AMTA

Australian Mobile Telecommunications Association

EME Update

Winter 2020

CONTENTS

Update to the international EME health risk assessment

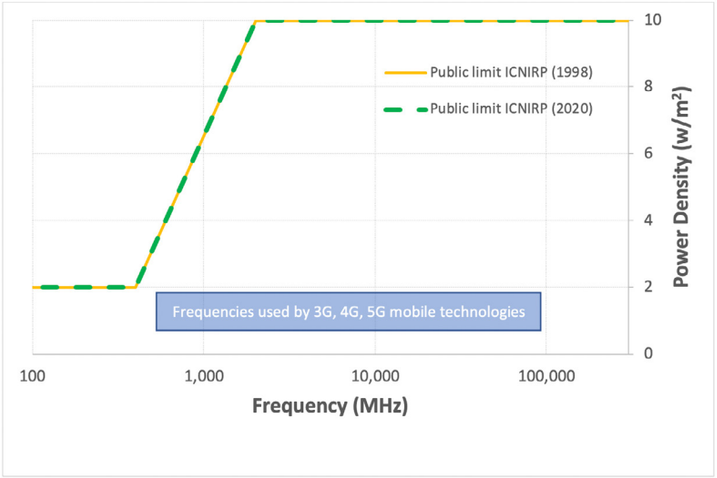
The International Commission on Non-Ionizing Radiation Protection (ICNIRP) 1998 international guidelines form the basis of EME policy in Australia.

In March 2020, ICNIRP revised and updated the EME exposure guidelines. In reviewing the evidence, ICNIRP concluded that there remains no evidence of adverse health effects below the limit values.

Dr Eric van Rongen, ICNIRP Chairman, stated:
'The guidelines have been developed after a thorough review of all relevant scientific literature, scientific workshops and an extensive adverse health effects due to EMF exposure in the 100 kHz to 300 GHz range.'

The review found that claims of EME effects on cancer, reproduction, the immune system, neurodegenerative diseases or other health outcomes could not be 'substantiated.' ICNIRP stresses that the guidelines contain many conservative elements and their conclusion is that '**there is no evidence that additional precautionary measures will result in a benefit to the health of the population.'**

As shown in the chart, there are no changes to the exposure limits relevant to base stations (the shading shows the frequencies used for current mobile and future 5G technologies).



The updated guidelines contain some technical changes including the extension of the frequency range for whole body basic restrictions, changes to limits for exposures to small areas of the body, and new limits for brief (pulse-like) exposures. These refinements take account of advances in modelling of how EME is absorbed by the body.

Dr van Rongen explains that the existing guidelines were conservative in most cases:
'However, the new guidelines provide better and more detailed exposure guidance in particular for the higher frequency range, above 6 GHz, which is of importance to 5G and future technologies using these higher frequencies. The most important thing for people to remember is that 5G technologies will not be able to cause harm when these new guidelines are adhered to.'

The Australian EME standard is maintained by the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA). Dr Carl-Magnus Larsson, CEO, welcomed the updated guidelines and stated that: **'It is reassuring to see the scientific consensus continues to support current standards, which provide strong public protection.'**

ARPANSA will incorporate the new ICNIRP guidelines in a review and update of the Australian EME standard which is currently underway. ICNIRP acknowledges that some people are concerned, and Dr van Rongen hopes that the updated guidelines **'will help put people at ease.'**

False claims link 5G to COVID-19

On 9 April 2020, the World Health Organization (WHO) added the false claim of links between 5G and COVID-19 to its myth busters database of advice to the public. WHO responded to the misinformation stating clearly that 'viruses cannot travel on radio waves/mobile networks' rather the virus 'is spread through droplets when an infected person coughs, sneezes or speaks.'

The WHO move followed a series of attacks on telecommunications infrastructure starting in the UK before spreading to several countries in Europe and also affecting Australia, Canada and New Zealand. According to the Global Mobile Industry Association (GSMA), there were 142 attacks in 10 European countries by early June.

The European telecommunications industry and unions representing workers who had been threatened issued a joint statement calling for action by governmental authorities to fight all false claims about mobile technology and warning:
'The ongoing escalation in misinformation and attacks against workers is absolutely unacceptable. In the long term, it also threatens Europe's ability to leverage the 5G technology in supporting current and future jobs.'

Professor Brendan Murphy, Australia's Chief Medical Officer, the Hon Paul Fletcher MP, Minister for Communications, Cyber Safety and the Arts, both issued statements in line with the WHO myth buster. Professor Murphy called the 5G claims 'complete nonsense' and Minister Fletcher said:
'Any suggestions that there is a link between 5G and coronavirus are utterly baseless.'

He continued to say: 'Causing damage to mobile phone networks can cut vital connectivity, risking serious harm, even death, if a person is unable to contact Triple Zero.'

Mr Chris Althaus, CEO of Australian Mobile Telecommunications Association (AMTA), said:
'All generations of mobile technology including 5G, have a major role to play in enabling Australians to stay as connected as possible as well as enabling industries to be more productive and efficient in order to respond to this health emergency.'

According to Wired the claim of a 5G link to COVID-19 was first made by a Belgium doctor in an interview in a local paper in January. From there it spread among anti-5G Internet groups before being amplified on social media.

The UK regulator, Ofcom, reported in April 2020 that 50% of respondents to a survey on sources of news and information had seen theories falsely linking 5G to COVID-19. The false claims were even repeated on UK broadcast media leading to enforcement action by Ofcom. Both Twitter and Facebook announced action to curb the spread of misleading and potentially harmful content.

The 5G false claims are part of a what the WHO labelled an 'infodemic' of misinformation and cybercrime during the COVID-19 crisis. Antonio Guterres, United Nations Secretary General, described the infodemic as 'our enemy' and called for urgent work to 'promote facts and science, hope and solidarity over despair and division.'

5G Parliamentary Inquiry – 5G is safe and transformative technology

The report of the House of Representatives Communications and the Arts Committee 5G inquiry was tabled in Federal Parliament earlier this year on 12th May and concludes:

'The capabilities of 5G are exciting, and offer the opportunity for innovation and connectivity. We are at a point where enough is known about the standards and safety of 5G technology to allow businesses of all sizes, communities, governments and individuals to imagine new use cases and new opportunities and help them come into being.'

Dr David Gillespie, Committee Chair, reflected on the vast amount of misinformation about 5G safety and addressed concerns about 5G EME in his Parliamentary statement: 'Due to technological qualities of 5G, beamforming and network slicing, and multiple input and multiple output technologies involved in 5G, the amount of energy that is received is actually lower than 4G, which is lower than 3G, and it is safe.'

The Inquiry had broad terms of reference and received over 550 submissions and exhibits. It held public hearings across Australia in NSW, Queensland, Victoria, South Australia, Western Australia and Canberra.

Many of the submissions addressed concerns about 5G EME exposure. The Committee noted that 'new technology can be complex to understand, and that members of the community may be unsure of its safety.' It received submissions from several government agencies, including the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) who said: **'ARPANSA's assessment is that 5G is safe.'**

The Committee heard that 5G is expected to provide the 'underlying architecture that will enable the next wave of productivity and innovation across different sectors of the Australian economy.'

The joint Australian Mobile Telecommunications Association (AMTA) and Communications Alliance submission pointed out that the mobile industry directly contributed $8.2 billion to the Australia economy in 2017-18 and directly employed almost 25 000 FTE people. The submission also highlighted Bureau of Communications and Arts Research that conservatively forecasts a $1300-2000 per person benefit to GDP after the first decade of a 5G roll-out in Australia.

The report includes 14 recommendations covering speedy allocation of spectrum, improvements to the rules for antenna deployment, expansion of 5G trials and better consultation with members of the public concerned about 5G.

Mr Chris Althaus, CEO of AMTA, said: **'The mobile telecommunications industry looks forward to working with the government on consideration of the Report's recommendations to ensure the right regulatory environment and essential 5G mobile infrastructure is in place to enable all Australians, including those in rural and regional Australia, to benefit from the productivity and connectivity 5G will enable.'**

In December 2019, the Minister for Communications, Cyber Safety and the Arts, Paul Fletcher MP and Minister for Aged Care and Senior Australians, Senator Richard Colbeck, announced $9 million for research and information in order to 'build public confidence in the safety of telecommunications networks – including new 5G mobile networks.'

Experts say no health risks are expected from 5G

Over the past few months many authorities have stated that no health risks are expected from 5G networks or devices operated in compliance with current safety guidelines.

World Health Organization

The World Health Organization (WHO) explains that 5G is expected to enhance performance and support new applications, including strengthening e-Health.

WHO points out that the higher frequencies planned for 5G are new to mobile networks but commonly used for point-to-point radio links and body-scanners for security checks. They confirm: 'To date, and after much research performed, no adverse health effect has been causally linked with exposure to wireless technologies.' WHO plans to publish a health risk assessment for all radiofrequencies, including 5G, by 2022.

Australia

Professor Brendan Murphy, Australia's Chief Medical Officer, issued a statement on the safety of 5G technology to **'reassure the community that 5G technology is safe.'**

He explained that wireless networks use low-powered radio waves and the 'radio waves to which the general public is exposed from telecommunications are not hazardous to human health.'

The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) sets the standard for EME limits to protect people and the regulatory framework of the Australian Communications and Media Authority (ACMA) ensures that telecommunications technologies, including 5G, comply with the ARPANSA standard.

European Commission

In preparation for new regulations aimed at harmonising the rules for small cell deployment, the European Commission addressed exposure from 5G networks: **'The existing scientific evidence on electromagnetic field exposure confirms that 5G networks will not cause more electromagnetic emissions than it is allowed. This means that 5G will not have a negative effect on people's health.'**

Across the Europe Union, there is a non-binding exposure limit recommendation based on the international guidelines. However, setting exposure limits is a member state public health competency and there are differences in a minority of member states. The new European Electronic Communications Code, which comes into effect in late 2020, makes several reference to the European exposure recommendation.

The European Commission reminds countries that: 'The European Electronic Communication Code calls for consistency and predictability throughout the Union regarding the way the use of radio spectrum is authorised while protecting public health and at the same time ensuring more consistent deployment conditions for 5G across the Union.'

Poland announced adoption of new EME limits based on the international guidelines effective from 1 January 2020 and Lithuania from 5 March 2020. Previously, both countries had used more restrictive limits derived from former Soviet standards.

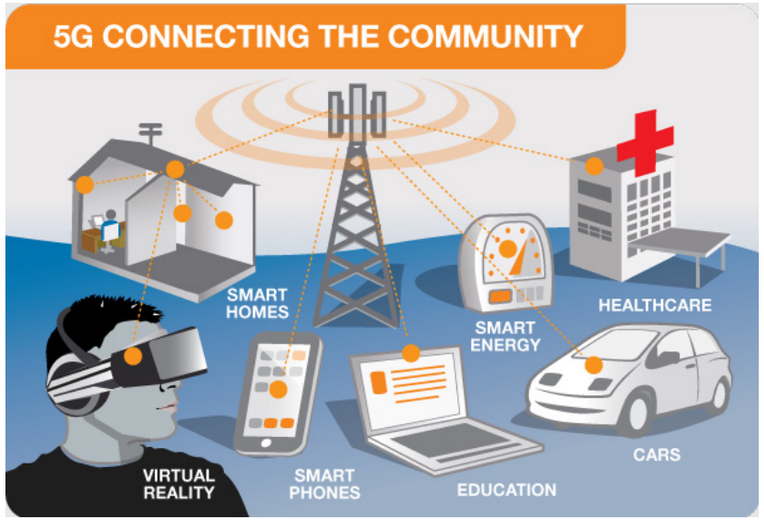
New Zealand

The Office of the Prime Minister's Chief Science Advisor produced an information sheet titled 5G in Aotearoa New Zealand that describes the technology, potential benefits and possible health concerns.

On the question of cancer, the Chief Science Advisor says: 'The clear conclusion reached internationally, supported by health authorities in New Zealand, is that exposure to this type of radiation at levels experienced in New Zealand is not hazardous.'

5G levels similar to existing wireless technologies

Assessments of 5G networks in Australia, Belgium, France, the Netherlands and the UK show similar levels to existing wireless technologies confirming that EME levels will remain well below safety guidelines as 5G is deployed.



Australia

Telstra has conducted measurements on both trial and commercial 5G deployments reporting that all levels were 'well below the safety limits, and in many cases over a thousand times lower.' These levels were found to be similar to 3G, 4G and Wi-Fi.

One of the technologies that will get expanded use in 5G is beam steering making use of multiple-input multiple-output (MIMO) antennas. These antennas are already used in 4G to improve capacity by switching the antenna beam to focus the signal on active users.

A novel Australian experiment showed the size of the base station safety zone was overestimated by at least a factor of two when determined by the conventional approach of assuming continuous site transmission rather than the real 'intermittent, random like behaviour' of the active MIMO antenna beams.

Belgium

A study simulating EME exposure from a 5G network compared to a reference 4G network found that the 5G network produced five times lower exposure from the network antennas while providing the same user coverage due to the use of advanced MIMO antennas.

France

The French National Frequency Agency (ANFR) conducted 5G EME measurements at 43 pilot sites operating in the 3.5 GHz band. The measurements included both situations of no subscriber activity and using controlled traffic quantities. This was used to define an indicator of the average EME exposure for 5G base stations with active antennas.

The analysis showed that the 5G active antenna will only transmit in a given direction for about 15 seconds in any 6 minute measurement period – about 4% of the time. As a consequence ANFR estimates that the predicted levels of indoor radio signals for 4G and 5G sites will be similar.

The Netherlands

The Telecom Agency conducted measurements on 5G network antennas in both the 3.6 GHz and 26 GHz bands. All measured levels were well below the international limits and also below the stricter limits in some European countries, such as Italy.

A report by RIVM (the Dutch National Institute for Public Health and the Environment) observed that initial measurements and calculations for 5G systems showed levels below the international limits and concluded that 'the available scientific literature does not provide evidence that exposure below the limits is harmful.'

The UK

Telecommunications regulator, Ofcom, reported measurements at 22 locations in 10 cities across the UK, including Belfast, Cardiff, Edinburgh and London. They selected locations where high levels of mobile phone use were expected and measured both the existing mobile services and the contribution from 5G.

The maximum level for all mobile services was 1.5% of the public limit values with the highest 5G contribution just 0.039% of the limit. Ofcom notes that 5G take-up is at an early stage in the UK and they will continue the program of measurements. Ofcom has been undertaking mobile network measurements for many years and the results have consistently been 'well within the internationally agreed levels published in the ICNIRP Guidelines.'

Reviews from Sweden and the United States find no reason to change safety guidelines

A report from the US Food and Drug Administration (FDA) and an expert group advising the Swedish Radiation Safety Authority (SSM) find no credible scientific evidence for a reason to change current safety guidelines.

USA

In February 2020, the FDA technical report was published, examining around ten years of peer-reviewed animal and epidemiological (human population) studies.

Between 2008-2019, there were 70 relevant epidemiological studies and while some studies suggest a possible link between 'heavy' use of mobile phones and some tumours, overall 'no clear and consistent pattern... has emerged from these studies and these studies were subject to flaws and inaccuracies.'

For the animal studies the FDA reviewers identified 125 articles concluding that 'none have adequately demonstrated that localized exposure of RFR [radiofrequency radiation] at levels that would be encountered by cell phone users can lead to adverse effects.'

An associated FDA page on the scientific evidence for mobile phone safety concludes: **'To date, there is no consistent or credible scientific evidence of health problems caused by the exposure to radio frequency energy emitted by cell phones.'**

Additionally, in regard to 5G, the FDA notes: 'While many of the specifics of 5G remain ill-defined, it is known that 5G cell phones will use frequencies covered by the current FCC exposure guidelines (300 kHz-100 GHz), and the conclusions reached based on the current body of scientific evidence covers these frequencies. The FDA will continue to monitor scientific information as it becomes available regarding the potential impacts of 5G.'

The US exposure guidelines are mandated by the Federal Communication Commission (FCC) and are broadly consistent with the Australian EME standard. Based on the FDA analysis, the FCC decided to keep the US safety guidelines unchanged.

Sweden

In April 2020, the Scientific Council for Electromagnetic Fields published its 14th report for SSM. 'The report does not identify any new health risks linked to the EMF. Whether or not cell phones cause brain tumours has been investigated for many years in a large number of epidemiological studies. An overall assessment is that there is no relationship. The increases in the number of cancer cases reported, especially with regard to the most serious cancer type glioma, can probably be explained by changes in diagnostics and tumour classification.'

Wireless device use by children was a key topic examined by the Scientific Council.

Observing that the strongest effects were reported for activities with low exposure, such as text messaging, they concluded that 'it seems clear that other reasons than radio wave exposure primarily causes the association' and point to patterns of use. The report recommends more research in the new 5G frequency bands even though **'there is no established mechanism for affecting health from weak radio wave exposure.'**

US expert committee examines health and safety issues on electromagnetic fields

The Committee on Man and Radiation (COMAR), has published a review paper on the safety of 5G in the peer reviewed scientific journal Health Physics.

The US expert committee is a group of experts on health and safety issues related to electromagnetic fields, from powerline through microwave frequency ranges and beyond. It is a Technical Committee of the Institute of Electrical and Electronics Engineers (IEEE). COMAR's primary area of interest is biological effects of non-ionizing electromagnetic radiation, examining and interpreting the biological effects and presenting its findings in respected scientific journals.

COMAR's latest publication reviews the available literature on health effects related to all 5G but focussing in particular on millimetre wave frequencies (MMW). It considers exposure from both personal devices and from mobile network infrastructure, noting that personal device exposure will always dominate any other kind of exposure to the general public. For MMW which will become more dominant in future 5G deployments, COMAR also considers the more widespread use of small cells to provide coverage to users.

While there aren't any commercially mature 5G networks in operation currently, and typical public exposure to these networks in the future cannot currently be measured, COMAR was able to estimate future exposure based on known technical details and concludes 'exposures from 5G networks will not differ greatly from those associated with present generation networks. In fact, most 5G systems transmitting millimeter waves will operate with only a few watts of power'.

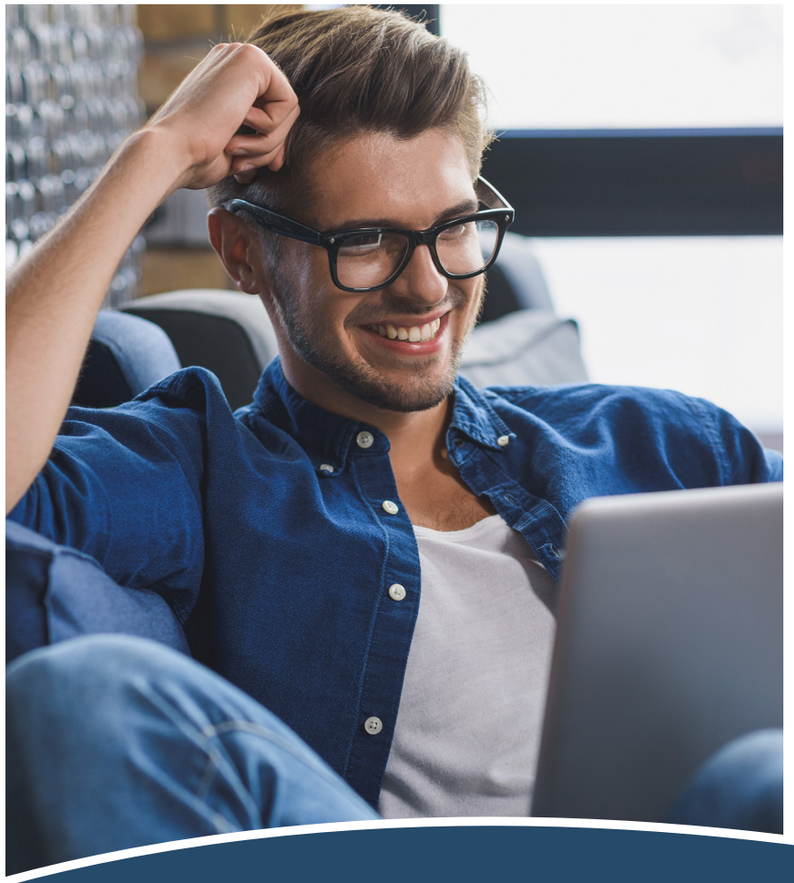
In terms of potential health effects from exposure to millimetre wave, COMAR note the deposition of RF energy is confined to the outermost layers of the body. The scientific literature relating to the exposure of skin and eyes to EME is therefore the most relevant, and clearly shows that levels far in excess of the international safety limits are required to produce any noticeable effect.

COMAR summarise their review: 'First, unlike lower frequency fields, MMW do not penetrate beyond the outer skin layers and thus do not expose inner tissues to MMW. Second, current research indicates that overall levels of exposure to RF are unlikely to be significantly altered by 5G, and exposure will continue to originate mostly from the "uplink" signals from one's own device (as they do now). Third, exposure levels in publicly accessible spaces will remain well below exposure limits established by international guideline and standard setting organizations, including ICNIRP and IEEE. Finally, so long as exposures remain below established guidelines, the research results to date do not support a determination that adverse health effects are associated with RF exposures, including those from 5G systems.'

'COMAR concludes that while we acknowledge gaps in the scientific literature, particularly for exposures at millimeter wave frequencies, the likelihood of yet unknown health hazards at exposure levels within current exposure limits is considered to be very low if they exist at all.'

The COMAR review paper is available at this link:
https://journals.lww.com/health-physics/Abstract/9000/IEEE_Committee_on_Man_and_Radiation_COMAR.99768.aspx

Wireless signals unable to cause direct genetic damage



Researchers from the University of Basel, Swiss Federal Institute of Technology and IT'IS Foundation (all in Switzerland) and Fraunhofer Institute for Toxicology and Experimental Medicine (Germany) conducted a systematic assessment of the potential for wireless signals to directly impact DNA or DNA repair.

The joint study found **'no conclusive evidence'** of direct genetic damage nor alterations of the DNA repair capacity in cells exposed to wireless communication signals.

The experiments were independently conducted at laboratories in Switzerland and Germany, using identical cell lines, standardized experimental methods and the same exposure systems.

The wireless technologies used included GSM, 3G, Wi-Fi and Radio-Frequency Identification (RFID). Many of the exposures used levels corresponding to the limit values for mobile phones and some used exposures two-and-half times higher than the limit.

More than 40 exposure conditions were tested, and none produced statistically significant evidence of direct DNA damage nor conclusive evidence of changes to DNA repair. They were also unable to confirm previous reports that GSM signals could cause genetic damage.

The researchers concluded that the results show radio signals can't cause cancer through direct DNA damage, but they are not able to exclude the possibility of other indirect effects.

World Cancer Report finds that potential phone cancer risk is ‘small’ for individuals

The latest World Cancer Report from the World Health Organisation (WHO) and the International Agency for Research on Cancer (IARC) reveals that most population studies do not indicate that EME can cause cancer and that any undetected risk is ‘small from an individual perspective.’

World Cancer Report

On 4th February 2020, the 20th anniversary of World Cancer Day, the fourth edition of the World Cancer Report: Cancer Research for Cancer Prevention was published, examining the latest trends in cancer incidence worldwide and providing wide-ranging insights into cancer prevention.

Within the report, Dr Dominique Laurier (International Commission on Radiological Protection, France) and Dr Martin Röösli (ICNIRP, Switzerland) state: ‘Most of the epidemiological research does not support an association between mobile phone use and tumours occurring in the head, which is the body part with the highest exposure to radiofrequency electromagnetic fields. In studies reporting positive associations, it is difficult to exclude various forms of bias, such as recall bias in retrospective exposure assessment.’

Considerable research has been unable to identify how radio signals could cause cancer and as most of the epidemiological studies do not show a risk increase, ‘this implies that any potentially undetected risk is expected to be small from an individual perspective.’

They say that for base stations, ‘transmitters will rarely be a relevant exposure source for adults who at least occasionally use wireless communication devices.’

Given that the possible undetected risk is small and most exposure comes from mobile phone use, they say **‘the simplest and most effective precautionary measure is to hold the mobile phone away from the body during transmission; this will result in a substantial reduction in exposure.’**

Australian cancer trends reassuring

A study lead by the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) in partnership with the University of Auckland, Monash University and the University of Wollongong, looked at brain cancer diagnoses in Australians aged 20-59 between 1982 and 2013.

The original analysis in December 2018 and further analysis in 2019 found **'no link between mobile phones and brain cancer across all age groups.'**

Dr Ken Karipidis, Assistant Director ARPANSA, said:

'It shows that there has been no increase in brain cancer rates in Australia that can be attributed to mobile phone use.'

IARC Re-evaluation of radio signals

In 2011, an IARC working group classified radio signals as Group 2B – possible human carcinogen based on limited evidence that wireless phones may increase certain types of brain tumours. Since that evaluation, some researchers argue that the evidence of a hazard is stronger, while others interpret the evidence as weaker.

In March 2019, an Advisory Group met to recommend agents for evaluation in the period 2020-2024. Of the 170 candidate agents, radio signals were among 38 possibilities recommended for re-evaluation. The report of the meeting explains that the epidemiological evidence for radio signals remains 'mixed' with new studies expected to report in the next few years. Radio signals were placed in the group 'high priority' and proposed for re-evaluation in the second half of the 2020-2024 period when new data would be available.

The IARC Council will consider the Advisory Group recommendations when selecting agents for future assessments. Selection will also be subject to agreement between IARC and the WHO headquarters that any re-evaluation does not duplicate work or present a risk of 'contradictory evaluations across the hazard identification [IARC] and risk assessment [WHO] programmes.'

The IARC Monographs program typically evaluates two or three agents per year. Radio signals were first nominated for IARC review in 1998, but the actual evaluation only happened in May 2011 when the results of large-scale epidemiological studies became available.

Sleep is affected by mobile phone use not radio signals

A study involving more than 44,000 mobile phone users from Finland and Sweden found the top 10% of phone use was associated with sleep disturbance, this was not due to radio signals but rather other aspects of phone use.

The analysis was part of the Cohort Study of Mobile Phone Use and Health (COSMOS) study – an international study involving about 300,000 mobile phone users designed to investigate the possible health effects of long-term use of mobile phones and other wireless technologies.

To help overcome limitations of previous studies that relied on participants to remember their past mobile phone use over many years, the COSMOS researchers also collected operator data on call time.

The sleep study used both the operator data and participant's own information on the use of handsfree kits to assess mobile phone exposure. Additionally, operator data was available separately for time on 2G and 3G networks. A self-reported sleep questionnaire was also completed when participants joined the study and again after four years.

At baseline there was no association between operator records of call time and sleep disturbance. However, at the four-year follow-up, increased insomnia was reported among the top 10% of call time participants. When the analysis was adjusted for the lower exposure from 3G compared to 2G, the evidence was weaker. There was also almost no difference when the use of handsfree kits, which reduce exposure to the head, was considered.

The researchers conclude that **'findings from this study do not support the hypothesis that RF-EMF [radiofrequency electromagnetic field] exposure from mobile phone use has long-term effects on sleep quality.'**

They suggest that the insomnia findings could be linked to other aspects of mobile phone use such as stress, displacement of sleep by taking calls at night, exposure to blue light at bedtime or other behavioural factors.

Government agencies focus on EME compliance for small cells

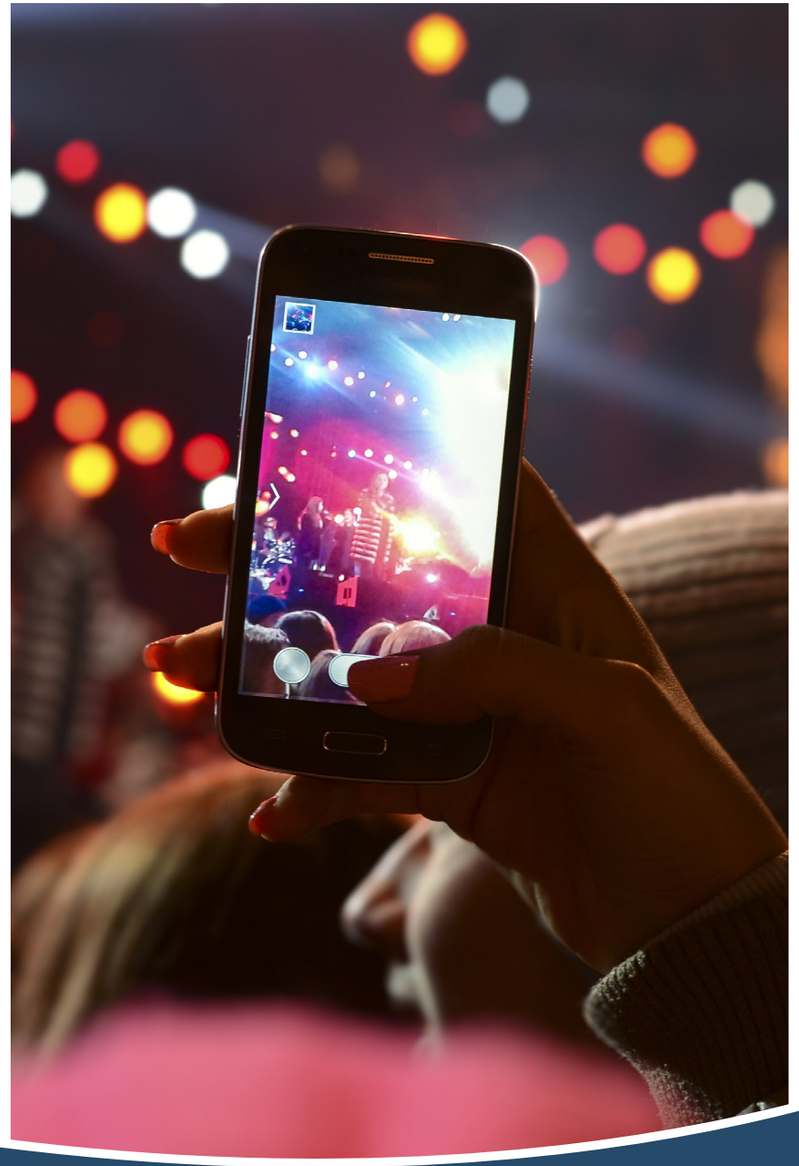
The Australian Communications and Media Authority (ACMA) is responsible for making sure people, equipment and devices comply with safe EME limits - consistent with the limits set by The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA).

ACMA recently released results of its small cell EME audit program which included field measurements near 59 small cell installations in various locations throughout Australia. The measurements were conducted on existing 4G small cell installations in early 2020, as part of a small cell compliance program which was identified in the ACMA's compliance priorities for 2019-20.

The results show that for all 59 small cell sites visited nationally, the EME levels were found to be very low, with EME levels in publicly accessible areas less than 1% of the Australian Standard exposure limit for the general public. The highest level recorded anywhere was just 0.737 per cent of the ARPANSA limit (i.e. over 135 times below the safety limit).

The results also show that for all small cell sites visited, the average EME levels were below the calculated EME levels recorded in the carrier's corresponding EME environmental report (see next page). All of the measurements were taken in publicly accessible areas, so that the audit demonstrates that the public exposure levels from small cell sites is extremely low.

ACMA notes the measurement program will continue into 2020–21. The full report on the measurement program can be found here: https://www.acma.gov.au/publications/2020-06/report/eme-measurements-near-small-cell-base-stations



Updated Environmental EME Report for small cells

The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), produced an updated Environmental EME Report specifically designed to improve the presentation of information for small cell base stations.

The report provides a summary of levels of radio frequency EME in the area close to a given small cell base station. These levels are calculated by the carriers using methodology developed by ARPANSA. A document describing how to interpret this report can be accessed here: A Guide to the Environmental Report.

In Australia, the Industry Code of Practice that governs the deployment of mobile telecommunications base stations requires that carriers or their consultants produce an Environmental EME Report as part of the consultative process with the local community and local government authority.

The small cell Environmental EME Report provides separate estimates of EME levels for both the existing and proposed technologies. For small cells, which can be mounted on light and power poles or other structures, the EME report shows the maximum level and the distance where this occurs.

As reported in the Australian Mobile Telecommunications Association (AMTA) EME Update December 2019 measurements at 295 points near 98 small cells in three countries showed that the typical level was about 0.6 V/m, more than 4,000 times below the public exposure limit for mobile communication signals.

The calculation method is intended to be conservative and ARPANSA says that: 'Measurements around base stations have shown actual values of EME are usually less than calculation by factors of 10 to 1000 or even more. Values of EME indoors will typically be even lower as walls, windows and roofs absorb or reflect the energy.'

The Environmental EME Report also provides for a table of calculated EME levels at other areas of interest. This can be used to include specific calculations for nearby buildings or places of particular community interest.

ARPANSA also says that these estimates are 'overconservative' for advanced antenna systems using multiple-input and multiple-output (MIMO), which will become more common for 5G.

Environmental EME Report for small cells

A snapshot of calculated EME at street level

The maximum EME level calculated for the existing system at 1.5m above ground is **0.46%** out of 100% of the public exposure limit, 20.0m from the location

The maximum EME level calculated for the proposed changes at 1.5m above ground is **1.0%** out of 100% of the public exposure limit, 21.5m from the location

Radio systems at the site

Existing transmitting equipment is listed under the existing configuration. Proposed includes the final configuration after modifications are complete.

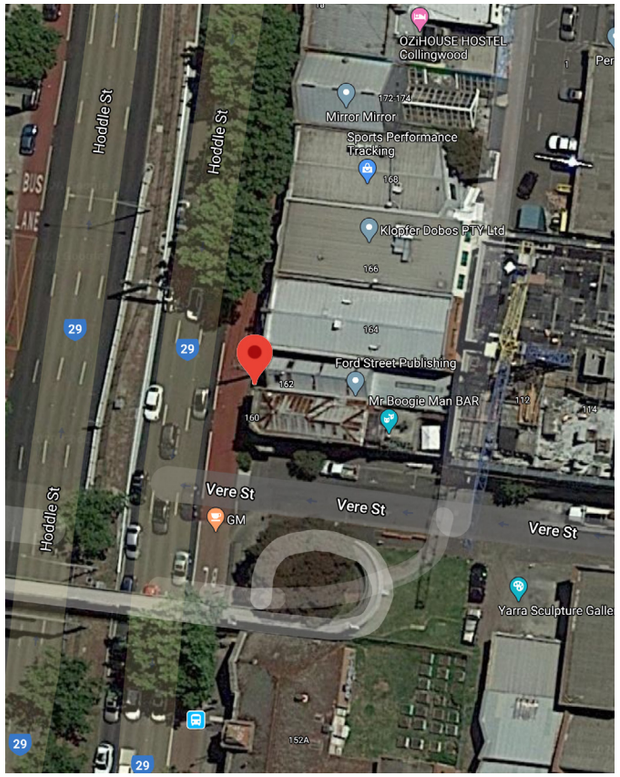
	Existing		Proposed	
Carrier	**Systems**	**Configuration**	**Systems**	**Configuration**
e.g. Optus	2G,3G	WCDMA8500, LTE1800	4G	WCDMA850, LTE1800, LTE700

Calculated EME levels at other areas of interest

This table contains calculations of the maximum EME levels at selected areas of interest, identified with regard to the consultation requirements of the Communications Alliance Ltd Deployment Code C564:2018 or other means. Calculations are performed over the indicated height range and include the proposed radio systems for this site.

Maximum cumulative EME level for the proposed configuration

Location	Height range	Percentage of the pubic exposure limit
ABC Primary School	0 - 6m	0.29%
123 Sports Centre	0 - 6m	0.23%



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