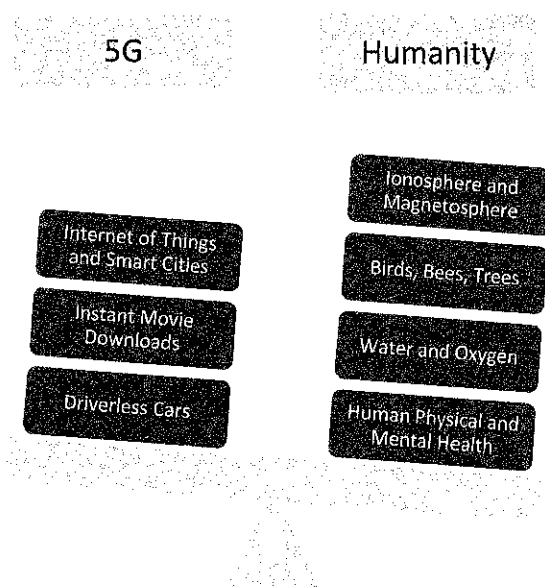
Summary and Recommendations

ORSAA's major concern is the evident harm to the mental and physical health of the current and next generations, as well as the likely harm that is forecast by experienced scientists in this field for our planetary stability and ecosystems.

Given the high risks involved, there is an urgent responsibility to the public for the Australian government to disallow further increases in the population's exposure to RF-EMR with the proposed 5G technologies. Scientists at ORSAA therefore recommend that:

- The Australian government immediately halt the 5G deployment due to the serious risk to public health and planetary health.
- Australia adopt the **ALARA (As Low As Reasonably Achievable)** principle with respect to RF-EMR exposure and **Prudent Avoidance** of RF-EMR exposure in children and pregnant women in order to protect vulnerable children and fetuses.
- Safer alternatives available such as fibre and cable be used and regulations put in place to enforce such safe technologies in all educational settings, hospitals and all public places
- Australian citizens be given the right to refuse exposures to EMF-RF in their home, at work or the marketplace.
- The Australian government establish an organisation to monitor and advise on EMF exposures, that is independent of industry and comprised of suitable expertise in biophysics, medical research and with knowledge of the effects of EMRs on neuropsychology and neuropsychiatry. Engineers and physicists are not qualified to make informed decisions about health effects.

In the balance we have the needs of industry to promote its own growth and development and the push to 'innovate' versus the serious risks to humans and the planet. We implore the committee to consider what is in the balance, and the responsibility of the government to protect its people and the environment. RF-EMR is a biologically damaging agent akin to ionizing radiation and non-ionizing UV radiation. It is not possible that RF-EMR will ever be 'proven' safe but substantial evidence of harm is already here. What is required now is the political will to address the scientific evidence in a prudent manner with public health protection a prime mainstay instead of economic interests. An unhealthy population would significantly impact Australia's economy and social structure.



ORSAA offers our cooperation and assistance with this review process and look forward to hearing from the committee concerning any or all of the above issues that we have raised.

Yours sincerely,

ORSAA

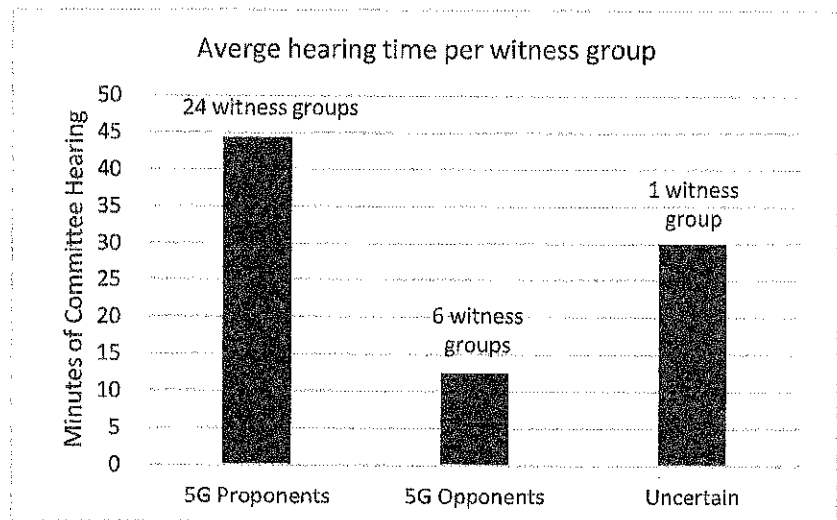
- Albanese, R., Blaschak, J., Medina, R., & Penn, J. (1994). *Ultrashort electromagnetic signals: Biophysical questions, safety issues and medical opportunities*. Retrieved from
- Bandara, P., & Carpenter, D. O. (2018). Planetary electromagnetic pollution: it is time to assess its impact. *The Lancet Planetary Health*, 2(12), e512-e514.
- Bandara, P., & Weller, S. (2017). Biological effects of low-intensity radiofrequency electromagnetic radiation—time for a paradigm shift in regulation of public exposure. *Radiat Protect Australas*, 34, 2-6.
- Centre for Energy Efficient Communications. (2015). *The power of wireless cloud*. Retrieved from <https://ceet.unimelb.edu.au/publications/ceet-white-paper-wireless-cloud.pdf>
- EMF-Portal. (2019). Retrieved from <https://www.emf-portal.org/en>
- European Parliamentary Assembly. (2011). *The potential dangers of electromagnetic fields and their effect on the environment*. Council of Europe Retrieved from <http://assembly.coe.int/nw/xml/XRef/Xref-XML2HTML-en.asp?fileid=17994>
- Firstenberg, A. (2018). International Appeal: Stop 5G on earth and in space. Retrieved from <https://www.5gspaceappeal.org/about>
- International Agency for Research on Cancer. (2011). IARC classifies radiofrequency electromagnetic fields as possibly carcinogenic to humans [Press release]. Retrieved from https://www.iarc.fr/wp-content/uploads/2018/07/pr208_E.pdf
- International Agency for Research on Cancer. (2019). Advisory Group recommendations on priorities for the IARC Monographs. *The Lancet Oncology*, April. Retrieved from <https://www.thelancet.com/action/showPdf?pii=S1470-2045%2819%2930246-3>
- Jones, D. (2019). Power Consumption: 5G Basestations Are Hungry, Hungry Hippos [Press release]. Retrieved from <https://www.lightreading.com/mobile/5g/power-consumption-5g-basestations-are-hungry-hungry-hippos/d/d-id/749979>
- Lázaro, A., Chroni, A., Tschulin, T., Devalez, J., Matsoukas, C., & Petanidou, T. (2016). Electromagnetic radiation of mobile telecommunication antennas affects the abundance and composition of wild pollinators. *Journal of insect conservation*, 20(2), 315-324.
- Maisch, D. (2019). 5G: Eco-Energy or Energy Monster. Retrieved from <https://www.emfacts.com/2019/06/5g-eco-energy-or-energy-monster/>
- Markov, M. (2018). *Mobile Communications and Public Health*: CRC Press.
- National Toxicology Program. (2018). *High exposure to radio frequency radiation associated with cancer in male rats*. Retrieved from <https://www.nih.gov/news-events/news-releases/high-exposure-radio-frequency-radiation-associated-cancer-male-rats>
- Neufeld, E., & Kuster, N. (2018). Systematic derivation of safety limits for time-varying 5G radiofrequency exposure based on analytical models and thermal dose. *Health physics*, 115(6), 705-711.
- ORSAA. (2019). Retrieved from <https://www.orsaa.org/>
- Oughton, E., Frias, Z., Russell, T., Sicker, D., & Clevely, D. D. (2018). Towards 5G: Scenario-based assessment of the future supply and demand for mobile telecommunications infrastructure. *Technological Forecasting and Social Change*, 133, 141-155.
- Patton, L. (2019). My New Year's Resolution – Keep fighting for #BetterBroadband. Retrieved from <http://theluckygeneral.biz/2019/01/06/my-new-years-resolution-keep-fighting-for-betterbroadband/>
- Russell, C. L. (2018). 5 G wireless telecommunications expansion: Public health and environmental implications. *Environmental research*, 165, 484-495.
- Smith-Roe, S. L., Wyde, M. E., Stout, M. D., Winters, J. W., Hobbs, C. A., Shepard, K. G., . . . Tice, R. R. (2019). Evaluation of the genotoxicity of cell phone radiofrequency radiation in male and female rats and mice following subchronic exposure. *Environmental and molecular mutagenesis*.
- The Parliament of the Commonwealth of Australia. (2001). *Inquiry into Electromagnetic Radiation*. Retrieved from https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Environment_and_Communications/Completed_inquiries/1999-02/emr/report/index
- Thielens, A., Bell, D., Mortimore, D. B., Greco, M. K., Martens, L., & Joseph, W. (2018). Exposure of insects to radio-frequency electromagnetic fields from 2 to 120 GHz. *Scientific reports*, 8(1), 3924. Retrieved from <https://www.nature.com/articles/s41598-018-22271-3.pdf>

- Vertiv. (2019). *5G: The Risks and Rewards for Operators*. Retrieved from <https://www.vertiv.com/en-asia/about/news-and-insights/articles/white-papers/5g-the-risks-and-rewards-for-operators/>
- Warnke, U. (2009). *Bees, Birds and Mankind: Destroying Nature by "electrosmog"*: E. Oppenheimer and Sons.
- World_Cancer_Research_Fund. (2018). *Global cancer data by country*. Retrieved from <https://www.wcrf.org/dietandcancer/cancer-trends/data-cancer-frequency-country>
- Xiao, H., & Oughstun, K. E. (1999). Failure of the group-velocity description for ultrawideband pulse propagation in a causally dispersive, absorptive dielectric. *JOSA B*, 16(10), 1773-1785.

ORSAA follow up documents to the 5G Parliamentary Hearing

ORSAA thanks the committee for a chance to follow up following the Melbourne hearing. However, with this also comes our regret that we have not had adequate time to effectively communicate with the committee. Being positioned within in a 45minute slot along with two other witnesses meant that we did not get enough time to answer your questions adequately nor to hold an interactive discussion with you regarding very important matters that you would not be aware of due to industry

influences in the mainstream conversations. Members of ORSAA who presented at the hearing feel that this process has not been democratic in view of the huge imbalance in airtime. As the adjacent figure shows, the proponents of 5G were given much more time to speak across the six hearings. On average, each witness group that was a proponent for 5G had ~45 minutes in person with the committee, while each witness group opposing 5G as currently planned had 12.5 minutes. Therefore, ORSAA is providing this follow-up material in the hope that you will read it and think deeply about what is presented here.



Which experts to believe: The problem for the committee is that the small number of recognised and funded experts have many industry ties (clear conflicts of interest), yet they are also the prominent voices in most mainstream media. On the other hand, ORSAA is asserting there are many other independent expert voices speaking about harmful effects, who are rarely heard; e.g., the International EMF Scientist Appeal: www.emfscientist.org This may be confusing for the committee. To assist, we offer two helpful tool sets below that can be used to scrutinise the presented evidence. These tools are accessible to any thinking person, scientist or not, as follows.

A. A set of principles which can help to determine whether scientific evidence is solid

- **Converging evidence:** many studies from different fields all point to the same conclusions. The amount of converging evidence regarding health effects of RF-EMR is large.
- **Consensus by experts:** several recognised experts speaking from within their own field of expertise agree on the conclusions. This is true for the number of expert voices cautioning against 5G e.g. see the 5G space appeal signed by scientists and doctors from around the world <https://www.5gspaceappeal.org/the-appeal>
- **Science denialism** occurs when the focus is on small gaps or small amounts of evidence contradict a conclusion instead of considering the strength resulting from convergence. All scientific studies are imperfect. We claim that denialism is rife when it comes to the research into the health effects of wireless radiation.
- **Industry funded studies are unlikely to be trustworthy** e.g. in the early 1990s, Lai and Singh found breaks in the DNA of cultured cells and brain cells of live rats due to exposure to radiation (at levels considered to be safe). A full-scale effort to discredit the experiments ensued, and the head of the Wireless Technology Research asked the university to fire Lai and Singh. In a leaked internal Motorola memo executives claimed success in "War-Gaming" the Lai-Singh experiments (see attached and the following links)
<https://www.rfsafe.com/wp-content/uploads/2014/06/cell-phone-radiation-war-gaming-memo.pdf>
<https://www.seattlemag.com/article/uw-scientist-henry-lai-makes-waves-cell-phone-industry>

- **Null results are vacuous.** Any study needs to obtain non-null results to add meaningfully to the literature. Therefore, industry-funded studies that have turned up null results prove nothing.
- **Balanced debate required:** When there is uncertainty, a balanced debate needs perspectives from both sides. The problem is that the WHO EMF expert panel is top heavy with ICNIRP members who are industry linked. These 'experts' are not qualified in biophysics, and they hold a one-sided position that supports their own interests. They conveniently and repeatedly claim that only thermal effects matter, and dismiss the mountain of non-thermal bio-effects evidence that has been piling up since the 1970s. e.g. see World Academy of Sciences Journal online article: <https://www.spandidos-publications.com/10.3892/wasj.2019.28>
- **Modern science versus Newtonian physics:** The science of the invisible (e.g. electron transfer) is vastly different from the science of the visible (e.g. machines). Without any understanding of complex biology, telecommunications engineers are creating infrastructure and signalling systems that are disrupting the basic processes on which life exists. The ARPANSA and ICNIRP assurances of safety are feebly based on Newtonian physics. They sound plausible to the lay person but they are of no relevance to what is actually occurring.

B. The science provides a significant weight of evidence.

We appreciate that it is difficult for the committee to trust ORSAA, as we are a new and less well-known entity. Instead, we ask you to trust the evidence that we put before you, using your own understanding of logic and critical thinking to discern the truth.

1. Thermal effects of 5G

The committee asked ORSAA to provide the Neufeld and Kuster paper (Neufeld & Kuster, 2018 see attached and summary below). Note that Prof. Kuster was the main RF technical consultant hired by the US National Toxicology Project for their \$30 million cancer study .

Summary

The recent study: The Neufeld & Kuster study modelled a worst-case scenario for 5G exposure as an extended pulse train, in which previous pulses create a background temperature increase in skin temperature via diffusion. The freshly arriving 5G pulses then superimpose rapid, localized heating. Such a 5G pulse train was modelled mathematically (see adjacent Figure 1 from Neufeld & Kuster showing the temperature spikes).

The authors used objective criteria for deriving safety limits (based on [MRI] exposure safety guidelines).

Results: The temperature oscillations become very large, resulting in thermal spikes. The temperatures of these spikes may result in permanent tissue damage. These spikes occurred within the limits allowed by ICNIRP guidelines, which is unacceptable for regulatory purposes.

Comments: A criticism by Foster (from ICNIRP) was made in the same journal saying that Neufeld & Kuster's results are overestimates, that the new IEEE standard C95.1-2019 (IEEE 2019) provides limits, and that pulse trains causing high temperature spikes are unlikely to happen with real world technologies, so there is no need to worry. Neufeld & Kuster responded by saying that the overestimation in their results is small, and that the new guidelines only apply to signals over 30GHz. Furthermore Neufeld & Kuster clarify that 'unlikely to happen' is not good enough; instead, 5G signals need full formal regulations in order to ensure that industry complies with safety. These

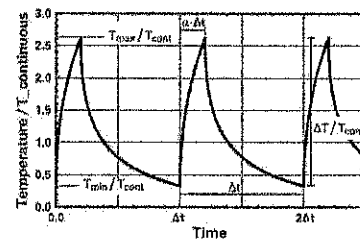


Fig. 1. Transient temperature oscillations resulting from a pulse train, computed for $\Delta t = \tau_1$ and $\alpha = 20\%$ at an intensity resulting in a temperature increase of 1 K at continuous exposure. T_{min} : minimum temperature; T_{max} : maximum temperature; T_{cont} : temperature at continuous exposure.

regulations do not yet exist under 30GHz. The current Australian spectrum being auctioned for 5G is in the 26-27GHz frequency range, which is not regulated by the new IEEE standard.

2. Planetary effects of 3G 4G and 5G

The committee asked ORSAA to provide the Bandara and Carpenter paper (Bandara & Carpenter, 2018 see attached)

Radiofrequency electromagnetic radiation causes DNA damage ... similar to near-UV radiation, which was also long thought to be harmless.

[https://www.thelancet.com/journals/lanplh/article/PIIS2542-5196\(18\)30221-3/fulltext](https://www.thelancet.com/journals/lanplh/article/PIIS2542-5196(18)30221-3/fulltext)

3. Neurodevelopmental effects from exposure to EMR

The committee asked about evidence of neurodevelopmental effects in children who have been affected by EMR exposures. There are some very important human studies e.g. the following papers (attached):

A Danish study on ~13,000 children linked maternal mobile phone use, both prenatal and postnatal, to emotional and hyperactivity problems in children around the age of school entry: the more the mothers used mobile phones during pregnancy, the more problematic the children's behaviour (Divan, Kheifets, Obel, & Olsen, 2008)

To follow up on this finding, a Yale study exposed pregnant mice to mobile phone radiation and studied the offspring. The young mice looked fine on the outside but their brains had abnormal structural and functional changes and they displayed behaviours similar to ADHD children (Aldad, Gan, Gao, & Taylor, 2012).

More recently, Spanish academics found that young boys who live near RF transmitters showed reduced verbal expression/comprehension and had higher scores for total problems, obsessive-compulsive and post-traumatic stress disorders than controls without such residential exposure (Calvente et al., 2016).

Behavioural pathology: smartphone addiction has recently been directly related to EMR signals. This is not just due to phone use (content) which only results in phone addiction, but due to the signal itself. The results show fMRI brain changes. See <https://www.ncbi.nlm.nih.gov/pubmed/32062336>

In addition, the ORSAA database has 20 more papers showing neurodevelopmental effects of EMRs/mobile phones (MP) on children and adolescents. Over 100,000 children and adolescents from Australia, New Zealand and countries all over the world have been included in these studies. See www.orsaa.org, and summaries below. (Note: paper ID refers to the unique identifier in the ORSAA database).

Paper ID	N	Results
112 Zheng	781 children	The association between fatigue and MP usage remained statistically significant.
120 Chiu	2042 11-15 years old	MP use was associated with a significantly increased adjusted odds ratio (AOR) for headaches and migraine
249 Divan	28 745 children	Exposure to cell phones prenatally, and to a lesser degree postnatally, was associated with more behavioural difficulties, with further control for an extended set of potential confounders, the associations remained.
775 Krause		Electromagnetic fields emitted by mobile phones have effects on brain oscillatory responses in children in the approximately 4 - 8 Hz and approximately 15 Hz EEG frequencies during cognitive processing.

776 Kolodynski	Skrunda is a pulse radar radio station	Children living in front of the Skrunda station had less developed memory and attention. Their reaction time was slower and their neuromuscular apparatus endurance (tapping test) was decreased.
2740 Lu	461 mother and child pairs	The mean infant birth weight was lower in the excessive use (mother) group than in the ordinary use group, and the frequency of infant emergency transport was significantly higher in the excessive use group than in the ordinary use group.
3503 Grigoriev		Chronic exposure to electromagnetic radiation from a mobile phone may negatively affect the central nervous system of the child: 1. The reaction time to sound and light stimuli is increased; 2. There is an increase in the number of violations of phonemic perception and the number of missed signals when a sound stimulus is presented; 3. Indicators of arbitrary attention and semantic memory deteriorate; 4. There are increased parameters of fatigue and decreased parameters of working memory capacity
461	1,498 children and 1,524 adolescents	An association between exposure (dosimeter) and conduct problems for adolescents (3.7; 1.6-8.4) and children Exposure to RF fields in the highest quartile was associated to overall behavioural problems for adolescents but not for children.
109 Schoeni	439 adolescents	A change in memory performance over one year was negatively associated with cumulative duration of wireless phone use and more strongly with RF-EMF dose. This may indicate that RF-EMF exposure affects memory performance.
127 Redmayne		The number and duration of cellphone and cordless phone calls were associated with increased risk of headaches. Using a wired cellphone headset was associated with tinnitus while wireless headsets were associated with headache, feeling down/depressed and waking in the night. Several cordless phone frequencies bands were related to tinnitus, feeling down/depressed and sleepiness at school, while the last of these was also related to modulation.
174 Abramson (The MoRPhEUS study)	317 grade 7 children from 20 schools around Melbourne	The accuracy of working memory was poorer, reaction time for a simple learning task shorter, associative learning response time shorter and accuracy poorer in children reporting more mobile phone voice calls. There were no significant relationships between exposure and signal detection, movement monitoring or estimation. The completion time for Stroop word naming tasks was longer for those reporting more mobile phone voice calls.
396 Munezawa	94,777 adolescents	Mobile phone use for calling and for sending text messages after lights out was associated with sleep disturbances (short sleep duration, subjective poor sleep quality, excessive daytime sleepiness, and insomnia symptoms) independent of covariates and independent of each other.
764 Ikeda	2,785 high school students	Overall associations between hours of mobile phone use and total scores were significant for "Depressed mood", "Tension and excitement" and "Fatigue".
861 Leung	41 adolescents 42 adults and 20 elderly	The accuracy for the N-back task [working memory test] in the adolescents was significant worse in the 3G exposed group than in the sham exposed group. Delayed ERD/ERS responses of the alpha wave power were found in both 3G and 2G conditions compared to the sham condition (independent of age group).
1128 Kim	715 adolescents	Higher prevalence rates for ocular symptoms were observed in groups with greater exposure to smartphones.
2344 Roser	412 adolescents	Problematic mobile phone use was associated with impaired psychological well-being, impaired parent and school relationships and more behavioural problems.
2345 Schoeni	439 adolescents	Being awakened during the night by mobile phone was associated with an increase in health symptom reports such as tiredness, rapid exhaustibility, headache and physical ill-being.
2812 Geronikolou		The hypothalamic-pituitary-adrenal (HPA) axis response to cellular phone after mental stress in children and adolescents follows a different pattern in frequent users than in occasional users that seems to be influenced by the baseline thyroid hormone levels.
3163 Foerster	669	Decreased figural memory scores in association with an interquartile range (IQR) increase in estimated cumulative RF-EMF brain dose scores.

4. Health effects

Dr. Paul Heroux, Professor of Toxicology and Health Effects of Electromagnetism at McGill University Faculty of Medicine summarised 1,724 peer-reviewed studies showing radio-frequency bioeffects produced by non-ionizing radiation.¹ Effects include: altered enzyme activity, biochemical changes, oxidative stress, pathological cell changes, neuro-behavioural effects, DNA damage, altered gene expression, brain activity changes, and death of cells. It is well established that in the long-run, these adverse biological effects will lead to chronic diseases. It is these conditions that now comprise the major health burden in Australia rather than acute illness.

Similarly, the ORSAA database classifies the bio and health effects into meaningful categories. See Figure 2 adjacent and attached files described below.

Figure 2: Total number of papers in the ORSAA database showing biological effects in each effect category. Many papers have multiple statistically significant biological effects, each of which is included in the summary totals.

Find Search Summary Totals					
Peer Reviewed Studies Showing Biological Effects		Number of records used: 1485 of 2653			
Auditory Dysfunction / Hearing loss / Tinnitus	32	Apoptosis (Programmed Cell Death)	96	Brain Tumours	44
Blood Brain Barrier Permeability Changes	15	Breast Cancer	13	Cellular Stress	61
Brain Development / Neuro Degeneration	39	Biochemical Changes	331	EEG changes / Brain Waves	93
Neuro Behavioural Effect / Cognitive Effects	171	Cell Irregularities/ Damage/ Morphological Changes	187	Effects on Mitochondria	35
Calcium Influx / Efflux	24	Fatigue	41	Altered Enzyme Activity / Protein Levels / Protein Damage	418
Circadian Rhythm Disruption	11	Altered Gene Expression	144	Headaches/Migraines	57
DNA Damage / Mutagenic / Genotoxic	154	Altered Glucose Level / Glucose Metabolism	21	Inflammation	23
Endocrine / Hormone Effects	66	Cardiovascular/Vascular Effects	70	Hepatic Effects (Liver)	25
Miscarriage / Spontaneous Abortion / Foetus Resorption	7	Immune System Effects	70	Impaired / Reduced Healing/ Bone Density Changes	3
Memory Impairment	65	Oxidative Stress / ROS/ Free Radicals	346	Speech Impairment	4
Sperm / Testicular Effects	83	Sleep Effects	58	Haematological Effects	54
Tumour Promotion	35	Neurotransmitter Effects	30	Synergistic/Combinative Effects	62
Thyroid Effects	14	Visual Disturbances/ Ocular Effects	40	Autism	6
Leukemia	14	Parotid Gland Malignancy	4	Neoplasia/ Hyperplasia (Abnormal Tissue Growth)	3
Depression	23	Induced Adaptive Response	55	Dizziness / Vertigo / Vestibular Effects	23

Continue

ARPANSA's inadequacies as revealed by the ORSAA database: see attached files in folders.

- ORSAA database ARPS conference papers folder including a letter to the editor exchange between ARPANSA and ORSAA in the Radiation Protection in Australasia journal.

¹ The studies reviewed by Heroux were contained in the New Hampshire Commission interim report <http://www.gencourt.state.nh.us/statstudcomm/committees/1474/reports.html>

- **A Novel database containing** folder containing *A novel database of bio-effects from non-ionizing radiation* (Leach, Weller, & Redmayne, 2018) plus a subsequent letter to the editor from a German rival database called emfportal and our rebuttal.
<https://www.ncbi.nlm.nih.gov/pubmed/29874195>

5. Evidence on Mobile phones See attached folder Mobile phone epidemiological studies.

Mr Victor Leach told the committee he would provide the follow-up information on mobile phone studies. The papers reveal a clear pattern i.e. greater exposure → greater damage. The committee chair and deputy need to study the science as they are misinformed. Comments on blanket safety cannot be given as the Italian courts are now showing.

6. Mass worry as stated by the WHO

The committee asked about whether the WHO commentary on mass worry was pointing to a psychological phenomenon. There are two groups of people who are currently being accused of being 'worried' or 'concerned' about 5G, in order to explain their objections to the 5G upgrades. The first is the group of people who are suffering from Electro Hyper Sensitivity (EHS), who feel painful and debilitating effects from the current exposures to EMRs from phones, devices, modems and towers. These people are very worried that they will not be able to cope physically with the 5G signals, and that they will no longer be able to participate in civil society. (Their current participation is already very low as they are unable to control their exposures to 3G and 4G signals in public places). The second group are those who are worried about health effects based on their knowledge of the science. Instead of their concerns being taken seriously, these objectors are being grouped as overly anxious. In response to this conjecture, we bring the following to your attention.

Doctors are not claiming that anxiety is the issue in EHS. For a doctor to diagnose anxiety as the cause of any condition, all other factors need to be first ruled out. This has not been done in the case of EHS. In fact, there are large groups of doctors and medical researchers who have made substantial inputs into this issue (see attached):

- **The Austrian Medical Association's Guidelines** for the diagnosis and treatment of EMF related health problems and illnesses (EMF syndrome) to government. See also the attached letter by Professor Beatrice Golomb, MD, PhD with comment on EHS from an accomplished medical doctor and researcher.
- **Blood and saliva tests for diagnosing EHS have been established** (Belpomme, Campagnac, & Irigaray, 2015 see attached)
- **Brain changes in EHS sufferers have been observed using fMRI** (Heuser & Heuser, 2017)
- **Adverse health effects of exposure to RF radiation is classified in the ICD-10 (W90)** and therefore they are accepted as real. EHS is recognised in Sweden and Canada as a functional impairment.
- A new FDA report (<https://www.fda.gov/media/135043/download>) conducted epidemiological reviews on 69 papers, handpicked² to show no harm. Even then, in their conclusions they state:

the need for shifting the focus from the general population with undetectable overall risk to a very small subset of people who might be inherently predisposed to the risk for tumorigenesis and who therefore might be more susceptible to putative risk modification by the intense RF-EMF exposure.

Current estimates put this group anywhere between 1 to 13% of the general population and growing. See <https://www.ncbi.nlm.nih.gov/pubmed/26372109>

- **The 2002 ICNIRP statements** on NIR acknowledged that Different groups may differ in their ability to tolerate a particular NIR exposure such as children, the elderly, and some

² The ORSAA database contains 292 epidemiology papers that have not been hand picked

chronically ill people, and therefore separate guideline levels may be needed.
(<https://www.icnirp.org/cms/upload/publications/ICNIRPphilosophy.pdf>)

These results and expert opinions provide converging evidence that EHS is a real physiological condition, and not a psychosomatic complaint due to anxiety. Thousands of people around the world are claiming to have become EHS. True scientists would go looking for the cause, thereby pushing the boundaries of understanding regarding human sensory and learning mechanisms. Instead we have industry-linked scientists using their positions to shut down the research or to conduct trivial experiments. For example, the research in Australia at ACEBR has focused on proving that people describing electromagnetic sensitivities are suffering from psychosomatic affects. Their published paper on this topic was based on an unacceptable sample size of three participants. Not one serious study has been conducted in Australia investigating the effects of radiation on biological tissue, DNA, oxidative stress markers or even skin cells where 5G is said to have its sole effects. Not even on rats. This Australian group has advised the WHO (which has taken up the mantra of mass anxiety due to media coverage) and is also highly influential in ICNIRP. Thus, the global telecommunications rollout has its claims of no harm built on a foundation of lame science and conflicts of interest.

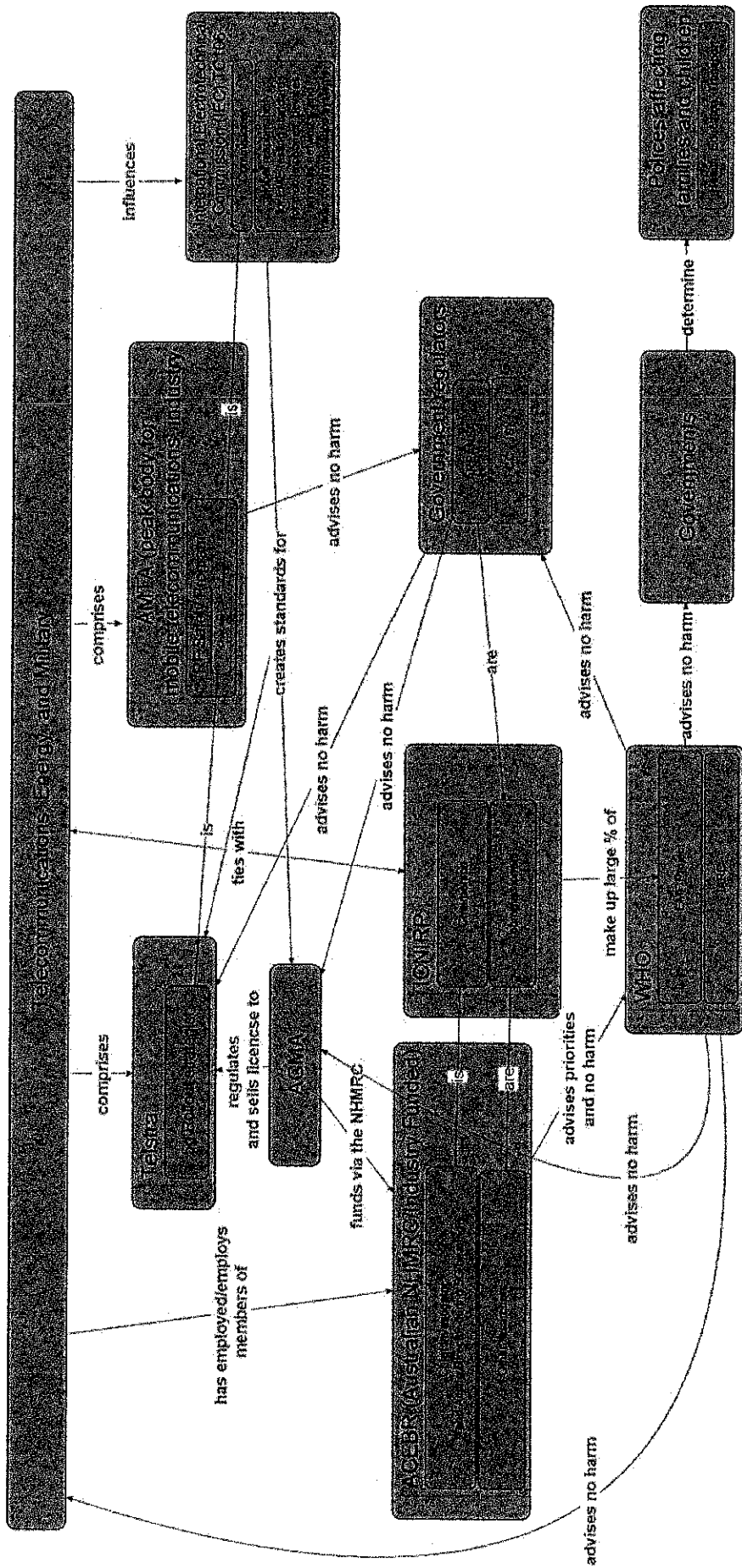
Please see the diagram at the end of this document showing how the telecommunications industry, researchers and the government advisory bodies comprise the same people and create a circular chain of advising one another of no harm. There is no independent voice or authority amongst them which is not directly or indirectly influenced by industry. See (Hardell, 2017) attached and "Influential Australia" <https://betweensrockandhardplace.wordpress.com/2019/03/25/influential-australia/>

Industry has been using the same hype and the same tactics on governments since the 1990s, promising faster services, wonderful technologies, and improved health and education yet not delivering (Kushnick, 2015, The Book of Broken Promises). We implore this committee not to act as a puppet in the service of the telecommunications industry, and instead, to do its own independent research and thinking.

The future: The fall-out from the 5G rollout may make the PFAS and asbestos cover-ups both look like a walk in the park. Our children and grandchildren may suffer greatly, while our planet will heave. Who knows if it will survive man-made electromagnetic fields 1,000,000,000,000,000 times greater than natural systems (Bandara & Carpenter, 2018). There is an alternative, safer future with a sophisticated and human internet based on wired connections (Schoechele, 2018) which must be seriously considered.



OCEANIA RADIOFREQUENCY
SCIENTIFIC ADVISORY ASSOCIATION INC



- Aldad, T. S., Gan, G., Gao, X.-B., & Taylor, H. S. (2012). Fetal radiofrequency radiation exposure from 800-1900 mhz-rated cellular telephones affects neurodevelopment and behavior in mice. *Scientific reports*, 2, 312.
- Bandara, P., & Carpenter, D. O. (2018). Planetary electromagnetic pollution: it is time to assess its impact. *The Lancet Planetary Health*, 2(12), e512-e514.
- Belpomme, D., Campagnac, C., & Irigaray, P. (2015). Reliable disease biomarkers characterizing and identifying electrohypersensitivity and multiple chemical sensitivity as two etiopathogenic aspects of a unique pathological disorder. *Reviews on environmental health*, 30(4), 251-271.
- Calvente, I., Pérez-Lobato, R., Núñez, M. I., Ramos, R., Guxens, M., Villalba, J., . . . Fernández, M. F. (2016). Does exposure to environmental radiofrequency electromagnetic fields cause cognitive and behavioral effects in 10-year-old boys? *Bioelectromagnetics*, 37(1), 25-36.
- Divan, H. A., Kheifets, L., Obel, C., & Olsen, J. (2008). Prenatal and postnatal exposure to cell phone use and behavioral problems in children. *Epidemiology*, 523-529.
- Hardell, L. (2017). World Health Organization, radiofrequency radiation and health-a hard nut to crack. *International journal of oncology*, 51(2), 405-413.
- Heuser, G., & Heuser, S. A. (2017). Functional brain MRI in patients complaining of electrohypersensitivity after long term exposure to electromagnetic fields. *Reviews on environmental health*, 32(3), 291-299.
- Kushnick, B. (2015). *The Book of Broken Promises: \$400 Billion Broadband Scandal & Free the Net*: New Networks Institute.
- Leach, V., Weller, S., & Redmayne, M. (2018). A novel database of bio-effects from non-ionizing radiation. *Reviews on environmental health*, 33(3), 273-280.
- Neufeld, E., & Kuster, N. (2018). Systematic derivation of safety limits for time-varying 5G radiofrequency exposure based on analytical models and thermal dose. *Health physics*, 115(6), 705-711.
- Schoechle, T. (2018). *Re-Inventing Wires: The Future of Landlines and Networks*.

I am Dr Julie McCredde, I have a PhD in cognitive science in neural network models of the mind. I work as an education researcher and research consultant. I am the president of ORSAA, here today with my colleagues Victor Leach and Steven Weller.

ORSAA stands for Oceania Radiofrequency Scientific Advisory Association. ORSAA is a not for profit charity made up of researchers and technical experts from the physical, biological, and human sciences. Free from industry and political influence, we have been investigating the effects of man-made electromagnetic radiation on human and planetary health. We have compiled a large database which includes of all the locatable experimental papers published in science and medicine since 2012, military papers from the 1970's onwards, and all of the papers from the ARPANSA database. There are over two thousand experimental papers in our database, categorised into biological and health effects. The results are striking, in that about 70 percent of the papers show effects. That number of papers all pointing in the same direction from a wide range of disciplines cannot be easily explained away. Furthermore, when the studies are funded by government or institutions, then over ¾ of the studies show effects due to EMR exposures. When industry funds the studies, about 2/3 of the papers do not show effects.

In order to simplify the complexity of the situation, I will draw upon an analogy .. If I may take a few more minutes, in order to paint the picture for the committee.

We are all standing on the deck of a ship, called 5G. The shipping consortium is asking us all to fund this voyage to the **land of unlimited data**, to one of blue skies and discovery of new treasures. There is a flag on the deck that says **public consultation**. You have been sitting there for several days asking if this voyage will be safe. Oh yes they have said, the only thing to worry about is **overheating at sea**. We have an international sailing organisation called **ICNIRP** and a local branch called **ARPANSA** that has stipulated that to ensure a safe voyage we must measure the temperature of healthy sailors while they are on deck for 6 minutes to make sure their temperature does not increase by 1 degree. We have done this many times and not of them has overheated. Oh yes, there are some claims worldwide about a **radiation sickness scurvy** in some past passengers that causes headaches, nausea, heart palpitations and fatigue when they are at sea, but we have **ACE experts** on hand who reassure us that this condition is just due to **fear of the unknown**. Some doctors and researchers have been calling for a fruit called **precaution** to be a compulsory. but if we started talking that on board the passengers might start to **worry even more about the scurvy** and bring it upon themselves!

However, Mr chair and committee members, if one takes a magnifying glass, as science does, and inspects the boards beneath our feet we find that they are rotting with a fungus called **oxidative stress**, and that the ship's hull is full of borers called **DNA damage, redistribution of charges, changes to molecular bonds and calcium signalling, cell membrane damage, mitochondrial damage, mast cell activation, and synergistic affects with other toxins**. There are rates called changes in **neurotransmitters and hormones** running through the rafters.

We cannot say exactly when and how, but science has it that these borers and vermin are known to create huge leaks called **autoimmune disease, heart disease, anxiety, depression, diabetes, Alzheimers, reduced fertility, cognitive deficits, sleep disturbances and cancer**. Moreover, we are gravely concerned that this ship will be wrecked on the shoals of three possible destinations called **1. Marked deterioration in the physical and mental health of our children 2. A debilitated workforce and 3. Alterations to fundamental planetary systems**.

This journey is not optional. Every man woman and child in Australia must come on board. In spite of health and privacy concerns, many families are being pressed ganged by **small cells in their street beaming 24/7** and **thousands more satellites in the sky.**

The path that Australia choses to take as we face the proposed techno revolution will be shaped by the willingness of thinking people such as yourselves to open your minds to the available evidence and not be easily persuaded by simple arguments or media campaigns.. Our aim here is to provide you with some of the understanding that you will need to forge this journey. Thank you for this opportunity.

5G committee my intro

My opening statement does not directly address the 5G health debate but I wish to cover the wider issue of the ICNIRP's RF Guidelines and whether or not they provide protection against chronic environmental level RF emissions. The ARPANSA RF standard is essentially a copy & Paste version of ICNIRP's RF Guidelines.

- I have been writing and researching on the issue of the health impacts of electromagnetic fields (EMF) since the early 1990's as a science writer for Australian Senator Robert Bell. I was a member of the Standards Australia TE/7 Committee in 1998-1999 during its final round of meetings on revising the then RF exposure standard ($200\mu\text{W}/\text{cm}^2$ regardless of frequency) in order to accommodate new wireless technology. Notably this was the only Standards Australia committee in its entire history to fail to come to a consensus. The stumbling block was disagreement over how to address ICNIRP's supposed precautionary principle that only considered acute thermal effects in setting exposure limits. Seven of the committee members, including the CSIRO member, thought this approach was not justified because it avoided consideration of non-thermal biological effects and so it was referred to as just a cooking standard. A chapter of my theses examines in detail the historical TE/7 debate over ICNIRP and I can make it available for the committee.
- Note that from the start of my involvement with TE/7 I stated that I was prepared to vote in favour of accepting a ICNIRP compliant RF standard **provided it was plainly stated in a precautionary approach statement in the Aust standard what the standard covered and what**

it did not. At the conclusion of TE/7 this was removed as any admission that non-thermal effects may exist could have legal consequences, such as possible litigation.

- From 2005 to 2010 I was a PhD candidate through the University of Wollongong, The Science, Technology and Society Program. My thesis, titled *"The Procrustean Approach: Setting exposure standards for telecommunication frequency electromagnetic radiation"* examined the historical development of the Western radiofrequency / microwave (RF/MW) exposure standards and how it influenced Australia's RF debate.
- I later authored a published paper, *Spin in the Antipodes: A history of industry involvement in telecommunications health research in Australia.* This paper, originally intended for my thesis, examined how telecommunications industry vested interests and professional PR firms have influenced the direction of radiofrequency health research in Australia and in the NH&MRC. I can provide this to the committee if requested.
- I am currently a member of the Oceania Radiofrequency Scientific Advisory Association and the Australasian College of Nutritional and Environmental Medicine and have a specific interest in the connection between Electromagnetic radiation and chronic fatigue syndrome and sleep impairment and have previously published research papers on this topic with researchers from Massey University in New Zealand.

- I currently writing paper on this topic which is titled: Sleep disorders and Chronic Fatigue Syndrome (CFS): Evidence that extremely low frequency magnetic fields and radiofrequency electromagnetic fields may be a co-factor to investigate in treatment.

This is in stark contrast to an ICNIRP statement that claims that research on the relationship between HF fields and health outcomes such as headaches, concentration difficulty, sleep quality, cognitive function, cardiovascular effects, etc. has not shown any such health effects. This is incorrect as I will show in the paper.

END

Notes

At the International conference, *Mobile Communications and Health: Medical, Biological and Social Problems*, held in Moscow in 2004, The then ICNIRP chairman Paulo Vecchia stated the following in relation to ICNIRP's so called *precautionary principle approach*:

"ICNIRP only considers acute effects in its precautionary principle approach. Consideration of long-term effects is not possible. Precautionary actions to address public concerns may increase rather than mitigate worries and fears of the public. This constitutes a health detriment and should be prevented as other adverse effects of EME."

(p 325)

- My name is Victor Leach (Applied Physics RMIT 1969, MSc 1989 Melb Uni) I am a retired radiation health physicist and have over 48 years experience in the setting of radiation protection limits and the philosophy behind the setting of these limits.
- I am a founding member of two professional associations the Australian Radiation Protection Society (45 yrs old) and the Oceania Radiofrequency Scientific Advisory Association (ORSAA) (5yrs old) have also worked at the Australian Radiation Laboratory (now called ARPANSA) for over a decade from 1972 to 1982.
- Unlike ionising radiation, that is X rays and gamma rays this wireless communication radiation is man-made and does not occur in nature. It is discrete frequencies, polarised, carries low frequency modulations, so these complexities make this radiation very bioactive.
- So for example in a classroom of students all surfing the internet on their computers means there can be hot-spot in the room. ARPANSA did a NSW schools survey in which they made short-term measurements (1 min averages) with one laptop in room with no students present and said this was a typical classroom situation. I think you will all agree this is not a typical classroom. Therefore, the results cannot be relied upon.
- It's clear that the current ICNIRP guideline which ARPANSA follow supports short-term (6 minute) heating standard is not applicable to the exposures that the general population are exposure to 24/7.
- The ICNIRP makes the assumption that low-level exposure to this type of wireless radiation that all these pathological (bio-effects) effects that occur in an organism can be compensative for by the organism, it is called adaptive response. So ICNIRP admits that non-thermal exposure do cause bio-effects but these effects will be managed by the

bodies natural defenses. This adaptive response is assumed will be protective of everyone. I strongly disagree with this assumption as in any community you have both well and unwell people. Children, the aged, those with immune and autoimmune disease, of which there are many now, will not be able cope with this extra insult on their bodies defence system.

- Many of these bio-effects we see with this wireless radiation we also see at low dose ionising radiation (X-rays and Gamma rays). Another group called the International Commission on Radiological Protection (ICRP) writes guidelines for low exposure to ionizing radiation and adopts a precautionary approach using principles such as As Low As Reasonable Achievable (ALARA). ALARA need to be incorporated in the design of equipment. How many people know that the antenna in their mobile phone has been moved from the top to the bottom of the phone. I now see we have WiFi in children nappies. How many here think this is a good idea. I can think of an application but it is not babies nappies.
- People very rarely have contact with ACUTE exposures in everyday life.
- All populations in the world have daily contact with low levels of wireless radiation and are chronically exposed. This thermal standard for mobile phones exposure on the basis of heating does not apply for children and adolescence.
- There are currently no way to estimate safety by using existing International guidelines recommendations from acute exposures to chronic exposure, that is from thermal levels to non-thermal levels of exposures.

- This is why we need to adopt a much lower threshold level as a precaution.
- Many countries have selected a guideline 100 times lower as a precautionary approach. France recently banned WIFI and other wireless devices in kindergartens while imposing restrictions on use of wireless for older students. The Italian courts are now ruling in favour of compensation to those occupational mobile phone users who have developed brain tumours.
- These radiation devices are now tools of the trade for not only businesses but for everyone. The ARPANSA approach of sending you an information sheet on how to minimize your mobile phone exposure on the basis of “if you are concerned” is not good enough. We should be advising all users to change their habits.
- Very few of my colleagues in radiation protection have assessed the science on this radiation. Most work in hospitals as medical physicists. Since 2017 I have been presenting papers at our annual ARPS conferences. I have been very critical of ARPANSA. I will send you the papers and letters to the editor in the follow-up.
- We need a Health symposium on this matter. These concerns are far reaching in our Australian community and cannot be easily dismissed as ‘Tin-hat-foil’ wearers.

Extra comments on Mobile Phone use.

There are diverse health risks for users of mobile devices and those who are exposed to RF from wireless infrastructure such as mobile masts. Altogether, the epidemiological studies and the well-conducted studies with no conflict of interest have found effects. A number of risks were even identified by the 13-country Interphone study, which was partially industry funded, and the French CERENAT study which followed the Interphone protocol.

The risk of brain tumours from mobile phone use is convincing.

In summary, research shows that for certain brain tumours:

- the higher the cumulative hours of mobile phone (MP) use, the higher the risk
- the longer the time from first using an MP, the higher the risk – ‘If a mobile phone is used for more than 10 years there is a statistically significant risk’
- the higher the power, the higher the risk
- the younger you are, the higher the risk
- there is a higher risk of tumours occurring on the same side of the brain as the handedness of the user.

Hence, authorities need to be advising people to change their habits when using these radiation-emitting devices and to adopt a harm-minimizing approach.

Committee Secretary

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24 November 2019

RE: Inquiry into 5G in Australia

Dear Sir/Madam,

I am an educated member of the public who has a number of concerns with the proposed rollout of 5G technology across Australia. I have a Bachelor of Science degree in microbiology and biochemistry. I am a founding member of the Oceania Radiofrequency Scientific Advisory Associate (ORSAA), an association of independent scientific researchers that has established the largest categorized database on radiofrequency bio-effects in the world. I am also a public representative on the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) Electromagnetic Energy Reference Group (EMERG) committee.

I am very grateful that a parliamentary inquiry has been established to investigate the deployment, capacity, capability, adoption and application of 5G technology. Although it is considered to be too late by some, as the horse has already bolted with 5G facilities already being established in public places.

In this submission I would like to raise a number of points that need further discussion and investigation in relation to the terms of reference of the 5G Parliamentary Inquiry:

TERMS OF REFERENCE: Deployment, Capacity, Capability, Adoption, Application.

- 1. Is 5G an essential technology or just Industry marketing spin to increase profits?**
- 2. Inadequate public consultation for the application and deployment of military grade 5G technology**
- 3. Misinformation and misunderstandings in relation to 5G and health**
- 4. Human health and wider environmental impact, a critically important topic, is missing from the 5G parliamentary inquiry's terms of reference**
- 5. Taking a Precautionary Approach**

5G essential technology or industry marketing spin?

5G, which is short for 5th Generation wireless technology, promises to bring significant higher performance in capacity, capability along with reduced latency. 5G will not only interconnect people, but also interconnect and control machines, objects, and devices, commonly referred to as the internet of things, or simply IoT. This move to a more interconnected wireless world will exponentially increase the radiofrequency (RF) emissions that will bathe our planet 24x7, put additional pressure on already strained natural resources and dramatically increase energy consumption needs. This ever-growing demand for resources and energy will add to the existing pressures on our planet's biodiversity and therefore threaten our future security, health and well-being.¹

5G technology is being touted as the next industrial revolution and will see increased economic growth at the expense of further degradation of the natural environment, further loss of biodiversity, and an increase in preventable public health issues. Governments around the world appear to be scrambling to be the first to have 5G rolled out without any consideration of the environmental consequences this technology will have. As one submission indicated, industry is yet to develop a convincing business case to support the need for 5G. So why the rush?

Inadequate public consultation in the decision-making process

The perception many disaffected members of the public have is that the Federal Government's decision to pursue 5G in support of what appears to be an Industry driven initiative has occurred without adequate public consultation. Also, there is significant concern that Federal regulations for low impact facilities clearly undermine democracy and breach fundamental human rights by overriding local government planning laws. They don't allow members of the public to object to the deployment of an environmental pollutant 24x7 in close proximity to their homes.

The current telecommunications Industry public consultation process allows affected members of the public only one week to respond to plans to rollout wireless infrastructure in a designated area, with notices only being required to be sent to houses directly in close proximity to planned facilities along with small barely visible notices on poles where a "low impact" transmitter is to be installed. Formal notices are also sent impersonally in nondescript envelopes addressed "to the homeowner" and so are often confused with junk mail and discarded.

The consultation process does not allow the general public or local council to stop a facility from being deployed if it meets the Federal Government's low impact facilities determinations. This leaves affected home owners with no option but to take legal action at their own expense to try and prevent an installation in close proximity to their homes along with the possibility of being hit with large legal fees if their request for an injunction fails.

5G technology is based on military technology – phased array and beam steering technology. When photons are sent in a collimated beam this is called a laser. Lasers have strict safety guidelines that must be adhered to because there are potential health hazards. The same principle needs to be applied with 5G technology because the intensity of a collimated RF beam does not drop off by the inverse square law (at least in the nearfield) like RF emissions from older generation radio transmitters. What is even more concerning is that Australia's RF Standard is seriously out of date, and ignores a large evidence base that shows RF exposures at levels a fraction of currently permitted public limits, cause biological effects with a real potential to damage health in the long term.

5G, like all the previous Gs before it has never formally been tested for health impacts. It has been assumed to be safe based on an incorrect and outdated assumption that the RF emissions are "low power".

Misinformation and misunderstandings in relation to 5G and health

What is abundantly clear from reading some of the submissions (public, government and industry) is there are examples of misinformation as well as misunderstandings present and I will provide further specific examples later in this submission document (Appendix A). These false and misleading claims include, for example, suggestions that foreign actors are involved in disrupting 5G rollouts – the old commie under the bed ploy; claims that Australia's RF Standard provides protection to ALL; and that 5G is safe without providing any scientific evidence to back this up. There are also submissions that demonstrate rising public awareness of the potential health issues associated with chronic RF exposure suggesting that people are educating themselves and not blindly accepting what industry and some government agencies are telling them.

Unfortunately, misinformation seems to be a sign of the times with fake news everywhere. It makes it very difficult for the lay person to separate truth from what appear to be deliberate and planned deceptions.² In many cases one can simply use the wise saying – "follow the money" to understand what the potential motivations may be for what many people would consider seriously questionable behaviour.

ARPANSA has some responsibility in this space and therefore should take some of the blame. Their website disclaimer gives the public no confidence in their fact sheets or technical documents. They lack critical expertise in medical matters and have not fully disclosed the risks that are associated with Radiofrequency exposure to the public. They clearly lack qualifications to provide a medical opinion on any of the many bio-effects that are being found in well conducted peer reviewed scientific research. Letters from the concerned public presenting compelling scientific evidence to ARPANSA are typically deflected with template responses that don't deal directly with the evidence at hand. ARPANSA has also been shown to have misrepresented the science and the balance of evidence in its technical series report TR-164.³ It has not adequately dealt with the risks identified by independent researchers and dismisses or diminishes important findings without any plausible justification.

Human health and wider environmental impact, a critically important topic, is missing from the 5G parliamentary inquiry's terms of reference

To date, no environmental impact studies have been performed for 5G. This is a critical important deficiency because RF Standards were designed to protect humans (albeit from thermal damage only as a result of acute short-term exposures, not long-term exposures nor non-thermal bioeffects) and not insects, birds, other animals or plants. With recent reports suggesting that insect declines have been as high as 75% this is a significant concern.⁴ Prolonged RF exposure has been shown to affect insect fertility, development and in the case of bees, navigation.⁵ Insect population decline affects ecosystems, other animal populations, and humanity. Insects are at "the structural and functional base of many of the world's ecosystems." A 2019 global review warned that, if not mitigated by decisive action, the decline would have a catastrophic impact on the planet's ecosystems.

The information that is currently being disseminated by industry, the Australian Government via ARPANSA and reported in the media is incorrectly assuming that Radiofrequencies from 5G technology is safe because harm has not been established (proven). I believe the wrong assessment methodology is being applied in order to dismiss and ignore scientific evidence that does suggest harm. Science is not about providing proof and so unlikely to ever satisfy the unreasonable level of proof that is being requested by government authorities. Science is about providing evidence and there is an abundance of evidence when one systematically reviews the thousands of peer review papers that have been published, as ORSAA has done. Example bioeffects being noted with current wireless technology includes: DNA damage, sperm and fertility effects, neurodegeneration, oxidative stress, cancer, cardiovascular effects, developmental effects, behavioural changes and memory impairment. The list is quite extensive and many of these effects are being found in multiple studies. None of the identified bioeffects can be considered to be safe for health particularly if sustained.

The current Australian RF Standard administered by ARPANSA is based on ICNIRP 1998 RF guidelines which clearly advise that the guidelines may not provide suitable protection to sensitive peoples such as children, pregnant women, the elderly and those with chronic illnesses. The ICNIRP RF guidelines were originally designed for short term exposures. Cancer was not considered to be established at the time by ICNIRP when developing the guidelines in 1998 (more than 20 years old) because there was insufficient evidence available. Reviewing the ORSAA database one finds many papers suggesting RF is associated with DNA damage (a precursor for cancer development) and linked to tumour promotion and tumour initiation. It is one of the main reasons the International Agency for Research on Cancer (IARC), which is attached to the World Health Organisation (WHO), classified all man-made Radiofrequencies as a potential carcinogen in May 2011. With the recent National Toxicology Program (NTP) study (2018) and Ramazzini study (2018) the limited evidence no longer holds true. As such, IARC recently indicated (2019) that it has made it a priority to review this rating in the next few years.

Taking a Precautionary Approach

When it comes to ionizing radiation (x-rays, gamma rays etc.) the International Commission on Radiological Protection (ICRP), not to be confused with the International Commission on Non-Ionizing Radiation Protection (ICNIRP), has an open membership policy and includes members with medical expertise. When it comes to low level exposures to ionizing radiation where there is uncertainty, the ICRP takes a precautionary approach. To further support this precautionary stance, a hierarchy of controls is in place to minimize public exposure by following a cost benefit approach based on As Low As Reasonably Achievable (ALARA). ICNIRP on the other hand is a closed shop and includes very few professionals with medical science qualifications (dominated by physicists and engineers). When it comes to radiofrequencies, ICNIRP does not follow the precautionary principle nor does its radiation protection philosophy include ALARA. ARPANSA is following the ICNIRP philosophy for non-ionizing radiation.

With Ionizing radiation, the nuclear industry attempts to lower public exposure by implementing a hierarchy of controls using a cost benefit approach. With non-ionizing radiation (radiofrequencies), instead of trying to deploy technology that follows a 'as low as reasonably achievable' philosophy, we are actually seeing the reverse where the telecommunications industry, with every generation creeping closer and closer (increasing radiofrequency emission levels) to existing public safety limits. We are also seeing ICNIRP looking to raise public limits so that 5G will not be impeded. At ORSAA we recommend a precautionary approach be taken, so that 5G technology should not be rolled out until is demonstrated to be safe.

Conclusion

Today, we are faced with unprecedented global challenges that threaten the survival of many species including our own. Government responses around the world, including Australia, have been underwhelming. Economic interests appear to be far more important than the threats to our future existence. This short-sightedness and lack of any tangible action has resulted in public movements being established to deal with what is perceived as Government failures to tackle the issues responsibly. 5G is one of them.

5G technology is being forced upon the Australian community whether we like it or not. In a modern democratic society such an approach is seen to be unreasonable and unacceptable as the public is one of the major stakeholders that will have to wear the brunt of any risks this technology may bring without any formal consent.

We are seeing a rise in chronic illnesses, declines in mental and physical health as well as the recent reverse in the direction of life expectancies in a number of western nations, such as the United States. Some scientists are suggesting that the electrification of our environment (power frequencies and radio frequencies) has a role to play but there is very little government investment to investigate the issue. We seem to be far more preoccupied in trying to find cures for rising incidences of diseases, such as cancer in our society, rather than looking for possible causes.

I hope the committee will investigate why there is such a diverse and divergent opinion on 5G safety. In need of consideration is whether perceived economic benefits are responsible for distorting the interpretation of the science, because there is a lot at stake if we get it wrong.

I am willing to expand on the contents in person before the committee either as an individual, or in conjunction with ORSAA of which I am an active executive team member.

Sincerely,
Steven Weller
B.Sc. Monash, MORSAA

List of References:

1. [https://www.theworldcounts.com/counters/environmental effect of mining/depletion of natural resources statistics](https://www.theworldcounts.com/counters/environmental%20effect%20of%20mining/depletion%20of%20natural%20resources%20statistics)
2. Hertsgaard M, Dowie M. 2018. How big wireless made us think that cell phones are safe: a special investigation. Available from: <https://www.thenation.com/article/how-big-wireless-made-us-think-that-cell-phones-are-safe-a-special-investigation/>
3. Leach V, Weller S. 2017. Radiofrequency exposure risk assessment and communication: Critique of ARPANSA TR-164 report. Do we have a problem? Radiat Prot Australas 34:9–18.
4. Robust evidence of declines in insect abundance and biodiversity – Nature, 30-Oct 2019 <https://www.nature.com/articles/d41586-019-03241-9>
5. A review of the ecological effects of radiofrequency electromagnetic fields (RF-EMF) Environment International Volume 51, January 2013, Pages 116-140.
6. Radio frequency radiation-related cancer: assessing causation in the occupational/military setting. Environmental Research Volume 163, May 2018, Pages 123-133.
7. Microwave Exposure Affecting Reproductive System in Male Rats Applied, Biochemistry and Biotechnology, August 2009.
8. Cluster of testicular cancer in police officers exposed to hand-held radar. Am J Ind Med. 1993 Aug;24(2):231-3.
9. Combined Effects of Circularly Polarized Microwaves and Ethidium Bromide on E. coli CELLS, Electro- and Magnetobiology Volume 18, 1999 - Issue 3
10. Commentary on the utility of the National Toxicology Program study on cell phone radiofrequency radiation data for assessing human health risks despite unfounded criticisms aimed at minimizing the findings of adverse health effects, Environ Res. 2019 Jan;168:1-6.
11. Report of the Advisory Group on Non-ionising Radiation. Health Effects from Radiofrequency Electromagnetic Fields. RCE-20, ISBN 978-0-85951-714-0, 2012.
12. Inaccurate official assessment of radiofrequency safety by the Advisory Group on Non-ionising Radiation <https://www.degruyter.com/view/j/reveh.2016.31.issue-4/reveh-2016-0060/reveh-2016-0060.xml>
13. EMF Scientist Appeal to UN <https://emfscientist.org/index.php/emf-scientist-appeal>

Appendix A Submission commentary

Telstra submission No. 296

Page 50, 6.8 Community and health professional EME

The level of what we believe to be misinformation, purported to be based on scientific and medical evidence, circulating in the community about 5G EME and health is on a scale we have not seen with the rollout of previous generations of mobile technology. It appears to be driven largely by social media campaigns and there is evidence to suggest that messaging in these campaigns is being influenced by foreign actors⁷⁰. We also observe that claims are often made that 5G hasn't been tested, when in fact we have conducted considerable testing⁷¹ to confirm our network complies with the standards outlined in section 5.1. While only a small percentage of the community is engaging, the misinformation is gaining traction and the fears being raised need to be quickly and respectfully addressed.

Comment: Telstra has been disingenuous with its claim of considerable testing. There is no doubt that Telstra has performed a large number of tests to validate the function of the technology and that the emissions are within the public limits. However, I would challenge Telstra to provide a single health-based study they have performed to verify the safety of its equipment not only on humans but also the greater environment (insects, birds, animals and plants). Saying their technology meets specific RF Standard limits is not sufficient because the validity of the RF Standard to provide suitable protection has been brought into question by well qualified and independent scientists from all over the world. There is also considerable peer review research available in the ORSAA database to back up these public concerns of risks that RF exposure has for long-term health and wellbeing.

Telstra would like to see a broad-based government led communications campaign that seeks to educate the public on the independent global and peer-reviewed research which has found that 5G technology is safe, and that there are robust government settings in place, which include monitoring of EME safety standards. Ideally this campaign should incorporate the research from relevant government health experts such as the Department of Health and Chief Medical Officer.

In addition to campaigns for the general public, we also believe that a program of EME information / training should be developed for the medical community so that practitioners are better informed about EME science and in turn they are able to better inform patients who present with concerns about EME and their health.

Comment: Although I applaud and am in agreement with Telstra's request to educate the public and medical professionals on the independent peer reviewed research, I would like to bring to the committee's attention a number of points of concern:

1. There is no peer reviewed research available in any database that shows 5G is safe. This is because there has not been a single health-based study (in vivo, in vitro or epidemiological) conducted to date using the frequencies and modulation patterns that define 5G.
2. There are studies available that show mmWave RF frequencies are associated with cancers such as leukaemia⁴, reproductive system effects^{5,6,8} and DNA damage⁷ (which is a precursor for developing cancer). 5G is also using lower frequencies i.e. microwaves (3.6Ghz) and there is a large evidence base that shows pulsed microwaves frequencies are potentially deleterious to health.
3. The use of the word Electromagnetic Energy (EME) is a term that is not used in ARPANSA's Radiation Protection Series 3 (the "RF Standard"). This would appear to be a ploy to distract people from the fact that we are actually talking about a form of radiation. Electromagnetic Radiation (EMR) is a more appropriate term.

ORSAA and myself also believe that Government agencies and Industry need to be educated on what the actual independent science is suggesting when it comes to bioeffects from RF exposures and their implications for health. Those providing this advice need to be suitable qualified covering a range of different scientific and medical disciplines. ARPANSA is not the body to be conducting this education as it lacks suitably qualified staff (physics and radiochemistry qualifications are not sufficient). Unfortunately, in Australia, research is being dominated by psychologists, some of whom are connected with industry. What I believe is required is far more involvement of the biomedical research community in radiofrequency science and health. Such research needs to be performed independent of industry, something that is seriously lacking today.

5.1. "But ARPANSA RPS3 only protects against thermal effects"

As described in Section 4, the ARPANSA RPS3 protects against 'all' adverse health effects caused by RFEMF exposure. The limits have indeed been set to protect against thermal effects, but this is merely because these represent the lowest RF-EMF exposure levels capable of adversely affecting health, and so if there are any other adverse health effects that require higher RF-EMF exposure levels to occur, these will also be protected against.

Comment: The ACEBR is dominated by psychologists (all their research fellows are psychologists) and some of their principal researchers are funded by industry. ACEBR has not performed any biological research that involves long term chronic exposures, health surveillance or ecological studies of populations living in close proximity to base stations, smart meters and other wireless infrastructure. Much of their work has been focused on impacts of RF on cognition, EEG, sleep effects and whether electromagnetic hypersensitivity (EHS) is caused by RF exposure using questionable and poorly conducted provocation studies. All these aforementioned studies are conducted using short term acute exposures which give little to no insight to health effects that may result from chronic long-term RF exposures.

Some of the ACEBR scientists are members of ICNIRP, an NGO with no accountability and providing one of the least protective scientific based RF guidelines in the world. RPS3 does not protect against ALL health effects as is being claimed. ICNIRP 1998 guidelines, on which RPS3 is based, and ICNIRP's 2002 statement is very clear on what protection is provided and who are protected. That is, only acute exposures are considered and health effects such as shock and burns from thermal effects. Sensitive populations may exist and may not be protected by ICNIRP guidelines.

The World Health Organization predicted a cancer tidal wave in 2014 and significant changes in disease incidences have occurred in the last 30 years correlating with the increase in Radiofrequency background levels. The available research shows that RF-EMF can damage DNA (via free radicals and potential inhibition of DNA repair mechanisms), which is a precursor for cancer development and downregulates genes involved in metastasis control. Research also points to other pathological outcomes such as increased risk of neurological diseases and behavioural changes, developmental problems, cardiovascular diseases (observable in people with no inherited risk factors), immune system dysfunction, allergies and fertility effects. Many of these pathological outcomes were identified in literature reviews as far back as the late 60s and early 70s performed by NASA, the US Naval Medical Research Institute (NMRI) and the US Defense Intelligence Agency (DIA). These findings occurred before the commercial potential of RF was fully realised.

ACEBR's claims are also not in alignment with more than 240 international scientists who wrote a letter to the UN.¹³

5.2. "But ARPANSA RPS3 does not protect against cancer"

As described in Section 4, the ARPANSA RPS3 protects against 'all' adverse health effects caused by RFEMF exposure, which would include cancer if it was found to be related to RF-EMF exposure. However, after careful consideration of the literature, all independent international reviews have concluded that there is no evidence that RF-EMF exposure causes cancer. This includes consideration of: 1/ the IARC 2011 evaluation on carcinogenicity (which, although classifying RF-EMF as 'possibly carcinogenic', did not find any evidence that RF-EMF in fact caused cancer); and 2/ the US National Toxicology Program carcinogenicity studies (which, although reporting that RF-EMF exposure was carcinogenic, suffered from too many scientific flaws to be able to provide any evidence for this assertion; see for instance the critical review by the International Commission on Non-Ionising Radiation Protection, *Health Physics* 2019, doi: 10.1097/HP.0000000000001137).

Comment: Here we have direct evidence of ACEBR misrepresenting the NTP findings, demonstrating groupthink behaviour and suggesting ACEBR, ARPANSA and ICNIRP are acting like a cartel. Remembering that some ACEBR representatives are also members of ICNIRP, it is clear they are not going to make statements that are in conflict with an organisation they are members of. The lead designer of the NTP study Dr Ronald Melnick published a commentary qualifying the outcome of the NTP study and responding to the "unfounded criticisms aimed at minimizing the findings of adverse health effects"¹⁰

When looking at the evidence since the IARC classification, such as CERENAT study, Lerchl (2015) Tumour Promotor study, NTP and Ramazzini Institute findings, the doubling of brain tumours in some European countries over the last 30 years suggests there is sufficient evidence today, to warrant a change in status to the IARC classification to a "Group 1 carcinogen".

Vodafone Hutchison Australia submission No. 319

Page 3 of the submission:

As noted in the submission by the Associations, Industry is keenly aware that the deployment of 5G mobile networks has caused concern among some members of the community, both in Australia and overseas, in relation to health and safety.

It is important to recognise that Australia has some of the most comprehensive and stringent radio frequency safety and electromagnetic energy (EME) compliance requirements in the developed world. Pre-design risk assessments, publicly visible community environmental EME reports, and independently certified site-specific compliance assessments are just some of the requirements that apply to new radiocommunications facilities, technology upgrades to existing facilities, and ongoing site operation.

Comment: There are a number glaring issues in the Vodafone Hutchison submission.

1. Australia's RF Standard is based on ICNIRP 1998 guidelines and is one of the least protective RF Standards in the world. At least 40% of the world's population enjoy more protective standards.
2. There has been no environmental impact assessment performed by the Telcos for 5G or any other Gs for that matter. The RF Standard does not consider species other than humans (i.e. insects, plants or animals are not considered)
3. The EME reports are for individual towers and provide no useful information on real exposures (they are theoretical calculations that do not consider reflections, hot spots etc.) or consider the impact of multiple transmitters in nearby locations (constructive wave interference patterns).
4. Upgrades typically mean increased EMF exposure levels as more panels are added often resulting in increases to the power density of the emitted radiation. This can easily be verified by looking at, or measuring a facility's emission levels before and after the upgrades.

Australian Mobile Telecommunications Association and Communications Alliance Submission No. 335

Pages 23, 24, and 26

The current ICNIRP guidelines and Australia's own safety standard (the ARPANSA standard³⁸) is based on guidelines first published by ICNIRP in 1998³⁹. These guidelines were again reviewed in 2009⁴⁰ when ICNIRP published an update having reviewed research up to that time and found the guidelines remained protective with a significant safety margin although some detailed adjustments may be warranted to provide greater scientific consistency with advances in EME measurement and calculation. Importantly, there was no new health research that suggested any changes to the limits were required.

ARPANSA also reviewed its own standards, making similar findings in their 2014 report⁴¹ that the limits continued to provide ample protection but could be improved with some detailed adjustments arising out of improved measurement and calculation techniques.

Comment: ORSAA reviewed TRS-164 which is being referred to by AMTA, an association of mobile carriers. TRS-164 suffered from many deficiencies including misrepresenting the balance of evidence, ignoring evidence and failed to objectively review all the studies in ARPANSA's own database. One particular section dealing with in vivo and in vitro studies was simply a reproduction of the data provided by the UK HPA AGNIR report which was heavily criticised in a peer review scientific journal (Starkey 2016)¹² as being an inaccurate official assessment of radiofrequency safety. The AGNIR group was also later disbanded.

...

Following their 2009 update, ICNIRP conducted an exhaustive review of the scientific research up to the present time, and again examined their guidelines for any required adjustments, issuing a draft new guideline in 2018⁴² for public and scientific review. ICNIRP presented the draft guidelines at the 2018 BioEM Conference and emphasised the thorough review of the science to support the new guidelines, the conservative nature of the guidelines and that they cover the existing and new mmWave 5G frequencies. The draft guidelines maintained a conservative approach and made no major departures from the previous guidelines even though a further 10 years of scientific study had been undertaken, indicating the basis for the original and current guideline remains sound and appropriate for protection of the public. ICNIRP have indicated the completed new guideline will be

published in the peer reviewed scientific journal *Health Physics*⁴³ in the coming months

Comment: More than 100 submissions were made raising serious question around the validity of the new ICNIRP draft guideline. ORSAA also provided feedback to the draft guidelines (attached). To date there has been no response from ICNIRP to address any of the issues raised, particularly the issues around non-thermal bio-effects and their potential to cause harm, a theme that was common to many submissions made by researchers from all over the world. It would appear ICNIRP is going to simply ignore these concerns and proceed with their faulty draft RF Guidelines as is.

...

International authorities have also considered the potential health effects of 5G technology. In a recent statement⁵¹ from the UK health authority, Public Health England, PHE note that:
"Exposure to radio waves is not new and health-related research has been conducted on this topic over several decades."

Comment: HPA released the AGNIR report¹¹ which received a scathing response¹² as being an inaccurate assessment of the science and that important topics relating to health were overlooked. Some of those involved in the development of the report are also connected to ICNIRP, received funding from industry and therefore not excluding possible conflicts of interest.

...

And although in future 5G may be implemented at higher frequencies (mmWave) than used for current technologies:

"... the biophysical mechanisms that govern the interaction between radio waves and body tissues are well understood at higher frequencies and are the basis of the present ICNIRP restrictions. The main change in using higher frequencies is that there is less penetration of radio waves into body tissues and absorption of the radio energy, and any consequent heating, becomes more confined to the body surface."

Comment: The skin is the largest organ in the human body. It contains nerve endings, capillaries, sweat ducts etc. It is the first line of defence against an external hostile environment. The eyes are also vulnerable to damage from mmWaves. Using existing research one can predict likely outcomes as a result of mmWave deployment and exposure. One can expect to see an increase in rare ocular cancers, skin cancers, leukaemia, dermatological issues (e.g. eczema) and potentially peripheral nerve damage/neuropathy.

Australian Communications Consumer Action Network (ACCAN) Submission No. 341

Page 3

ACCAN is very aware that there is considerable concern within the community about health impacts from increased electromagnetic energy (EME). A 2019 Roy Morgan survey indicated that 26.1 per cent of Australians surveyed have concerns about the health implications of 5G technology.⁴ While ACCAN is not in a position to make a determination on any potential negative health or environmental impact from the increased spectrum use which underpins 5G technology, ACCAN recommends ongoing monitoring and research into any effects of this increased spectrum use. If 5G is to be deployed successfully with support and uptake of services from Australians then there needs to be a strong relationship of trust between all stakeholders. ACCAN expects policy makers, regulators, industry and academia to all play a vital role in ensuring that the Australian community at large have access to understandable, independently verified and comprehensive testing and reporting as the 5G deployment occurs. ACCAN is aware that in a number of jurisdictions internationally there have been restraints put on the deployment of 5G until further research has been undertaken regarding the health and environmental impacts of increased EME as a result of 5G deployment, and the increased interconnectivity of devices that 5G allows.⁵

Comment: I support ACCAN's recommendation to perform more research. However, I feel it is irresponsible to continue performing a rollout of 5G technology without first doing the research to demonstrate it is in fact safe. We are essentially flying blind as one US senator put it as nobody is doing the research. Given that we have enough evidence already from microwave frequencies suggesting long term harm, which is collectively being ignored by ICNIRP, Industry and government regulatory bodies, I believe a precautionary approach must be taken.

Dr Murray May, [REDACTED]

28 October, 2019

Submission to the House of Representatives Standing Committee on Communication and the Arts: Inquiry into 5G in Australia

Dear Committee Members

I submit the following in relation to the committee's terms of reference addressing the deployment, adoption and application of 5G in Australia. I note there is no mention of public health in the terms of reference, even though this has been an issue of significant interest in the media.

My qualifications include a First class Honours Science degree in chemistry (University of Queensland) and a later career PhD in social ecology/environmental health (Western Sydney University, 2005). I worked for 23 years in the Australian Public Service in Canberra, primarily in the Health Department (environmental health, health education) and the Environment Department and associated agencies. From 2008 to 2016, I was a Visiting Fellow in the School of Physical, Environmental and Mathematical Sciences, UNSW Canberra. I have in recent years been involved with the issue of electromagnetic radiation and am a current active member of the Oceania Radiofrequency Scientific Advisory Association (<https://www.orsaa.org/>).

The deployment of 5G in Australia is problematic on multiple grounds. These are summarised below:

1. There is now significant resistance worldwide and in Australia, both institutionally and at a community level, towards the installation of 5G technology. These responses demonstrate a depth of thought and a critical approach, drawing on the existing and growing scientific evidence about harm from radiofrequency radiation.

For example, in Brussels Environment minister Céline Fremault earlier in 2019 stated that "I cannot welcome such technology if the radiation standards, which must protect the citizen, are not respected, 5G or not ... The people of Brussels are not guinea pigs whose health I can sell at a profit. We cannot leave anything to doubt" ("Radiation concerns halt Brussels 5G development, for now," 2019).

Moratoriums have already been applied, for example, in various forms in parts of Switzerland, the Netherlands, Florence, Italy, Portland, Oregon, and San Francisco, California. The organisation, Americans for Responsible Technology (ART), co-ordinated a nationwide day of action to protest the deployment of 5G in the USA. A petition with signatures from 54,643 Germans asked the Parliament to stop a 5G auction on health grounds. There are currently over 60 Stop 5G groups across Australia, spanning national, State and Territory groups (<https://www.wesaynoto5ginaustralia.com/local-groups>).

2. Deploying 5G without the scientific evidence that it is safe to do so is not only highly irresponsible but potentially very costly in financial terms. Current topical examples of what happens in terms of financial cost from ill-considered government/industry mishandling and approval include the grounded Boeing 737 MAX which killed two

planeloads of people in October 2018 and March 2019, costing Boeing severely. A further example is the installation and subsequent required removal of flammable cladding from buildings in Australia at a cost of hundreds of millions of dollars, and more likely billions of dollars. PFAS chemical contamination across Australia is an additional example with huge financial ramifications.

Professor Dariusz Leszczynski (University of Helsinki, Finland) outlines in a September, 2019 presentation (included as an **appendix** to this submission) the confusion around 5G, in that it is being developed and deployed at the same time, and is a combination of old and new technologies. He also emphasises the paucity of research and serious limitations of biomedical research to date on millimetre waves, the higher frequency bands planned for use with 5G. Auctioning off this part of the spectrum is premature in such a state of ignorance.

Bodies such as ARPANSA and ICNIRP are looking for established evidence of harm before acting, which is not world's best practice for risk management. To establish harm is the point at which a potential risk materialises, which is far too late given the size of the population being exposed without formal consent. US Senator Richard Blumenthal (D-CT) raised concerns about scientific research on the safety of 5G technology with wireless industry representatives at a US Senate hearing, who conceded it had not been done. At the end of the exchange, Blumenthal concluded: "So there really is no research ongoing. We're kind of flying blind here, as far as health and safety is concerned" ("At Senate Commerce Hearing, Blumenthal Raises Concerns on 5G Wireless Technology's Potential Health Risks," 2019).

Concerned and experienced scientists and medical doctors in fields from biophysics to oncology with respect to electromagnetic radiation (253 signatories at September 17, 2019) have therefore come together supporting the need for a precautionary approach via the 5G appeal. The appeal begins:

"We the undersigned, scientists and doctors, recommend a moratorium on the roll-out of the fifth generation, 5G, for telecommunication until potential hazards for human health and the environment have been fully investigated by scientists independent from industry. 5G will substantially increase exposure to radiofrequency electromagnetic fields (RF-EMF) on top of the 2G, 3G, 4G, Wi-Fi, etc. for telecommunications already in place. RF-EMF has been proven to be harmful for humans and the environment."

And in relation to higher frequencies:

"5G technology is effective only over short distance[s]. It is poorly transmitted through solid material. Many new antennas will be required and full-scale implementation will result in antennas every 10 to 12 houses in urban areas, **thus massively increasing mandatory exposure.**" ("The 5G appeal," 2019).

To give just one example of the state of knowledge, or rather ignorance of possible harm, consider recent research by Israeli physicists whose work suggests that sweat ducts in the

skin could behave as antennas and thus respond to millimetre waves. They conclude as follows:

“While the promises of a glorious future, resplendent with semi-infinite data streaming, may be attractive, there is a price to pay for such luxury. We shall find our cities, workspace and homes awash with 5G base stations and we shall live through an unprecedented EM smog. The benefits to our society ... cannot ignore possible health concerns, as yet unexplored. There is enough evidence to suggest that the combination of the helical sweat duct and wavelengths approaching the dimensions of skin layers could lead to non-thermal biological effects. Such fears should be investigated and these concerns should also effect the definition of standards for the application of 5G communications.” (Betzalel, Ishaia, & Feldman, 2018).

3. The deployment of 5G in Australia rests on assumptions about the ARPANSA RF Standard. Bureaucrats and most politicians default to this position without apparently understanding the politics, research, and assumptions behind it.

Australia’s regulation of RF radiation by ACMA is flawed, risking public health. ACMA uses the ARPANSA RF standard, but has actually dropped the limited precautionary aspects contained in the ARPANSA Standard. It is either naïve or reckless for politicians to continue with this approach.

The elements of and reasons for such a flawed position continuing are outlined below:

(a) The current ICNIRP safety guidelines are obsolete, being based on the outdated notion that only thermal effects are relevant, whereas there is now a large and growing scientific literature on non-thermal bio-effects showing adverse biological and health effects at radiation levels well below ICNIRP guidelines. ARPANSA similarly continues to ignore this scientific evidence. I am co-author of a recent letter to the editor in the journal *Bioelectromagnetics* in which the problems with the current thermally based standard are discussed (<https://onlinelibrary.wiley.com/doi/abs/10.1002/bem.22225>).

Such extensive scientific evidence is available for any politician or bureaucrat to access via the Oceania Radiofrequency Advisory Association database, the world’s largest categorised database on radiofrequency electromagnetic radiation (www.orsaa.org). An overview of the latter database is provided by Leach, Weller and Redmayne (2018). Another review is the BioInitiative Report 2012 website updated to 2019 (<https://bioinitiative.org/conclusions/>). The extent of the paradigm gulf of thermal vis-à-vis non-thermal effects is now increasingly recognised in the medical literature, including a recent overview in *The Lancet* (Bandara & Carpenter, 2018).

(b) ACMA, ARPANSA, and ICNIRP (used by ARPANSA) have financial conflicts of interest, receiving funding from the wireless industry and working in partnership with it. For example, the well published long-term EMR researcher and oncologist Professor Lennart Hardell (2017) analyses in a paper attached as an **appendix** to this submission, how ICNIRP is an industry loyal NGO and has serious financial conflicts of interest. He discusses how the World Health Organization (WHO) EMF project was largely funded by telecom lobbying

organisations and how the chairman of ICNIRP acted like a representative for the telecom industry while responsible for the EMF health effects department at WHO.

This activity is at odds with the WHO's International Agency for Research on Cancer (IARC) which reviewed the scientific evidence related to cancer and classified radiofrequency electromagnetic fields as possibly carcinogenic to humans (Group 2B). Based upon the research published since 2011, the IARC has recently prioritized RFR to be reviewed again in the next five years. When considered with recent animal experimental evidence, the recent epidemiological studies strengthen and support the conclusion that RFR should be classed as carcinogenic to humans (IARC Group 1). The large (US \$25 million) National Toxicology Program (NTP) study showed statistically significant increases in the incidence of brain and heart cancer in animals exposed to EMR below the ICNIRP guidelines followed by many countries.

(c) None of the themes above are particularly new, though the evidence base is now considerably larger. The earlier Australian Senate report provided a critique of and recommended against adopting ICNIRP guidelines to relax the Australian exposure standard (Senate Environment Communications Information Technology and the Arts References Committee, 2001). An earlier 1994 report by Dr Stan Barnett of CSIRO's Division of Radiophysics listed many well documented adverse bio-effects from exposure to RF at power levels well below the threshold for thermal effects.

As this evidence threatened industry interests, the trend in recent years has been for the Australian government to fund bodies such as the Australian Centre for Electromagnetic Bioeffects Research (ACEBR) staffed by people such as Prof. Rodney Croft, a psychologist by training. This skews research towards nocebo explanations of effects observed, rather than the biomedical approach as previously elaborated by Barnett. Handily for industry, it's much easier to locate problems in people's psyches than to address the biological data. Contradicting the nocebo thesis is the expanding literature showing the broad-ranging, scientifically demonstrated impacts of EMR pollution on animals and plants. One recent example is a study on insects, of great importance for the future economy, as it indicates a threat to honeybees from frequencies ranging from 2-120 GHz, encompassing those planned for use by 5G (Thielens et al., 2018).

(d) ARPANSA's website includes a disclaimer on its website which reads in part:

"Nothing contained in this site is intended to be used as medical advice and, in particular, it should not be used ... as a substitute for your own health practitioner's professional advice. ARPANSA does not accept any liability for any injury, loss or damage incurred by use of or reliance on the information provided on this website."

How could it do otherwise? There is no way that research can keep up with the technology. Implementing 5G is therefore a human experiment on a wide scale, potentially opening Pandora's box. Unaddressed by ARPANSA's assurances are the total cumulative exposure across the spectrum from multiple sources and exposures for sensitive populations such as children. If there are synergistic effects from simultaneous exposures to multiple types of RFR, the overall risk of harm from RFR may increase substantially. There is a need to

address changes in carrier frequencies and the growing complexity of modulation technologies.

ARPANSA's assurances about no evidence of harm are thus not backed with any confidence, given the disclaimer above. Further, no one with medical qualifications is involved in ARPANSA's assessment of health risks, nor anyone with biomedical expertise. The academic training of panel members spans physical sciences, epidemiology and psychology.

The major insurance and reinsurance group Swiss Re is considerably more hard-headed with its evaluation, naming five risks with high potential impact on the industry in its 2019 SONAR report (Swiss Re, 2019). One of these is the spread of 5G technology, with concerns about potential negative health effects from electromagnetic fields likely to increase. In addition, hackers can exploit 5G speed and volume to acquire (or steal) data faster. This raises significant additional concerns about possible privacy and security breaches, as well as espionage e.g. the concerns raised about Huawei in Australia.

4. Careful technology assessment is required, taking into account the need for technologies and the costs involved. Just because we *can* do something doesn't necessarily mean we *should*. Prevention is better than cure.

Professor of Medicine at the University of California San Diego, Beatrice Golomb, reports that her research group alone has received hundreds of communications from people who have developed serious health problems from electromagnetic radiation, following introduction of new technologies. Golomb says most likely these are the tip of an iceberg of tens or perhaps hundreds of thousands of affected persons. As each new technology leading to further exposure to electromagnetic radiation is introduced – and particularly introduced in a fashion that prevents vulnerable individuals from avoiding it – a new group becomes sensitised to health effects. Her letter of 22 August, 2017 arguing against a Bill paving the way for 5G in California is attached as an **appendix**.

The speed of technological development doesn't mean we can abandon the important process of careful decisions about our common future. Just because we *can* do something doesn't necessarily mean we *should*. The internet of things means that one's home would end up being a major source of electrosmog.

Professor Golomb's call reflects that of many progressively oriented websites when she says:

“Let our focus be on safer, wired and well shielded technology – not more wireless.”

The deployment of wireless has led to many unintended but serious consequences to date. These include significant distraction related road crashes from people texting and viewing smartphones while driving. The Federal Minister for Education recently announced \$34.9 million in funding for the establishment of an Australian Research Council (ARC) Centre of Excellence for the Digital Child based at QUT. It will study issues such as excessive screen time and mental health issues in children, addiction, social media and gaming, online safety etc.

The ludicrous and widespread nature of technological invasion is underlined by the example of a new smart nappy that uses wireless sensors to alert parents when the baby's nappy needs changing. With this sort of thinking ever-present, a careful reconsideration of what is "smart" is urgently required.

Appendices

1. Professor Dariusz Leszczynski, University of Helsinki, Finland – presentation on "gaps in the knowledge" 15 September, 2019 Australia.
2. Professor Lennart Hardell – journal article (Hardell, L. (2017). World Health Organization, radiofrequency radiation and health - a hard nut to crack (Review). *International Journal of Oncology*, 51, 405-413.)
3. Professor Beatrice Golomb MD, PhD – Professor of Medicine, University of California, San Diego. Letter of 22 August, 2017 on the case against a Bill paving the way for the implementation of 5G.

References

- The 5G appeal. (2019). Retrieved 23 October 2019, from <http://www.5gappeal.eu/>
- At Senate Commerce Hearing, Blumenthal Raises Concerns on 5G Wireless Technology's Potential Health Risks. (2019, 7 February). Retrieved 23 October, 2019, from <https://www.blumenthal.senate.gov/newsroom/press/release/at-senate-commerce-hearing-blumenthal-raises-concerns-on-5g-wireless-technologys-potential-health-risks>
- Bandara, P., & Carpenter, D. O. (2018). Planetary electromagnetic pollution: it is time to assess its impact. *Lancet Planetary Health*, 2(12), e512-e514.
- Betzalel, N., Ishaia, P. B., & Feldman, Y. (2018). The human skin as a sub-THz receiver – Does 5G pose a danger to it or not? *Environmental Research*, 163, 208-216.
- Hardell, L. (2017). World Health Organization, radiofrequency radiation and health - a hard nut to crack (Review). *International Journal of Oncology*, 51, 405-413.
- Leach, V., Weller, S., & Redmayne, M. (2018). A novel database of bio-effects from non-ionising radiation. *Reviews on Environmental Health*, 33, 273-280.
- Radiation concerns halt Brussels 5G development, for now. (2019, 1 April). Retrieved 23 October, 2019, from <https://www.brusselstimes.com/brussels/55052/radiation-concerns-halt-brussels-5g-for-now/>
- Senate Environment Communications Information Technology and the Arts References Committee. (2001). Inquiry into electromagnetic radiation. Canberra: Commonwealth of Australia.
- Swiss Re. (2019, 22 May). Swiss Re Institute's 2019 SONAR report examines new and "slow-burner" emerging risks like the public health implications of climate change. Retrieved 25 October, 2019, from <https://www.swissre.com/media/news-releases/nr-20190522-sonar2019.html>
- Thielens, A., Bell, D., Mortimore, D. B., Greco, M. K., Martens, L., & Joseph, W. (2018). Exposure of insects to radio-frequency electromagnetic fields from 2 to 120 GHz. *Scientific Reports*, 8(1), 3924. doi: 10.1038/s41598-018-22271-3

capacity to cause further harm. I urge this committee to immediately recommend a moratorium on 5G.

I apologise for any typographical errors and inconsistently formatted references in this letter written in a rushed manner.

Yours sincerely,

Priyanka Bandara

Dr. Priyanka (Pri) Bandara
Consultant/Educator in Environmental Health

[REDACTED]
[REDACTED]
Advisory Board Member, Environmental Health Trust, USA (<http://ehtrust.org/>)
Executive Member, Oceania Radiofrequency Scientific Advisory Association (<http://www.orsaa.org/>)

I declare no conflicts of interest as an independently operating (on a charitable basis) researcher in this field. My impetus to investigate this area of health research came from an entirely unexpected resolution of multiple diseases/disorders of neuro-immune nature in multiple members of my family, including young children, after I removed all wireless devices from my family home in April 2012. This was prompted by curiosity caused by an educational video by a Canadian academic researcher (Dr. Magda Havas). The protective steps I took, without the slightest expectation of observing any health benefits (i.e. operating with "just in case" attitude), in fact healed multiple health problems and we could discontinue medications. My research in this area on a full-time basis (and at immense financial and other sacrifices) is intended to protect millions of people, particularly children who are harmed without their knowledge or their doctors'. I am inspired by honest and brave researchers in our region such as, environmental scientists Prof. Niel Cherry (<http://neilcherry.nz/>). Prof. Cherry warned Australia not to increase public exposure to RF-EMR in the 1990s and early 2000s. He went to meetings even in his wheelchair as he was battling a terminal neurodegenerative disease. He fought bravely to protect public health from wireless radiation, but unfortunately, his noble efforts were futile in the face of massive economic conflicts of interest.

References

1. Bandara P and Carpenter DO. Lancet Planetary Health 2018; [https://doi.org/10.1016/S2542-5196\(18\)30221-3](https://doi.org/10.1016/S2542-5196(18)30221-3)
2. International EMF Scientist Appeal: www.emfscientist.org
3. Hocking B et al. Med Journal of Australia: <https://www.ncbi.nlm.nih.gov/pubmed/8985435>
4. French PW et al. Differentiation 2001: <https://www.ncbi.nlm.nih.gov/pubmed/11683499>
5. Khurana VG et al. 2009 Surgical Neurology: <https://www.ncbi.nlm.nih.gov/pubmed/19328536>
6. NTP, NIH USA: <https://www.nih.gov/news-events/news-releases/high-exposure-radio-frequency-radiation-associated-cancer-male-rats>
7. Smith-Roe et al. Evaluation of the genotoxicity of cell phone radiofrequency radiation in male and female rats and mice following subchronic exposure. Environmental and Molecular Mutagenesis. Oct 2019. <https://doi.org/10.1002/em.22343>

8. Alster N. Captured Agency: How the Federal Communications Commission Is Dominated by the Industries It Presumably Regulates. Edmond J. Safra Center for Ethics, Harvard University: https://ethics.harvard.edu/files/center-for-ethics/files/capturedagency_alster.pdf
9. Corporate Ties That Bind: An Examination of Corporate Manipulation and Vested Interest in Public Health, Martin J. Walker (Editor), 2017: <https://www.skyhorsepublishing.com/9781510711884/corporate-ties-that-bind/>
10. Maisch D. PhD Thesis 2010, The Procrustean Approach – Setting Exposure Standards for Telecommunications Frequency Electromagnetic Radiation. An examination of the manipulation of telecommunications standards by political, military, and industrial vested interests Wollongong University. Available on: www.emfacts.com
11. European Academy for Environmental Medicine (EUROPAEM): <https://europaem.eu/en/library/blog-en/97-europaem-emf-guideline-2016>
12. American Academy of Environmental Medicine (AAEM): https://www.aeonline.org/emf_rf_position.php
13. American Academy of Pediatrics (AAP): <http://www.saferemr.com/2013/09/american-academy-of-pediatrics-demands.html>
14. Ministry of Health of Israel: https://www.health.gov.il/PublicationsFiles/BSV_sviva2014_EN.pdf
15. French National Agency of Health Security of Food, Environment and Labour (ANSES) : <https://www.anses.fr/en/content/radiofrequency-radiation-mobile-telephones-and-wireless-technologies>
16. France – Policy Recommendations On Cell Phones, Wireless Radiation & Health: <https://ehtrust.org/france-policy-recommendations-cell-phones-wireless-radiation-health/>
17. Russian National Committee on Non-Ionizing Radiation Protection (RNCNIRP): <http://www.who.int/peh-emf/project/mapnatreps/RUSSIA%20report%202008.pdf>
18. National Committee on Environment and Children's Health of Cyprus: <https://www.youtube.com/watch?v=H43IKNjTvRM>
19. Carpenter DO. The microwave syndrome or electro-hypersensitivity: historical background Rev Environ Health. 2015;30(4):217-22. doi: 10.1515/reveh-2015-0016. <https://www.ncbi.nlm.nih.gov/pubmed/26556835>
20. Hocking B. Microwave sickness: a reappraisal, Occup Med (Lond). 2001 Feb;51(1):66-9. <https://www.ncbi.nlm.nih.gov/pubmed/11235831>
21. Hocking B, Westerman R. Neurological abnormalities associated with CDMA exposure. Occup Med (Lond). 2001 Sep;51(6):410-3: <https://www.ncbi.nlm.nih.gov/pubmed/11584121>
22. Hocking B, Westerman R. Neurological changes induced by a mobile phone. Occup Med (Lond). 2002 Oct;52(7):413-5. <https://www.ncbi.nlm.nih.gov/pubmed/12422029>
23. Hocking B, Westerman R. Neurological effects of radiofrequency radiation. Occup Med (Lond). 2003 Mar;53(2):123-7: <https://www.ncbi.nlm.nih.gov/pubmed/12637597>
24. Verrinder A et al. IEI-EMF provocation case studies: A novel approach to testing sensitive individuals Bioelectromagnetics. 2018;39(2):132-143. doi: 10.1002/bem.22095. <https://www.ncbi.nlm.nih.gov/pubmed/29125197>
25. Phone tower anxiety is real and we're worrying ourselves sick. ABC.net.au by Adam Verrinder. Updated 9 Jan 2019: <https://www.abc.net.au/news/2019-01-09/huawei-small-cell-boxes-fuelling-phone-radiation-anxiety/10701856>
26. Woman claims severe health problems are caused by wi-fi but international studies find no link. ABC South East NSW By Bill Brown Posted 12 Sep 2016: <https://www.abc.net.au/news/2016-09-12/evidence-rejects-wi-fi-health-effects-claim/7580686>
27. Wi-fi isn't hurting you, but the fear of it might be. The Drum By Mike Clay, Updated 10 Jul 2015: <https://www.abc.net.au/news/2015-07-10/clay-wi-fi-might-not-hurt-us-but-fear-of-it-certainly-does/6607860>
28. ORSAA database: www.orsaa.org

29. EMF Portal: <https://www.emf-portal.org/en>
30. Bioinitiative Reprot: <https://bioinitiative.org>
31. Baan R, Grosse Y, Lauby-Secretan B, El Ghissassi F, Bouvard V, et al. Carcinogenicity of radiofrequency electromagnetic fields. *Lancet Oncol* 2011;12(7):624-6.
32. International Agency for Research on Cancer (IARC). IARC Monographs on the Evaluation of Carcinogenic Risks to Humans Volume 102 (2013) Non-Ionizing Radiation, Part 2: Radiofrequency Electromagnetic Fields/ 2013: <https://publications.iarc.fr/126>
33. Miller AB, Morgan LL, Udasin I, Davis DL. Cancer epidemiology update, following the 2011 IARC evaluation of radiofrequency electromagnetic fields (Monograph 102). *Environmental Research*. 2018 (in press).
34. Carlberg, M, Hardell L. Evaluation of Mobile Phone and Cordless Phone Use and Glioma Risk Using the Bradford Hill Viewpoints from 1965 on Association or Causation. *Biomedical Research International*, 2017;9218486.
35. IARC Monographs Advisory Group. Advisory Group commendations on priorities for the IARC Monographs. *Lancet Oncol* 2019; 20 (6):763-764 (DOI:[https://doi.org/10.1016/S1470-2045\(19\)30246-3](https://doi.org/10.1016/S1470-2045(19)30246-3))
36. Bandara P and Weller S. Biological effects of low-intensity radiofrequency electromagnetic radiation – time for a paradigm shift in regulation of public exposure. *Radiation Protection In Australasia*, 2017 Nov; 34(2): 2-9.
37. Khurana V. *Int. Journal of Occupational and Environmental Health* 2010; 16: 263-277 : <https://www.ncbi.nlm.nih.gov/pubmed/20662418>
38. International Agency for Research on Cancer (IARC),WHO: <https://gco.iarc.fr/today/>
39. Dode A.C. et al., *Science of the Total Environment* 2011; 409:3649–3665).
40. Eger et al., *Umwelt Medizin Gesellschaft* 2004;17(4) 1-7): http://avaate.org/IMG/pdf/20041118_naila.pdf
41. Eger H and Neppe F., *Umwelt Medizin Gesellschaft* 2009; 22 (1): 55-60
42. Wolf R. and Wolf D., Increased incidence of cancer near a cell-phone transmitter station. *International Journal of Cancer Prevention* 2004; 1(2):123-128).
43. Stewart A et al., Mobile telecommunications and health: report of an investigation into an alleged cancer cluster in Sandwell, West Midlands. *Perspectives in Public Health*, 2012;132(6):299-304). *Perspect Public Health*. 2012 Nov;132(6):299-304. doi: 10.1177/1757913911427375. Epub 2011 Nov
44. Gulati S et al., Phenotypic and genotypic characterization of antioxidant enzyme system In human population exposed to radiation from mobile towers. *Molecular and Cellular Biochemistry*. 2018;440(1-2):1-9.
45. Zothansiana et a. Impact of radiofrequency radiation on DNA damage and antioxidants in peripheral blood lymphocytes of humans residing in the vicinity of mobile phone base stations. *Electromagnetic Biology and Medicine* 2017;36(3):295-305. doi: 10.1080/15368378.2017.1350584. <https://www.ncbi.nlm.nih.gov/pubmed/28777669>
46. Gandhi G et a., A cross-sectional case control study on genetic damage in individuals residing in the vicinity of a mobile phone base station. *Electromagnetic Biology and Medicine*, 2015; 34(4):344-54. doi: 10.3109/15368378.2014.933349
47. Huss et al., Source of Funding and Results of Studies of Health Effects of Mobile Phone Use: Systematic Review of Experimental Studies. *Environ Health Perspect* 2007: 115(1) 1-5. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1797826/>
48. ARPANSA statement: <https://www.arpansa.gov.au/news/misinformation-about-australias-5g-network?fbclid=IwAR>
49. Parliamentary records: https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Environment_and_Communications/Completed_inquiries/1999-02/emr/report/c03
50. ARPANSA info: <https://www.arpansa.gov.au/research/surveys/mobile-phone-base-station-survey/survey-management-and-funding>

51. ABC retraction of the Catalyst "WiFried?": <https://www.abc.net.au/catalyst/wi-fried-correction/11016192>
52. Breast Cancer at the ABC Toowong Queensland -Final Report of the Independent Review and Scientific Investigation Panel: <https://about.abc.net.au/wp-content/uploads/2013/04/BreastCancerABCToowongQLDFinalReportJune2007.pdf>
53. Maisch D et al., www.emfacts.com/download/toowong.pdf
54. West JG, Kapoor NS, Liao SY, Chen JW, Bailey L, Nagourney RA. Multifocal Breast Cancer in Young Women with Prolonged Contact between Their Breasts and Their Cellular Phones. *Case Rep Med.* 2013;2013:354682. doi: 10.1155/2013/354682.
55. Sagar S et al., Comparison of radiofrequency electromagnetic field exposure levels in different everyday microenvironments in an international context. *Environ Int.* 2018 May;114:297-306. doi: 10.1016/j.envint.2018.02.036. <https://www.ncbi.nlm.nih.gov/pubmed/29529581>
56. Bandara P and Johansson O. Letter to the Editor (Rebuttal of WiFi in Australian Schools by ARPANSA) *Radiation Protection Dosimetry.* 2018 Feb 1;178(3):288-291. doi: 10.1093/rpd/ncx108.
57. How much is safe? Investigate Europe Report 2019: <https://www.investigate-europe.eu/publications/how-much-is-safe/>
58. Hardell L. World Health Organization, radiofrequency radiation and health - a hard nut to crack (Review). *Int J Oncol* 2017;51:405-13.
59. Dimitris J. Panagopoulos. (2019) Comparing DNA damage induced by mobile telephony and other types of man-made electromagnetic fields. *Mutation Research/Reviews in Mutation Research* 781, 53-62. Online publication date: 1-Jul-2019.
60. Leach V and Weller S. Radio frequency exposure risk assessment and communication: Critique of ARPANSA TR-164 report. Do we have a problem? *Radiation Protection In Australasia*, Vol. 34, No. 2, pp. 9-18, 2017.
61. Bandara P, Weller S and Leach V. Health Risks of Wireless Technologies. *Radiation Protection In Australasia (Journal of the Australasian Radiation Protection Society)*, 2018; 35(2): 22-26.
62. ARPANSA Report TRS 164, 2014, "Review of Radiofrequency Health Effects Research – Scientific Literature 2000 – 2012"
<https://www.arpansa.gov.au/sites/default/files/legacy/pubs/technicalreports/tr164.pdf>
63. Karipidis K and Tinker R 2018. Letter to the Editor. *Radiation Protection In Australasia* (35)1:29-30.

1st November 2019

The Hon. Dr. David Gillespie, Chairman
and members of the 5G Parliamentary Inquiry Committee
Federal Parliament of Australia, Canberra, ACT

Dear Dr. Gillespie and committee members,

Re: Parliamentary Inquiry on the deployment, adoption and application of 5G technology

My submission to this inquiry focuses on reference term 1. Investigate the capability, capacity and deployment of 5G. I am a subject matter expert (please refer to my bio herewith submitted) on the biological/health effects of **radiofrequency electromagnetic radiation (RF-EMR)** which is the agent generated and released in to the environment to operate wireless technologies such as 5G. My submission is related to the health impact of 5G. **Health risks associated with 5G technology need to be considered with the utmost priority when assessing the deployment aspect.** I earnestly request your careful attention to the information presented below.

As detailed in my Lancet Planetary Health paper¹, RF radiation is the most prominent component of environmental electromagnetic pollution, a relatively new but serious problem for the health of humans, other species as well as the natural environment.

I am one of 251 scientists with expertise in this area (from 42 countries) who are signatories to the International EMF Scientist Appeal to the WHO and the UN² which urges immediate measures to protect the health and wellbeing of humans and other species from man-made electromagnetic fields- the most widespread of which is wireless radiation (RF-EMR). This petition refutes the often repeated yet incorrect claim by the wireless industry and regulatory bodies such as Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) that the "scientific consensus" is that there is no evidence of health risks. In fact, there is no scientific consensus on this topic. Other Australian signatories to this expert appeal include Dr. Bruce Hocking, the former long-serving Chief Medical Officer of Telstra, Dr. Peter French who was at St. Vincent's Hospital as lead scientist of the immunology research unit and renowned neurosurgeons Dr. Charlie Teo and Dr. Vini Khurana. These distinguished Australian professionals found in their research (years ago) credible scientific evidence linking wireless radiation to cancer: as an increased risk in people living near RF-EMR transmitters as per the epidemiology studies of Dr. Hocking³; in laboratory studies by Dr. French's team⁴ and as an increased risk of brain tumours associated with mobile phone use by neurosurgeons⁵. These Australian findings or thousands of similar findings elsewhere are not addressed in Australia nowadays.

Recently, the US National Toxicology Program (NTP) of the National Institutes of Health released findings from a large study that consumed \$30 million and took over 10 years to complete. This study demonstrated clear evidence of carcinogenicity⁶ and genotoxicity (DNA damage)⁷ associated with exposure to RF-EMR, at currently permitted levels of exposure. This evidence is not only being

ignored, but even unscientifically discredited by the wireless industry and their working partners - regulatory agencies of many Western countries, notably in Australia. This unfortunately delays much needed steps to minimise people's exposure to RF-EMR in order protect public health. What happened with tobacco and other examples where financial conflicts of interest involving regulatory/public health protection agencies that put public health at risk, is unfortunately repeating with 'wireless radiation'.^{8,9,10} The consequences could be worse than of tobacco and asbestos combined when considering the cytotoxic potential of RF radiation and its population-wide exposure which other agents did not have.

Credible medical/scientific organisations warn on wireless radiation (RF-EMR) health risks:

European Academy for Environmental Medicine (EUROPAEM)¹¹

"Studies, empirical observations, and patient reports clearly indicate interactions between EMF exposure and health problems. Individual susceptibility and environmental factors are frequently neglected. New wireless technologies and applications have been introduced without any certainty about their health effects, raising new challenges for medicine and society."

"On the one hand, there is strong evidence that long-term exposure to certain EMFs is a risk factor for diseases such as certain cancers, Alzheimer's disease, and male infertility. On the other hand, the emerging electromagnetic hypersensitivity (EHS) is more and more recognized by health authorities, disability administrators and case workers, politicians, as well."

American Academy of Environmental Medicine (AAEM)¹²

"The fact that RF exposure causes neurological damage has been documented repeatedly. Increased blood-brain barrier permeability and oxidative damage, which are associated with brain cancer and neurodegenerative diseases, have been found."

In 2013, AAEM specifically recommended only wired communications in schools including wired internet (instead of WiFi) to reduce the microwave RF radiation of more vulnerable children :

<https://www.aaemonline.org/pdf/WiredSchools.pdf>

American Academy of Pediatrics (AAP)¹³

"Children are disproportionately affected by environmental exposures, including cell phone radiation. The differences in bone density and the amount of fluid in a child's brain compared to an adult's brain could allow children to absorb greater quantities of RF energy deeper into their brains than adults. The current exposure limits may not reflect the latest research on RF energy"

Ministry of Health of Israel (MoH)¹⁴

"Although the MoH lacks authority under the Non-Ionizing Radiation Law, the Ministry publishes recommendations on reducing public exposure. The MoH recommends sensible use of cellular and wireless technology, including: considering alternatives like landline telephones, use of a speaker while talking on a cellphone, and refraining from installing the base of wireless phones in a bedroom, work room, or children's room" (page 69). The Israeli Ministry of Health recommends

reducing exposure to wireless radiation and advises against having cordless phones in areas where people spend time most or near children!

“recommends that students remain at a distance of at least 1.5 meters from electrical cabinets and that use of wireless communication networks in schools be reduced.” “The MoH recommends not using cellphones in closed places (for example, elevators, buses, trains) due to amplified radiation in such places.” (page 70).

“Findings in Israel clearly indicated a link between cellphone use for more than 10 years and the development of tumors in the salivary glands, particularly among people who held the telephone on the same side where the tumor developed and individuals in the highest category of exposure (heavy use in rural areas).” (page 71)

At least the Israeli MoH is telling their people the truth about the health risks of wireless communications (RF-EMR) and recommends steps to minimise exposure even though they are powerless to control public exposure levels. In contrast, no health authority is giving this vitally important advice in Australia and instead false assurances of safety are propagated through all communication channels.

French National Agency of Health Security of Food, Environment and Labour (ANSES)¹⁵

“the Agency emphasises that children can be more exposed than adults because of their morphological and anatomical features, in particular their small size, as well as the characteristics of some of their tissues. It is issuing a series of recommendations aimed at adapting the regulatory limit values in order to reduce the exposure of children to electromagnetic fields, which starts from a very early age due to the expansion of the use of new technologies.”

“ALL wireless devices, including tablets, cordless phones, remote controlled toys, wireless toys, baby monitors and surveillance bracelets, should be subjected to the same regulatory obligations as cell phones.”

France has in recent years taken several steps to reduce children’s exposure to RF-EMR such as banning marketing mobile phones to children, banning wireless systems such as WiFi in small children’s facilities and restricting the use of WiFi for older students in schools¹⁶.

Russian National Committee on Non-Ionizing Radiation Protection (RNCNIRP)¹⁷

“the following health hazards are likely to be faced by the children mobile phone users in the nearest future: disruption of memory, decline of attention, diminishing learning and cognitive abilities, increased irritability, sleep problems, increase in sensitivity to the stress, increased epileptic readiness. Expected (possible) remote health risks: brain tumors, tumors of acoustical and vestibular nerves (in the age of 25-30 years), Alzheimer’s disease, “dementia”, depressive syndrome, and the other types of degeneration of the nervous structures of the brain (in the age of 50 to 60).”

National Committee on Environment and Children's Health of Cyprus.

This series of 5 min information videos¹⁸ to protect children from wireless radiation explains the issue clearly - a must watch for this committee: <https://www.youtube.com/watch?v=H43lKNjTvRM>

Australian health agencies and regularly authorities have been negligent

Honourable Chairman and committee members, other government agencies and medical organisations have been warning their people of serious short- and long-term health risks including cancers and a range of neurological and neuro-behavioural problems for years. However, in Australia we have only heard assurances of safety. This must be either due to the incompetence of our health regulatory agency ARPANSA and the primary research body on RF biological/health effects ACEBR or something more complex, which must be investigated.

Australian health statistics show that our nation is burdened with a wide range of adverse health outcomes (physical and mental health problems) that have been linked to wireless radiation (RF-EMR) exposure. Yet wireless radiation remains 'the elephant in the room' when Australian health ministers are presented with health of the nation reports. Adverse health effects of RF-exposure have been long-referred to as "microwave sickness/illness"^{19,20}, initially identified in people occupationally exposed to RF-EMR, mostly military radar. While both cited papers on microwave sickness are by highly qualified /experienced medical professional in occupational and environmental medicine, reference 20 is by Dr. Bruce Hocking, former Chief Medical Officer of Telstra who found clear physiological changes involving nerves in some people upon exposure to mobile phone radiation in objective provocation tests.²¹⁻²³ These studies are far superior to subjective testing²⁴ which is the method used by medically-untrained psychologists at Australia's top research centre on RF-EMR health effects at ACEBR where much of the funding comes from the wireless industry.

Sadly, such poor-quality studies are being used as the basis on which health risks of wireless radiation are denied. In an ABC report titled "Phone tower anxiety is real and we're worrying ourselves sick"²⁵, an ACEBR PhD student claimed "*Decades of scientific research has found no evidence of any adverse health effects but still the public remains concerned*" (parroting ARPANSA/industry) referring to his study on 3 people which recorded unreliable subjective symptoms! His psychologist supervisor who headed ACEBR (therefore the lead health researcher in Australia) for many years is frequently featured in media denying any health risks of wireless. These industry-funded psychologists are misleading Australians, including medical professionals to believe that symptoms are due to a "nocebo effect" arising out of fear of wireless technology rather than RF radiation. They dismiss, discourage medical investigations and even ridicule Australian people who suffer from exposure to wireless radiation such as in the cases published in the ABC^{26, 27} In these two cited reports (there are many more), suffering Australians include a Sydney University physics professor who suffers from WiFi at work place, an unwell family with young children who live near a mobile phone base station (MPBS) and an older female claiming to have suffered severe neurological symptoms after an NBN WiFi tower was erected near her home. It appears from the older woman's case where the patient's GP, apparently without any education on adverse health effects of RF radiation, and misled by the false statements of ACEBR and ARPANSA, is not even trying to investigate if RF-radiation could be affecting her patient. If the GP was properly educated, she would be referring this patient to an expert neurological investigation by someone like Dr. Bruce Hocking and colleague Dr. Westerman who have conducted objective neurological tests with specialised equipment in the past. Australian doctors are not educated on this topic. These ABC reports are typical of countless such orchestrated propaganda by wireless proponents to mislead

Australians to believe that wireless radiation is safe. If that is the case, why do credible medical organisations in other parts of the world and hundreds of expert scientists give warnings?

Dr. Gillespie, as a medical professional, you will understand well why it is crucially important to investigate the health impact of wireless tech **before** the deployment of 5G when ARPANSA/industry/ACEBR/ACMA position is at odds with expert bodies like those mentioned above and thousands of scientific studies.²⁸⁻³⁰

Moreover, if RF-EMR exposure cannot cause any health problems, why has there been a specific WHO ICD code to diagnose adverse health effects caused by exposure to RF-EMR? The WHO International Classification of Diseases (ICD) for years has maintained W90 for RF-EMR caused health effects: <https://icd.codes/icd10cm/W900>

Accumulated scientific evidence indicates that wireless radiation can cause cancer

RF-EMR from all wireless sources was classified by the WHO's International Agency for Research on Cancer (IARC) as a **Group 2B Possible Carcinogen** in 2011^{31,32} This further warranted the long-held recommendation for the Precautionary Principle (i.e. reduce exposure due to potential risks). The scientific evidence related to cancer has markedly increased since 2011 and based on this new evidence, some experts from the IARC expert panel in 2011 have called for an upgrade to the IARC classification to **Group 1 Carcinogen** (established cancer-causing agent)^{33,34} As a scientist familiar with the empirical evidence in this field of research, I concur with these cancer experts – the scientific evidence as a whole shows that RF radiation is a carcinogen. WHO's IARC has recently announced that RF-EMR needs to be re-evaluated with high priority due to this increased evidence related to cancer causation³⁵.

It is clearly not the time to increase the exposure of people of Australia to wireless RF radiation with 5G, instead we need to reduce it by encouraging safer wired communications. The 4G deployment added a large network of small cell (micro cell) antennae mobile phone base stations (MPBS) to telegraph poles on residential streets. This increase in numbers of transmitters will be accelerated further with the introduction of the second phase of 5G which will require a closely located antenna array. There has been a massive increase in the exposure of Australian people to toxic RF radiation in the last decade which will get much worse with 5G.

My own review of the scientific literature has revealed that low levels of RF radiation (typical exposures) cause biological effects including oxidative stress which is a known mechanisms of cell damage (including DNA damage) causing a wide range of degenerative diseases and cancer. **Out of 242 peer-reviewed studies, 89% found oxidative stress related to RF-EMR exposure**³⁶. This research paper (Bandara P. and Weller S. Biological effects of low-intensity radiofrequency electromagnetic radiation – time for a paradigm shift in regulation of public exposure, 2017) provided evidence to substantiate the claim that ARPANSA's evaluation of the experimental evidence in this area is flawed and risks public health in Australia.

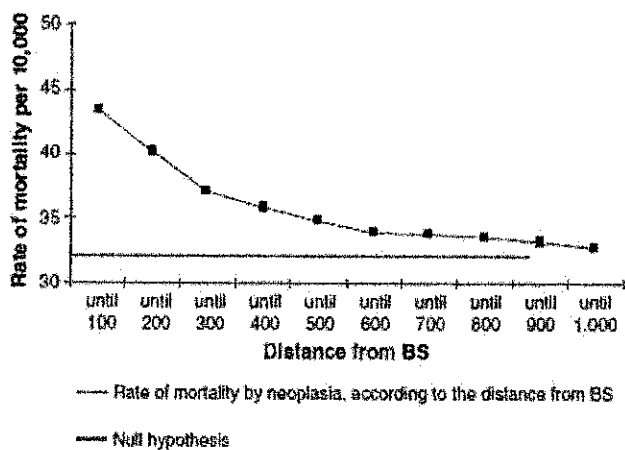
Reviewing the literature in 2016, I found that six out of eight studies that investigated if there was an increased risk of cancer in people living near mobile phone base stations (MPBS) reported evidence for an increased cancer risk. Some of these were detailed by neurosurgeon Dr. Vini Khurana (formerly ANU/Canberra Hospital) in his 2010 review titled "Epidemiological evidence for a health risk from mobile phone base stations"³⁷

Careful analysis of the two studies that did not find an increased risk of cancer near MPBS indicated that errors in methodology may have precluded such observations, i.e. missing an effect that exists. I would be happy to elaborate on these if given an opportunity

Intriguingly, Australia has not undertaken a single study to investigate if people living near RF-EMR transmitters like MPBS have an increased risk of cancer (or other diseases) since ex-Telstra Chief Medical Officer Dr. Bruce Hocking and colleagues conducted their study in the mid 1990s³. This is a national shame considering that there are hundreds of thousands of RF transmitters in close proximity to millions of Australian people. Most notably, **Australia is the nation with the world's highest cancer incidence rate³⁸ (the rate of new cancer diagnosis) out of 185 countries.**

While no one is investigating detrimental cellular effects such as oxidative stress and DNA damage or their consequences like cancer in Australian people, elsewhere academic medical researchers are publishing disturbing findings:

- In a large study conducted in a Brazilian city investigating cancer deaths over 10 years, researchers found a marked increase in cancer death rate near mobile phone base stations (MPBS) as per the graph below. Further, 93.5% of 7191 cancer deaths had occurred within 500m of MPBS. It took 1 km distance from a MPBS for the observed cancer death rate to reduce down to the expected cancer death rate (see graph). Based on their findings, the investigators claimed current ICNIRP public exposure standards (also followed in Australia) is not protective and urged immediate changes. The RF-EMR levels measured in this study varied between 0.4 – 12.4 V/m (4.2×10^{-4} – 0.4 W/m^2), only a small fraction of the levels allowed by the ARPANSA standards. These levels are typical already in Australia and levels near MPBS often exceed these. The city prosecutor took legal action against some mobile operators following this study³⁹.



If the mobile phone base stations had no association on cancer deaths, the researchers expected the flat blue line (null hypothesis), but what they saw was an increasing cancer death rates with proximity to MPBS.

Older studies conducted before everyone in the population became heavily exposed to RF radiation are far more powerful in assessing health risks than newer studies. This is because a study needs a comparison group (negative control) against which it can bench mark the observed effects. Sadly,

the much needed population studies have been delayed so far, that it is almost impossible to derive meaningful data in situ because everyone is exposed to wireless RF radiation.

- A study conducted by independent German GPs in Naila⁴⁰ investigating nearly 1000 newly diagnosed cancer cases during 1994-2004 found cancer risk to be increased by three times if patients lived within 400 m of the city's MPBS compared to the outer area, after five years of its operation. In addition, those who lived within 400m of the MPBS developed cancer at a younger age – by an average 8.5 years. The average age of females in inner area who developed breast cancer was 50.8 years as opposed to 69.9 years in the outer area – nearly 20 years younger. The German national average age for breast cancer at the time was 63 years. The same medical investigators did a subsequent study near a MPBS in another city and found a similar increased cancer risk near it.⁴¹

Similar findings of an increased cancer risk were made in studies by medical doctors and academic researchers without financial conflicts of interest in Israel⁴² and UK⁴³.

Meanwhile, three separate studies by academic researchers in India⁴⁴⁻⁴⁶ have reported increased DNA damage and oxidative stress in health young people (independent of smoking, alcohol intake, diet) who live near MPBS (in different areas) compared to age- and gender-matched controls. Interesting, these toxic effects that increase the risk of cancer were associated with personal mobile phone use as well. A dose-response was also noted in that an increased RF-EMR exposure corresponded to an increased biological damage suggesting a causal association.

Financial Conflicts of Interest are obfuscating research on RF-EMR and the regulation of public exposure in Australia

Financial sponsorship by the wireless industry (which is the case for a large number of studies in this field) has been demonstrated to influence the outcomes of research studies (i.e. reporting less health/biological effects than independent studies)⁴⁷. The Swiss researchers who did the analysis of sponsorship concluded: ***"The interpretation of results from studies of health effects of radiofrequency radiation should take sponsorship into account."***

Despite the ARPANSA claim⁴⁸ that it is an independent radiation regulator protecting the health of Australians from RF-EMR (i.e. independent from wireless industry and other government departments), this claim is NOT supported by the evidence:

- According to the AFP Hansard records of the 2001 Senate Inquiry, ARPANSA has been receiving funding from the mobile & wireless industry (as part of an annual levy collected by the ACMA for health effects investigation since 1997)⁴⁹

Quoting the Hansard records: *"Funding for the whole program has been made available at the rate of \$1 million per year starting on 1 January 1997. Of the \$1 million, \$700,000 goes to the NHMRC for the research program and the remaining \$300,000 covers the involvement in the WHO International EMF Project (\$US50,000 per year) and also the public information program (\$131,000 spent by June 2000)."*

Therefore, both health agencies, ARPANSA and the controversial International EMF Project (IEMFP) at the WHO have been funded by the wireless industry revealing serious financial conflicts of interest (Col). This Col is not monitored by any higher authority. Given that ARPANSA and WHO's IEMFP have clearly ignored/down-played a vast body of scientific research published in peer-

reviewed literature showing evidence of harm, it is reasonable to attribute this conflict of interest to a lapse in a public health protection, similar to what happened with tobacco. Interestingly, this also reveals that the public information ARPANSA disseminates to Australians on the safety of wireless radiation is sponsored by the wireless industry.

- ARPANSA is operating in partnership with the wireless industry:

The information on the ARPANSA website indicates this: *“The 2007 - 2013 survey of mobile phone base station EME levels was carried out by ARPANSA with financial support from the Mobile Carriers Forum (MCF), a division of the Australian MobileTelecommunications Association (AMTA) the peak industry body for the telecommunications industry”* ⁵⁰

Moreover, the suitability of ACMA as the regulator of RF-EMR emissions from wireless infrastructure such as MPBS is questionable when ACMA collects billions of dollars of revenue from the sale of the RF spectrum to the wireless industry, introducing a clear conflict of interest. Would a regulator that financially depend on the same industry that generates RF-EMR put health matters of RF first?

ACMA also regulates media and it is yet to be clarified whether its conflicts of interest have resulted in suppression of independent media reporting on the issue of wireless health risks. For example, in 2016, the ABC retracted a well-researched and professionally conducted piece of scientific journalism – the Catalyst episode “WiFried?” where risks of RF-EMR were investigated. Among the experts interviewed, Prof. Bruce Armstrong, the eminent physician epidemiologist from the University of Sydney who headed the Australian arm of the 13-country INTERPHONE study admitted that there is an increased risk of brain cancer associated with prolonged use of mobile phones. Passing such information to the Australian public is vitally important to reduce their risks by reducing exposure to wireless radiation. However, proponents of the wireless industry (mostly those who have received funding from the same) such as the psychologist head of ACEBR, a sociologist (in public health arena) who has no scientific expertise in RF-EMR and a physicist partnering with ACEBR unfairly criticised and defamed this program and subsequently ABC retracted⁵¹ that episode and stopped the entire Catalyst program. Staff, including prominent science journalist Dr. Maryanne Demasi lost their jobs as a result. This was one example where more qualified experts (such as Prof. Armstrong who was also one of the 30 cancer experts invited by the WHO’s IARC in 2011 to review RF-EMR evidence on cancer) were overcome by apparently more influential “experts” with financial conflicts of interest, not only crushing independent journalism in Australia, but also compromising public health.

ACMA’s regulation of emissions from RF-transmitters is not reliable and risks public health

Importantly, there should be NO further deployment of thousands of new RF radiation emitting antennae for 5G when there is evidence that existing RF emitters are not properly regulated for RF emissions. Although ACMA is commissioned to ‘police’ the wireless industry to ensure all RF antennae that expose Australians to RF-EMR, at least meet the disputed ARPANSA Standard, there is evidence that this regulation has failed. As a consequence, Australians could be at risk. The mysterious breast cancer cluster at ABC’s Toowong studios is my selected example. The expert investigation⁵² recognised that the breast cancer cluster was real, and it was related to some environmental aspect of that building, even though the exact cause was concluded to be unidentified.

There are many gaps in the ABC investigation (some as discussed by Maisch et al ⁵³) and it is questionable why the site was quickly demolished without carrying out a detailed investigation to

find out what exactly was the environmental hazard that caused the cancer cluster. In addition, I note with interest that at RF staff security card readers, the emitted RF-EMR level was exceeding the ARPANSA standard:

"in proximity to security card readers [magnetic (H) fields up to 1.93A/m and electric fields up to 121.3V/m (next highest 37.4 V/m)]. Staff members were concerned that if their hands were full carrying books, bags or equipment, they would bring their chest into close proximity to the card reader and, perhaps, be exposed to intermittent high levels of RF radiation." (page 20 of the expert report).

My questions are:

- How did these card readers emit 121.3V/m when the maximum RF field allowed under the Australian ARPANSA standard is 61V/m?
- What steps did ACMA take to investigate how this breach occurred?
- What steps did ACMA take to make sure similar RF card readers elsewhere weren't emitting RF-EMR at exceedingly high levels like in this example?
- What steps did ACMA take to ensure that other RF emitters such as mobile phone base stations are independently tested for compliance?

Furthermore, after extensively studying the scientific literature on biological effects of RF-EMR, I suspect that unnatural electromagnetic fields, including RF-EMR could be causally linked to the ABC Toowong breast cancer cluster. We cannot rule out that such high RF-EMR exposure, even that briefly occurring on a daily basis, but accumulating considerably over the years, did not contribute to the development of those breast cancers. There is concerning related evidence in the scientific literature. For example, clinicians in the USA have reported unusual multi-focal breast cancers (multiple primary cancers) in healthy young women (without other risks factors) who kept mobile phones tucked in bras for convenience. The cancers were mapped to the location of the mobile phones⁵⁴ However, such important medical case reports are not reportedly even collected by ARPANSA or WHO IEMFP let alone considered in their risk evaluation (they refer to original research articles and reviews only). Moreover, the population studies that have identified an increased breast cancer risk and DNA damage in women who lived near mobile phone base stations (as discussed above) provide further supporting evidence that RF-EMR was a likely causal factor in the ABC Toowong cancer cluster.

I also note that the main source of RF-EMR at the Toowong site was a satellite dish operating at **14 GHz** which is similar to the high frequencies used by **5G**:

"The THL RF Hazard control document¹⁰ indicates that the most prominent RF source is the 7 meter satellite dish on the TV Building rooftop, operating at 14 Ghz. The three VHF Comms 3-metre antennae have high maximum power and operate between 168 and 172 MHz. Overall the RF sources on site cover a wide range of frequencies and power outputs."

It is plausible, that this high RF-EMR exposure at the site, including 5G-like exposure at 14 GHz, contributed to the development of those breast cancers.

I urge this parliamentary inquiry to commission an independent health survey of all the employees at that ABC site in retrospect to assess risks beyond breast cancer. This is a vital step before allowing 5G deployment in Australia. This should be a case-control study with age- and gender-matched controls who have not had such high exposure to RF-EMR. I recommend a credible epidemiologist such as Prof. Bruce Armstrong (now Professor Emeritus, USyd) who headed the Toowong ABC

Cancer Cluster investigation to lead this further inquiry with **independent** academic researchers. This study should be entirely independent of ACMA, ARPANSA and ACEBR personal/researchers who have conflicts of interests due to funding by the wireless industry or by their obligation to defend the ARPANSA/ICNIRP exposure guidelines. It had been determined by the Ethics Committee of Karolinska Institute in Sweden, in response to a complaint by Prof. Olle Johansson that anyone affiliated with the private NGO body ICNIRP should declare their affiliation with ICNIRP as a potential conflict of interest.⁵⁷ This is because the ICNIRP is defending their guidelines for public health protection from non-ionizing radiation including RF-EMR. As ICNIRP guidelines have been adopted by ARPANSA as the Australian standard, both bodies are conflicted, effectively disqualifying both ARPANSA and ACEBR (affiliated with ICNIRP) from any independent inquiries into this matter.

Given the aforementioned situation with regards to a large body of scientific evidence showing biological harm, expert warnings, conflicts of interests in regulation and also the fact that Australia has the world's highest incidence rate of cancer, I strongly oppose any further increases to the Australian population's exposure to RF-EMR with 5G. Our nation's unacceptable level of cancer incidence, which has increased in recent decades indicate that we are poor at controlling factors that cause cancer, should prompt us to investigate RF-EMR as a plausible cause. There is some evidence, as per published studies and my own casual measurements over the years (unpublished data) that levels of RF-EMR exposure in some Australian locations are substantially higher than in many other parts of the world. The graph below from published research⁵⁵ compares outdoor exposure levels in some Australian locations with several other overseas locations.

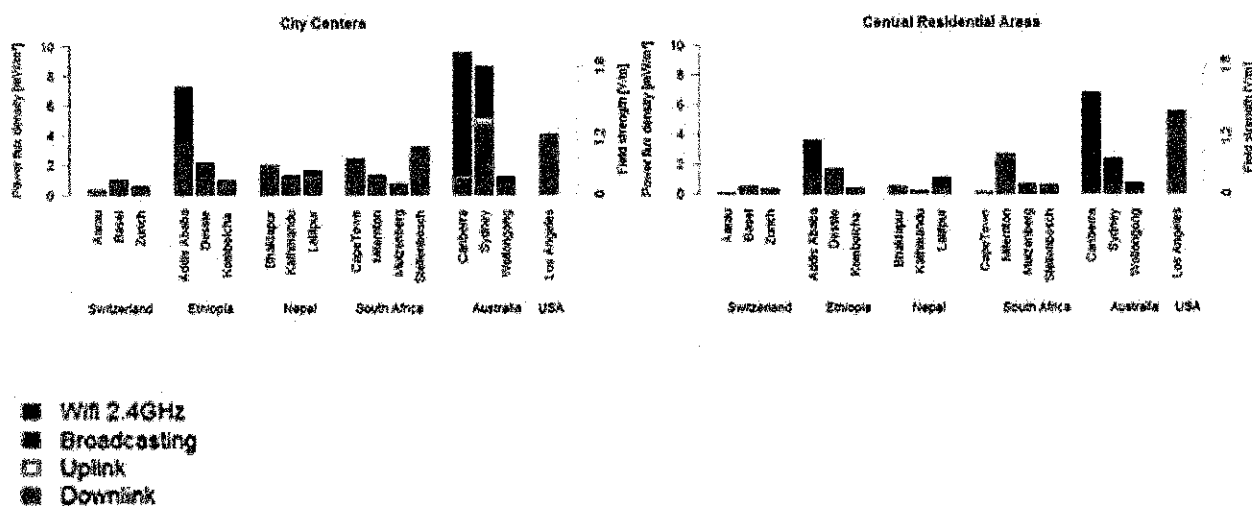


Figure from Sagar S. et al., Environment International, 114, 2018, 297–306

There has been a tremendous push for wireless tech in Australia. Aside from heavily marketed wireless communication devices such as mobile phones, the National Broadband Network (NBN) delivers internet to substantial proportion of the population wirelessly, adding to the RF-EMR exposure levels which could be completely avoided with safer wired options such as fibre. Similarly, the “Digital Education Revolution” has resulted in high RF-EMR exposure in classrooms in Australian schools from constantly emitting WiFi access points and wireless devices. The health risks of such practices involving RF radiation exposure to both mental and physical health of people, including more vulnerable children have been discussed by many medical organisations. I have published a rebuttal on the flawed ARPANSA RF measurement study at schools.⁵⁶

Most critical factor – the ARPANSA standard CAN NOT protect public health!

ARPANSA adopted the guidelines of the small industry-friendly NGO professional body the International Commission for Non-Ionizing Radiation Protection (ICNIRP) in 2002 against the advice of CSIRO and other Australian experts. This inquiry must find out why ARPANSA relaxed the previous more protective Australian exposure standard against the recommendations of the 2001 senate inquiry. ICNIRP and the WHO's IEMFP were both founded by the same person and both entities engage in dubious 'industry-friendly' conduct ignoring a vast body of scientific evidence of biological effects have come under heavy criticism.^{57,58} The WHO's IEMFP by endorsing ICNIRP guidelines has put public health at great risk because ICNIRP guidelines are only based on short-term (acute) heating (thermal) effect, and as such they cannot protect anyone against long-term effects or non-thermal effects. This is a well-known fact, and indeed, it was the explicitly-mentioned reason for the US government to commission its National Toxicology Program to undertake the above-mentioned large study. The biological effects such as oxidative stress^{36,44,45}, DNA damage^{7,46,59} potentially leading to cancer and other disease are non-thermal. ARPANSA regulation is therefore entirely ineffective in public health protection. These are addressed in detail by myself and colleagues at Oceania Radiofrequency Scientific Advisory Association (ORSAA) in important publications^{36,60,61} that this panel must investigate in detail. I freely offer my services to the panel when they get to this phase of the inquiry.

Most surprising – ARPANSA has no medical expertise to deal with this health matter

I find it extremely disturbing that ARPANSA had no medical expertise to assess health impact of wireless technology on millions of Australian people who are subjected to 24/7 exposure to RF-EMR. I urge this inquiry to find out why ARPANSA appointed only 4 individuals to review the vast body of complex scientific literature on RF-EMR biological/health effects⁶² when it should have been conducted by a large panel of multi-disciplinary experts -mostly biomedical experts. The expert team's formal qualifications appear to be limited to physical sciences, psychology and epidemiology. Where was the much-needed biomedical expertise to understand cytotoxic effects such as oxidative stress, DNA damage, mitochondrial damage, altered enzymic functions, effects on voltage-gated ion channels etc. and their consequences related to chronic diseases such as cancer? Is it not ludicrous that Australia's "Review of Radiofrequency Health Effects Research – Scientific Literature 2000 – 2012" had no medical expertise? I brought this matter to the attention of the Chief Medical Officer in 2016 who then asked the head of ARPANSA to answer. However, my question was evaded in a template letter from ARPANSA.

Why did ARPANSA appoint a single person to review⁶² thousands of experimental studies when that is clearly an impossible task? That review was flawed as proven by scientists at ORSAA with evidence presented in publications^{36,60,61}. ARPANSA has subsequently admitted to not doing a proper review as per Karipidis and Tinker, 2018⁶³ and instead relying on similar flawed reports from elsewhere. This unfortunately created the situation where there was no independent expert evaluation of the scientific evidence for the Australian government. Therefore, the alarming reality is, despite the assurances of safety by ARPANSA and the wireless industry, Australia has not properly studied the health effects of wireless radiation and the work done by ARPANSA is flawed and lacking medical expertise. Under these circumstances, it would be a serious offence on the unsuspecting millions of Australians to subject them to even higher levels of RF radiation with 5G deployment which has the