

Amendment to electromagnetic energy (EME) arrangements

Proposal to make the Radiocommunications (Electromagnetic Radiation – Human Exposure) Amendment Standard 2020 (No. 1)

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Canberra

Red Building
Benjamin Offices
Chan Street
Belconnen ACT

PO Box 78
Belconnen ACT 2616

T +61 2 6219 5555
F +61 2 6219 5353

Melbourne

Level 32
Melbourne Central Tower
360 Elizabeth Street
Melbourne VIC

PO Box 13112
Law Courts
Melbourne VIC 8010

T +61 3 9963 6800
F +61 3 9963 6899

Sydney

Level 5
The Bay Centre
65 Pirrama Road
Pyrmont NSW

PO Box Q500
Queen Victoria Building
NSW 1230

T +61 2 9334 7700 or 1800 226 667
F +61 2 9334 7799

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Written enquiries may be sent to:

Manager, Editorial Services
PO Box 13112
Law Courts
Melbourne VIC 8010
Email: info@acma.gov.au

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Executive summary

The Australian Communications and Media Authority (ACMA) is proposing to amend the Radiocommunications (Electromagnetic Radiation – Human Exposure) Standard 2014 (the ACMA Standard) to put appropriate supply requirements in place for devices operating above 6 GHz.

The ACMA Standard sets exposure limits for emissions from mobile stations (that is, radiocommunications transmitters established for use in motion or portability) with integral antennas, and specifies limits and the test method a supplier must follow to determine the specific absorption rate (SAR) or radiofrequency fields associated with a device.

The impending rollout of 5G deployments in the mmWave bands¹ will require handsets to operate on frequencies above 6 GHz. Currently, there are no finalised international standards on assessment methods for devices operating above 6 GHz that are used in close proximity to the head or body.

Currently, the electromagnetic energy (EME) of devices operating above 6 GHz that are used in close proximity to the head or body is regulated through licence conditions and is the responsibility of the licensee.

The ACMA is proposing to amend the ACMA Standard to adopt a technical report to ensure that devices operating above 6 GHz will be covered by device supply arrangements equivalent to that for equipment operating below 6 GHz, including placing regulatory obligations on the Australian supplier of the devices.

¹ mmWaves span 30 GHz to 300 GHz (that is, a wavelength of 1 cm to 1 mm), however, in the current 5G context, mmWave bands in consideration span from around 24 GHz up to 86 GHz.

Issue for comment

This consultation paper does not ask specific questions. However, the ACMA welcomes comment from interested stakeholders on the issues raised in this consultation paper or any other issues relevant to the amendment of the ACMA Standard.

Background

EME regulatory arrangements

The ACMA regulates human exposure to radiofrequency electromagnetic energy (EME) emissions from equipment (such as mobile telephone handsets) and radiocommunications facilities (such as mobile telephone base stations) through:

- > regulatory arrangements for transmitters defined as mobile stations at the point of supply to the Australian market, including testing, labelling and record-keeping obligations
- > licence conditions on the operation of radiocommunications transmitters.

The objective of the arrangements is to ensure that public exposure to EME from radio transmitters does not exceed the Australian exposure limits published by the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA).

Amendment details

ACMA Standard

The ACMA Standard is made under subsection 162(1) of the *Radiocommunications Act 1992* (the Act) and mandates Australia/New Zealand and international test method standards. These standards comprise measurement methods that are used to determine the exposure limits for emissions from mobile stations (that is, radiocommunications transmitters established for use in motion or stationary at unspecified locations) with integral antennas. They enable a supplier to measure the specific absorption rate (SAR) or the strength of radio frequency fields associated with a device.

The ACMA Standard adopts the EME exposure limits specified by ARPANSA in the [Radiation Protection Standard for Maximum Exposure Levels to Radiofrequency Fields — 3 kHz to 300 GHz](#) (the ARPANSA Standard) and currently mandates the following Australia/New Zealand and international test method standards.

For devices used in close proximity to the human ear:

- > EN 62209-1 and IEC 62209-1—Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices. Human models, instrumentation and procedures. Part 1—Procedure to determine the SAR for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 6 GHz).

> Add IEC/IEEE 62209 1528 UNIFIED standard (merges 62209-1 & -2): This is in final stage and not a published standard yet

> Add EN and IEC/IEEE 62209-3: Vector array systems (published IEC/IEEE standard)

For devices used 20 cm or less from the human body:

- > EN 62209-2 and IEC 62209-2—Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices. Human models, instrumentation and procedures. Part 2—Procedure to determine the SAR for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz).

> Add IEC/IEEE 62209 1528 UNIFIED standard (merges 62209-1 & -2): This is in final stage and not a published standard yet

Add EN and IEC/IEEE 62209-3: Vector array systems (published IEC/IEEE standard)

For devices used more than 20 cm from the human body:

- > AS/NZS 2772.2—Radiofrequency fields: Principles and methods of measurement and computation—3 kHz to 300 GHz.

EN 62209-1 is a European Union (EU) harmonised standard based on the International Electrotechnical Commission's (IEC) standard IEC 62209-1. Similarly, EN 62209-2 is an EU-harmonised standard based on IEC 62209-2.

Given that combined standard of IEC/IEEE are being rolled-out, I recommend adding FCC standards (based on IEEE) as an accepting methodology for compliance with Australian EME requirements

The impending rollout of 5G deployments in the mmWave bands will require handsets operating on frequencies above 6 GHz. Currently, there are no finalised international standards on assessment methods for devices operating above 6 GHz that function in close proximity to the ear or body and the EME requirements are specified in licence conditions.

The International Electrotechnical Commission (IEC) TC106 Committee has a joint project underway with the Institute of Electrical and Electronic Engineers (IEEE) to develop a joint international standard (IEC/IEEE 63195-1) for assessment of human exposure from wireless devices operating in close proximity to the head and body in the frequency range 6 GHz to 300 GHz.

In 2018, the IEC committee TC-106 developed and published the following test methods:

- > **IEC TR 63170:2018** – Measurement procedure for the evaluation of power density related to human exposure to radio frequency fields from wireless communication devices operating between 6 GHz and 100 GHz.

IEC TR 63170 is a technical report that describes measurement techniques and test approaches for evaluating the local and spatial average incident power density of wireless devices operating in close proximity to the user between 6 GHz and 100 GHz.

Consideration of options

The ACMA has considered options for accommodating measurement methods for devices above 6GHz. The ACMA has also considered delaying change until the international standard is finalised but considers that this approach does not provide appropriate regulatory protection for users of these devices in the interim. The options for change considered by the ACMA are discussed below.

Option 1: amend the ACMA standard to incorporate the technical report (IEC TR 63170)

As the IEC/IEEE 63195 standard is still under development, the ACMA could amend the ACMA Standard to adopt IEC TR 63170 as a measurement method. This will ensure that there are device supply requirements for devices operating between 6 GHz and 100 GHz in the interim period before the international standard is finalised. For devices operating on frequencies above 100 GHz, the existing licence conditions continue to place EME obligations on the use of the devices.

Adopting IEC TR 63170 into the ACMA Standard will give manufacturers and importers clear guidance on measurement methodologies for assessing their device against the ARPANSA limits, and place EME obligations on the Australian supplier of the devices.

Adopting a technical report is a departure from the ACMA's normal approach of adopting international standards once they have been finalised. In this case, the speed with which technological development is occurring means that devices operating in close proximity to the ear or body above 6 GHz may be available in Australia before the international standard is finalised.

Adopting the technical report is proposed as an interim measure until the international standard is available. At that time, the ACMA will undertake its usual process to consider whether to adopt the international standard, including consulting with interested parties.

Below is an example to highlight the effect of the proposed amendment.

Example of option 1:

The Australian supplier of a radiocommunications transmitter (a mobile station with an integral antenna, used in close proximity to the head) that operates on both 3.5 GHz and 28 GHz will need to ensure the transmitter is assessed against the limits in the ARPANSA Standard, using:

- > IEC 62209-1 or EN 62209-1 or UNIFIED standard or 62209-3 for frequencies below 6 GHz
- > IEC TR 63170 for frequencies above 6 GHz.

If the same transmitter only operated on 28 GHz, then the device would only need to be assessed against the ARPANSA Standard using IEC TR 63170.

Alternatively, if the transmitter only operated on 3.5 GHz, then it would only need to be assessed against the ARPANSA Standard using IEC 62209-1 or EN 62209-1 or UNIFIED standard or 62209-3

Option 2: amend the ACMA standard for devices operating above 6 GHz to expressly require compliance with the exposure limits in the ARPANSA Standard, and provide a guidance document for suppliers about testing compliance

This option amends the ACMA Standard to require compliance with the EME exposure limits in the ARPANSA Standard. This requirement would be applicable for devices operating above 6 GHz and would not refer to the method by which compliance is tested. This option allows suppliers to have discretion as to which test method to use for compliance.

The ACMA would develop non-regulatory guidance for suppliers about how to test compliance with the exposure limits in the ARPANSA Standard. This guidance would be based on the provisions of the test report IEC TR 63170:2018.

Preferred option

The ACMA considers Option 1—incorporating the IEC TR 63170 technical report into the ACMA Standard until an international standard can be similarly incorporated—to be the preferable option. It provides clear guidance for suppliers about the EME requirements of devices and provides appropriate protections for device users. The alternative of non-regulatory guidance about test methods provides less certainty for suppliers and less protection for consumers.

The attached draft legislative instrument is an amendment to the ACMA Standard and incorporates the IEC TR 63170 technical report as a measurement method.

Given that the TR 63170 is the only available methodology internationally and considering that other jurisdictions are also considering adopting this TR, I would recommend Option # 1 above.

IEC/IEEE Roadmap for 5G SAR standard below 6GHz

ROADMAP AND OBJECTIVES

► Objectives of the TR 5G Sub 6GHz

- Provide state of the art on 5G sub-6 technology and impacts on SAR compliance assessment
- Address increasing demand on system validation, uncertainty budget and measurement protocol

Starting announcement of TR for 5G Sub 6GHz draft circulation (JWG 13)

Clarified scope and objectives will drive the technical development

Finalize the technical report for circulation to NCs

TIMELINE of TR 5G sub 6GHz

June. 2019

Nov. 2019
Plenary

June. 2020

SCOPE OF THE TECHNICAL REPORT

Scope:

This Technical Report (TR) describes procedures for the conservative evaluation of the SAR induced by the EMF radiated by hand-held and body-worn devices operating on 5G New Radio bands and below 6GHz.

Unlike 2G, 3G and 4G telecommunication standards, the 5G New Radio bands below 6GHz allows large signal bandwidth exceeding 100MHz, and this signal can be supported by 1 to 8 carriers. Each carrier using high order modulations (up to 1024QAM), offering faster data rates and higher levels of spectral efficiency for the radio communications system.

Current exposure evaluation standards typically provide requirements on the measurement system performance, measurement procedure, procedure to evaluate the uncertainty budget as well as procedure validating and verifying that the system operates within its uncertainty.

This report complements the existing exposure evaluation standards with guidance for evaluating compliance of Specific Absorption Rate generated inside the head or the body by a radio communications system operating on 5G telecommunication bands below 6 GHz.

Invitation to comment

Making a submission

The ACMA invites comments on the issues set out in this consultation paper.

- > [Online submissions](#) can be made by uploading a document. Submissions in PDF, Microsoft Word or Rich Text Format are preferred.
- > Submissions by post can be sent to:

The Manager
Technical Regulation & Carrier Infrastructure Section
Australian Communications and Media Authority
PO Box 13112 Law Courts
Melbourne VIC 8010

The closing date for submissions is **COB, Thursday 12 March 2020**.

Consultation enquiries can be emailed to techreg@acma.gov.au.

Publication of submissions

The ACMA publishes submissions on our website, including personal information (such as names and contact details), except for information that you have claimed (and we have accepted) is confidential.

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