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AMTA

Australian Mobile Telecommunications Association

AMTA Submission

Australian Communications & Media Authority

IFC 35/2021—Review of 1800 MHz spectrum licensing technical framework—consultation paper

About AMTA

The Australian Mobile Telecommunications Association (AMTA) is the peak industry body representing Australia's mobile telecommunications industry. Its mission is to promote an environmentally, socially and economically responsible, successful and sustainable mobile telecommunications industry in Australia, with members including the mobile network operators and service providers, handset manufacturers, network equipment suppliers, retail outlets and other suppliers to the industry. For more details about AMTA, see http://www.amta.org.au.

General comments

Unwanted emission limits

AMTA appreciates the ACMA's revision of the 1.8 GHz spectrum licence technical framework (SLTF) with a view to supporting modern mobile broadband technologies, especially active antenna systems (AAS) and the adoption of parameters related to these, such as margins accounting for the dynamic nature of dynamically beamforming and total radiated power (TRP). That said, we are disappointed with the ACMA's decision to maintain existing unwanted emission limits that were originally based on what are now outdated technologies (i.e. 2G/GSM). The fact that the proposed unwanted emission limits do not reflect 4G/5G emissions standards places undue challenges on equipment vendors, who are then required to manufacture 5G radios that comply with 2G emission standards. This may ultimately also affect operators through higher equipment/deployment costs and/or constrain deployment features, e.g. coverage due to needing to operate at reduced power levels.

For this reason, we support a revision of the proposed unwanted emission limits based on 3GPP standards (specifically, the unwanted emission limits) rather than from the starting point of the existing licence limits. In particular, we note the following:

A. Unwanted emission limits for non-AAS should be based on conducted power or TRP (to align with 3GPP), not based on EIRP.

B. Wide Area Base Station Category B "Option 1" should be used to define the non-spurious emission limits (the ACMA proposes to use Category B "Option 2") to accommodate a wider range of vendor equipment.

C. The first 200 kHz of the non-spurious emission limits for base stations should maintain the 6 dB difference[1] between non-AAS and AAS.

More detail on each of these points is provided in the following sub-sections.

A. Unwanted emission limits should be specified as TRP

We believe that unwanted emission limits for non-AAS transmitters should be based on either conducted power per antenna port, or as TRP. In addition to aligning with 3GPP standards for 4G/5G unwanted emissions, it will give equipment manufacturers more certainty in the performance radios need to achieve by removing the need to know antenna gain and system losses that may be used in an operator's potential future network, particularly when such

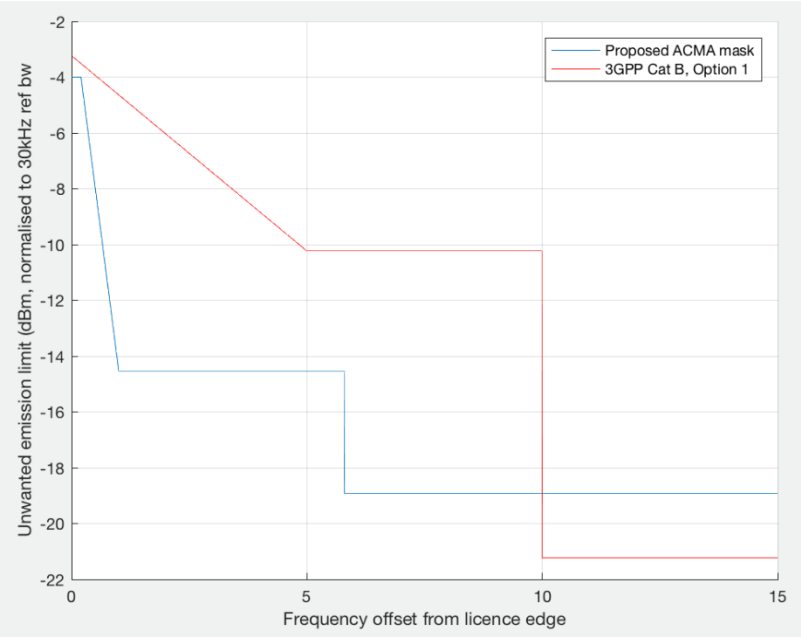
[1] For clarity, the 6 dB difference is a net difference due to a combination of (i) a 15 dB reduction when converting from EIRP to conducted power, and (ii) the addition of a 9 dB factor for AAS.

parameters may not yet be known and could be expected to evolve over time prior to the next review of the SLTF.

B. Wide Area BS Category B (Option 1) emission limits

We note the ACMA's comment that "The resulting out-of-band limits for non-AAS and AAS encompass Category B (option 2) non-AAS limits defined in 3GPP TS 38.104". However, we note that equipment may indeed be manufactured to comply with Option 1 rather than Option 2 limits, and as such we believe that the unwanted emission limits for base station transmitters should be revised to be based on Table 6.6.4.2.2.1-2 of 3GPP TS 36.104 to support economies of scale. Noting that there is a 1.5 dB difference between these limits and those in Table 6.6.2.5.1-1d of 3GPP TS 37.141, the limits may need to be increased by a further 1.5 dB out to 10 MHz.

We request the ACMA use Wide Area Base Station Category B "Option 1" (not "Option 2") to define the non-spurious emission limits. See the figure below for details.



C. First 200 kHz

In Figure 1 of the ACMA's consultation paper, there is a clear 6 dB difference[1] in the magnitude (in dBm) of the limits between AAS and non-AAS. However, in the first 200 kHz from the licence edge, the Non-AAS limits are much higher than those derived for AAS. We understand that the level for AAS, in the first 200 kHz, was intended to be derived from 3GPP, and therefore could be accepted if the correct magnitude is adopted.

However, we note that the TRP of -4 dBm/(30 kHz) is too low for the Wide Area BS Category B limits. In accordance with Table 6.6.2.5.1-1d of 3GPP TS 37.141, the limit in the first 200 kHz should be:

-1.72dBm – 7/5(∆f) dBm/(30kHz)
where -1.72 was derived from -5.5 dBm/100kHz [3GPP intercept value] + 10log10(30/100) [bandwidth conversion] + 9 dB [AAS margin].

Furthermore, we note that support for narrowband IoT (NB-IoT) requires higher unwanted emissions in the first 200 kHz. Table 6.6.2.5.1-1b for BS with standalone NB-IoT has a maximum value of 6.5 dBm/(30kHz), to which adding the 9 dB AAS factor equals +15.5 dBm/(30 kHz), which is 6 dB below the existing limit of +21.5 dBm/(30kHz) in the first 200 kHz. As such, there may be merit in maintaining +15.5 dBm/(30kHz) in the first 200 kHz to maximise flexibility for supporting standalone NB-IoT.

Table 6.6.2.5.1-1b: WA BS OBUE in BC1 and BC3 bands ≤ 3 GHz applicable for: BS with standalone NB-IoT carrier adjacent to the Base Station RF Bandwidth edge

Frequency offset of measurement filter -3dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Minimum requirement (Note 1, 2, 3, 4)	Measurement bandwidth (Note 6)
0 MHz ≤ Δf < 0.05 MHz	0.015 MHz ≤ f_offset < 0.065 MHz	$Max(6.5dBm - 60 \cdot \left(\frac{f_{offset}}{MHz} - 0.015 \right) dB + XdB, -12.5dBm)$	30 kHz
0.05 MHz ≤ Δf < 0.15 MHz	0.065 MHz ≤ f_offset < 0.165 MHz	$Max(3.5dBm - 160 \cdot \left(\frac{f_{offset}}{MHz} - 0.065 \right) dB + XdB, -12.5dBm)$	30 kHz

NOTE 1: The limits in this table only apply for operation with a standalone NB-IoT carrier adjacent to the Base Station RF Bandwidth edge.
NOTE 2: For MSR BS supporting non-contiguous spectrum operation within any operating band the minimum requirement within sub-block gaps is calculated as a cumulative sum of contributions from adjacent sub blocks on each side of the sub block gap.
NOTE 3: For MSR BS supporting multi-band operation with Inter RF Bandwidth gap < $2 \times \Delta f_{OBUE}$ the minimum requirement within the Inter RF Bandwidth gaps is calculated as a cumulative sum of contributions from adjacent sub-blocks or RF Bandwidth on each side of the Inter RF Bandwidth gap.
NOTE 4: In case the carrier adjacent to the RF bandwidth edge is a standalone NB-IoT carrier, the value of X = PNB-IoTcarrier – 43, where PNB-IoTcarrier is the power level of the standalone NB-IoT carrier adjacent to the RF bandwidth edge. In other cases, X = 0.

Implicit protection of GSM-R mobile stations

We appreciate the difficult challenge faced by the ACMA in accommodating both legacy (2G/GSM) and new (4G/5G) technology in the one band. The ACMA has charted a difficult course to reasonably successfully arrive at a technical framework that accommodates the interests of all parties, with only some modest concessions on both sides.

Despite the good efforts of the TLG, the potential for interference to GSM-R terminal receivers remains. The most likely example is the “near/far problem” where a user terminal is geographically close to an adjacent-channel (i.e., another network operator’s) base station and far from its own base station such that the unwanted (adjacent channel) emissions from the adjacent-channel base station “drown out” the wanted signal from the terminal’s own base station. When there is risk of this occurring between mobile operator networks, the network operators deal with the problem by ensuring they invest adequately in network deployment to avoid weak *wanted* signal in areas where a “near/far problem” would occur. We believe that similarly, a certain level

of performance and coverage should be expected of the GSM-R networks, such that the onus for managing adjacent-channel interference is shared between both parties on either side of a shared frequency boundary.

As an example, ECC Report 229 refers to the approach proposed by the Dutch regulator in 2014: *"If the minimum coverage level of GSM-R is less than -72 dBm (50% place/time probability), the licensee is not obliged to offer appropriate protection. In this case, the railway operator is responsible to tackle the GSM-R 'weak spot'"*.

While we are not asking for any additional obligations to be added to operator's licences, the Section 145 Determination or to the RAGs, we do wish to make the point that there are often actions that network operators can take themselves to improve the quality of service to their users, and we consider that such actions should be considered if interference happens to occur in the future despite network operators fully complying with their licence conditions, the Section 145 Determination and the RAGs.

In this case, the concerns of the state rail operators—that *"relaxing the existing out-of-band limits could increase the risk of interference to existing GSM-R terminals"* as stated in the ACMA's consultation paper—is being used to justify out-of-band emission limits that may unnecessarily constrain vendor equipment design and/or deployment for the Australian market. Firstly, the GSM-R terminals mentioned here are mobile/registration-exempt stations that operate on a "no interference, no protection" basis, and secondly, as explained above the susceptibility of these terminals to interference can be alleviated through improved (GSM-R) network coverage.

Answers to ACMA questions

Question 1: While all aspects of the proposed changes to conditions of spectrum licences in the 1800 MHz band (1800 MHz spectrum licences) are open for comment, the ACMA would like to draw attention to the proposed frequency range that out-of-band emission limits would apply for transmitters operating in the lower 1800 MHz band (1710–1785 MHz). Comment is sought on whether the frequency range should be either:
(a)+/- 45 MHz either side of the lower 1800 MHz band
(b) +/- (licensed bandwidth + 5 MHz) measured from the lower and upper frequency limits of the licence in a defined area.
Other proposals could also be considered.

AMTA observes the second option is based on 3GPP TS 38.101-1.[2] In line with a number of views expressed in the previous section, AMTA considers alignment with 3GPP to be the preferred approach for all bands with primary allocation for IMT services, and therefore recommends the ACMA adopt the second option.

In this context, we note that the consultation paper uses the terms "channel bandwidth" and "licenced bandwidth" (the latter appearing in the text of this question) interchangeably. However, these two terms are not interchangeable, as a licensee may have (for example) 40 MHz of licensed spectrum operating in two 20 MHz channels. We consider the definition for the proposed frequency range for out-of-band emissions should be expressed as "+/- (**channel** bandwidth) + 5 MHz" (not "licensed bandwidth") for alignment with 3GPP standards.

Question 2: Comment is sought on the effect the proposed changes to the 1800 MHz technical framework may have on incumbent services in the 1800 MHz (1710–1785 MHz and 1805–1880 MHz) band and adjacent bands.

AMTA members have not identified any likely impacts of proposed changes to the 1800 MHz technical framework may have on incumbent services in the 1800 MHz band, although as a precaution, AMTA supports the proposal for the addition of a "grandfathering" clause to the s.145 determination (see answer to question 4 below).

p.13 of the consultation (just above question 2) proposes that no changes are made to any of the three RAGs. We suggest some amendments are required, although we consider there to be no urgency to make these amendments.

[2] Consultation paper, p.8.

Instrument	Clause	Change required
Transmitter RAG (F2017C01051)	Part 1, first paragraph. Top of p.7.	The first paragraph says that on 2x15 MHz has been allocated for spectrum licensing in regional areas, however, this is no longer correct. 2x75 MHz has been allocated.
Additional DBC RAG (F2015C00769)	Several references.	This instrument is still using a 9-second DEM and 500m increments. We consider this should be updated to a 3-second DEM and 100m increments for consistency with the changes to the Section 145 Determination.

Question 3: Comment is sought on the changes proposed to the:
> 1800 MHz band spectrum licences conditions
> the Radiocommunications (Unacceptable Levels of Interference – 1800 MHz Band) Determination 2012 (s.145(4) determination) for the 1800 MHz band.

In general, AMTA agrees with the changes made to the 1800 MHz band spectrum conditions and the s145 Determination for the 1800 MHz band. Where we disagree with the development of certain unwanted emission limits, these have been detailed in the opening section to this response. Most notably, we advocate for unwanted emission limits being based on the emission limits stated in 3GPP Technical Specifications, and have pointed out the areas of concern where this is not the case and could place undue constraints on equipment manufacture and/or deployment.

We also note the following corrections we consider should be made to two of the tables proposed to be changed in the existing spectrum licence core conditions:

- Table 2: The ACMA have dropped the words “per cell/sector” from the heading of the middle column which should be reinstated. Note 1 immediately below Table 2 has also been dropped, and we consider it should be reinstated.

- Table 4: The ACMA have dropped the words “per cell/sector” from the heading of the middle column which should be reinstated.

Question 4: In relation to the draft amendments proposed to the s.145(4) determination (separate attachment in key documents section of this consultation), should additional measures be included to also grandfather device registrations when minor modifications are made? If so, what minor modifications should be permitted? For example, what should happen to changes that results in the same or lower horizontal radiated power for the purposes of device boundary calculations? Alternatively, what should happen to changes that result in the same or smaller device boundary as originally calculated when registering a device.

AMTA supports the proposed introduction of a grandfathering clause into the s.145 determination. This clause would allow pre-existing devices (i.e., devices already recorded on the Register of Radiocommunications Licences – RRL) to be upgraded against the DBCs specified in (what is as at Nov 2021) the **current version** of the s.145 determination, i.e., without requiring the upgrade to comply with the **updated version** of the s.145 determination as proposed in this consultation. For clarity, if a device was registered before this amendment to the s.145 determination, and an upgrade to that device occurs such that it would have satisfactorily passed the current s.145 determination but fails the updated version, that transmitter should nonetheless be deemed acceptable under the s.145 determination because clause 11 grandfathers the s.145 requirements that existed prior to the introduction of clause 11.

However, we strongly recommend that any upgrade performed (whether comply with the current or updated version of the s.145 determination) is nevertheless recorded in the RRL. This would include re-registering devices where even just minor modifications are made, such as antenna upgrades. It is vital for Accredited Persons performing coordination activities that the RRL contain fully up-to-date information about devices in operation.

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