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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

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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 actors[70]. We also observe that claims are often made that 5G hasn't been tested, when in fact we have conducted considerable testing[71] 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.
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> 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 leukaemia[4], reproductive system effects[5,6,8] and DNA damage[7] (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 worlds 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 standard[38]) is based on guidelines first published by ICNIRP in 1998[39]. These guidelines were again reviewed in 2009[40] 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 report[41] 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 2018[42] 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 statement[51] 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 report[11] which received a scathing response[12] 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.