Review of the 1800 MHz band spectrum licence technical framework

Outcomes paper

december 2021

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# Introduction

The Australian Communications and Media Authority (the ACMA) released the [*Review of the 1800 MHz band spectrum licence technical framework*](https://www.acma.gov.au/consultations/2021-10/review-1800-mhz-spectrum-licencing-technical-framework-consultation-352021?utm_medium=email&utm_campaign=Review%20of%20the%201800%20MHz%20band%20technical%20framework&utm_content=Review%20of%20the%201800%20MHz%20band%20technical%20framework+CID_b6dfb2feac8f6ffc78266bb424588199&utm_source=SendEmailCampaigns&utm_term=released%20a%20consultation%20paper) consultation paper on 6 October 2021. The paper sought industry feedback on our proposed amendments to the following 1800 MHz spectrum licensing instruments:

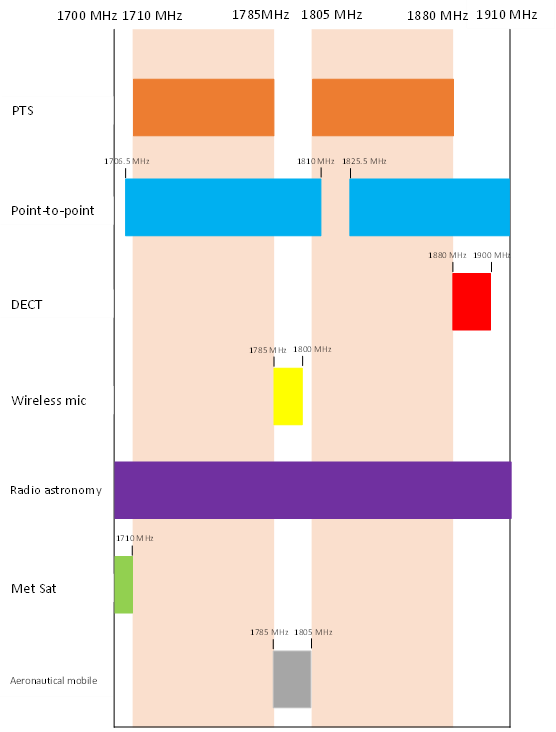
1800 MHz spectrum licence conditions

[Radiocommunications (Unacceptable Levels of Interference – 1800 MHz Band) Determination 2012](https://www.legislation.gov.au/Series/F2012L02045) (the s.145(4) Determination).

The consultation paper also sought feedback on how the proposed amendments may affect incumbent co-channel and adjacent channel services.

An illustration of the 1800 MHz band co-channel and adjacent channel services is provided in Figure 1.

Current arrangements in the 1800 MHz and adjacent band arrangements



Four submissions were received to the consultation paper from the following organisations:

* Australian Mobile Telecommunications Association (AMTA)
* Australasian Railway Association (ARA)
* Ericsson
* Optus.

A [summary of submissions](#_2_Summary_and) received and our response to the issues raised is outlined below. The [outcomes of the consultation](#_3_Outcomes_of) and how to implement these are listed in the final section of this paper.

# Summary and response to issues

Submissions were generally supportive of the proposed amendments to the 1800 MHz band spectrum licence technical framework (1800 MHz technical framework). However, some additional amendments were also proposed.

This section summarises responses to the issues for comment in the consultation paper as well as additional issues raised. Our views on these responses are also provided.

## Issues for comment

**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:

(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.

Two submissions were received on this question. AMTA and Optus indicated a preference to follow 3GPP standards and noted they preferred Option b as it based on the 3GPP TS 38.101-1 standard. AMTA highlighted the difference between ‘channel bandwidth’ and ‘licensed bandwidth’. It suggested channel bandwidth should be used as the measurement bandwidth as it is the measurement unit in the 3GPP standard.

#### ACMA response

The ACMA has adopted Option b. The term for channel bandwidth used in the legislative instruments is occupied bandwidth. As such, the term ‘occupied bandwidth’ will be used instead of ‘licensed bandwidth’ and the ACMA intends to vary the 1800 MHz spectrum licences accordingly.

**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.

Only AMTA provided a comment on this question. AMTA indicated its members had not identified any likely impacts the proposed changes to the 1800 MHz technical framework would have on incumbent services in the 1800 MHz band. However, as a precaution, AMTA supported the proposal for the addition of a ‘grandfathering’ clause to the s.145(4) Determination (see Question 4).

AMTA also proposed the following changes to the Radiocommunications Advisory Guidelines (RAGs), but noted these were not urgent:

|  |  |  |
| --- | --- | --- |
| **Instrument** | **Clause** | **Changes required** |
| [Radiocommunications Advisory Guidelines (Managing Interference from Spectrum Licensed Transmitters – 1800 MHz Band) 2012](https://www.legislation.gov.au/Details/F2017C01051) | Part 1, first paragraph. Top of p.7. | The first paragraph says that 2 x 15 MHz has been allocated for spectrum licensing in regional areas, however, this is no longer correct. 2 x 75 MHz has been allocated. |
| [Radiocommunications Advisory Guidelines (Additional Device Boundary Criteria – 1800 MHz Lower Band) 2012](https://www.legislation.gov.au/Details/F2015C00769) | Several references. | This instrument is still using a  9-second DEM and 500 m increments. We consider this should be updated to a 3-second DEM and 100 m increments for consistency with the changes to the s.145(4) Determination. |

#### ACMA response

As the RAGs are legislative instruments and were not formally consulted on in this process, we do not intend to make changes to the RAGs at this time. We have noted the comments from AMTA and recognises these are useful, but not urgent suggestions for change. The RAGs for the 1800 MHz band, and the s.145(4) Determination, are due to sunset in 2023, in accordance with the *Legislation Act 2003*. The ACMA intends to review and consider remaking those instruments over the next 12 months, and AMTA’s comments will be considered as part of that review process.

**Question 3**

Comment is sought on the changes proposed to the:

* 1800 MHz band spectrum licence conditions
* s.145(4) Determination for the 1800 MHz band.

AMTA, Optus and Ericsson generally agreed with the proposed changes to the 1800 MHz band spectrum licence conditions and the s.145(4) Determination for the 1800 MHz band. However, they identified the following issues:

* The unwanted emission limits for non-AAS transmitters should be based on either conducted power per antenna port, or as a total radiated power TRP.
* The proposed unwanted emission limits favour 2G technologies. Unwanted emission limits should be based on the Wide Area Base Station (BS) Category B (Option 1) emission limits as detailed 3GPP TS 38.104. This will allow equipment to be sourced more readily and operators to benefit from economies of scale.
* The proposed TRP of -4 dBm/30 kHz in the first adjacent 200 kHz is too low to support Wide Area BS Category B emission limits. In accordance with Table 6.6.2.5.1-1d of 3GPP TS 37.141, the emission limits in the first adjacent 200 kHz should be: -1.72dBm - 7/5(Df) dBm/30kHz. Additionally, an emission limit of +15.5 dBm/30 kHz (derived from the proposed non-AAS emission limit), would comply with 3GPP TS 37.141 Table 6.6.5.2.1-1 and would allow stand-alone narrowband Internet of Things (NB-IoT) services to be deployed.
* the middle column of Tables 2 and 4 should include ‘per cell/sector’ for measurement purposes.

#### ACMA response

The ACMA notes that the 1800 MHz Technical Liaison Group (TLG) considered:

defining unwanted emission limits for non-AAS in terms of conducted powers and TRP

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

However, agreement was not reached among all spectrum licensees to adopt these measures. There was a preference from rail spectrum licensees to maintain the existing interference environment. The resulting unwanted emission limits proposed in the consultation paper reflect a compromise position reached within the TLG. Refer to the [*Review of the 1800 MHz spectrum licence technical framework: TLG paper*](https://www.acma.gov.au/spectrum-licence-technical-liaison-groups) for further details.

As agreement has not been reached among spectrum licensees to adopt the emission limits proposed by AMTA, Optus and Ericsson, we will not seek to include them when varying spectrum licences. Instead, we will seek to include the emission limits detailed in the consultation paper, with the additional change detailed below.

The ACMA has reviewed the proposed increase to AAS unwanted emission limits in the first adjacent 200 kHz. Due to the small and limited frequency range this applies to, we consider adopting this proposal will have limited impact on adjacent channel licensees. Since the consultation processes ended, we have further consulted with 1800 MHz spectrum licensees and there is agreement to adopt the changes proposed. As such, for the first adjacent 200 kHz, the unwanted emission limit will be increased to +15.5 dBm/30 kHz for AAS transmitters.

As requested in submissions, we will also seek to include the text ‘per cell/sector’ in the middle column of Tables 2 and 4 from the consultation paper, as part of any variations made to spectrum licences.

**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 result 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 and Ericsson supported the proposed introduction of a grandfathering clause into the s.145(4) Determination. AMTA strongly recommend that any upgrade performed (whether compliant with the current or updated version of the s.145(4) Determination) be recorded in the RRL.

Optus supported the proposal and considered there is no need for additional measures to be included to allow for minor modifications of grandfathered registrations.

#### ACMA response

The ACMA notes the broad support for the proposed amendments to the s.145(4) Determination. After reviewing submissions, we have also included the additional measures to expand the grandfathering clause in the new section 11 of the s.145(4) Determination.[[1]](#footnote-1) This change will enable licensees to make minor modifications to existing devices that would otherwise result in a device boundary that is the same or smaller, when using the criteria that applied when the device was originally registered. To address concerns raised, we have included a provision that requires the details of a device be updated in the Register of Radiocommunications Licences to reflect any changes. This is consistent with similar arrangements recently implemented in the [Radiocommunications (Unacceptable Levels of Interference — 3.4 GHz Band) Determination 2015](https://www.legislation.gov.au/Series/F2015L00727).

## Other issues

### Implicit protection of incumbent services

AMTA indicated that while their submission was not asking for any additional obligations to be added to licences or instruments, AMTA noted that there are often actions that network operators can take to improve the quality of service available to their users. They consider that such actions should be considered if interference happens to occur in the future, despite network operators fully complying with their licence conditions and the s.145(4) Determination requirements.

The AMTA submission was concerned that decisions not to adopt its preferred unwanted emission limits were based on managing interference to GSM-R terminals. They felt this may unnecessarily constrain vendor equipment design and/or deployment for the Australian market. AMTA surmised that:

GSM-R terminals mentioned here are mobile/registration-exempt stations that operate on a ‘no interference, no protection’ basis

the susceptibility of these terminals to interference can be alleviated through improved (GSM-R) network coverage.

Optus’ submission noted that:

They will not agree to spectrum licence changes that afford additional protections to accommodate outdated equipment and technology. The ACMA licensing framework needs to encourage better engineering design and promote the adoption of newer technologies by licensees.

Interference management is a common and important theme throughout TLGs. As a spectrum licence holder Optus accepts the interference management responsibilities placed on licensees to ensure efficient use of the bands. This and other spectrum licence frameworks are designed to manage interference between licensees in different parts of a band or in different geographical locations, and not provide a zero-interference environment.

Considering or making changes to spectrum licence technical frameworks which have the potential to impact large live networks to address isolated issues on legacy network technologies or spectrum use cases is not considered an effective or appropriate interference mitigation technique, particularly when the onus for such mitigations is placed only on a licensee operating one side of the geographical or spectrum boundary. The management of interference is a shared obligation.

#### ACMA response

We note that a technical framework is not designed to guarantee a zero-interference environment. While the technical framework provides a level of certainty regarding the interference environment that can be expected, there is an onus on operators to design a network that can operate within this environment.

When designing a technical framework for the purposes of an initial spectrum allocation, the ACMA has greater flexibility to optimise the arrangements for the likely technologies under consideration. However, in this review process of a technical framework for existing spectrum licences, the core condition of the licence that sets limits on unwanted emissions, can only be varied with agreement of the licensee under section 72 of the *Radiocommunications Act 1992* (the Act). Noting this also directly affects adjacent channel licensees and currently deployed services, our approach is to seek agreement from all spectrum licensees on a common set of emission limits that will apply across a band.

In this case, while mobile network operators preferred adopting Wide Area Base Station (BS) Category B (Option 1) emission limits as detailed 3GPP TS 38.104, rail operators expressed concern regarding the potential increase in interference to their network from the proposed increase to in band unwanted emission limits. The resulting unwanted emission limits proposed in the consultation paper reflect a compromise position reached within the TLG between spectrum licensees. These provide greater flexibility for the deployment of AAS transmitters than under the current arrangements while minimising changes to the interference environment.

Unless there is agreement to implement alternative emission limits, we will seek to implement the unwanted emission limits agreed to and detailed in our response to Question 3.

### Additional rail technology

The ARA’s submission indicated that Future Railway Mobile Communication System (FRMCS) standards and specifications are under development and products are not expected before 2025. For this reason, some rail operators may choose to implement systems based on 3GPP Mission Critical Systems (MCX) standards earlier to overcome issues such as Global System for Mobile – Railway (GSM-R) obsolescence. To allow this to occur, the ARA recommended that, for the licence condition that defines devices exempt from registration, reference to ‘FRMCS’ should be amended to ‘FRMCS/MCX (for rail use)’.

#### ACMA response

We support the rail operator’s initiative to upgrade their system from GSM-R to 4G/5G systems. The ACMA will work further with rail operators and mobile network operators to identify suitable wording for the licence condition that exempts specific devices from registration to enable this.

# Outcomes of consultation

We will seek to update the 1800 MHz spectrum licence conditions in agreement with spectrum licences under section 72 of the Act as proposed in the consultation paper, with the following amendments:

For the unwanted emission limits defined in Table 4 of the consultation paper, which relate to AAS radiocommunications transmitters operating in the upper 1800 MHz band, increase the emission limit between 0 to 200 kHz to a TRP of 15.5 dBm/30 kHz.

For transmitters operating in the lower 1800 MHz band, define the frequency boundary for spurious emissions as starting at frequency offsets of +/- (occupied bandwidth + 5 MHz) as measured from the lower and upper frequency limits of the licence.

Include the text ‘per cell/sector’ in the middle column of Tables 2 and 4.

The ACMA will work further with spectrum licensees to identify suitable wording for the licence condition that exempts specific rail devices from registration to enable FRMCS/MCX deployments.

The ACMA has made the Radiocommunications (Unacceptable Levels of Interference – 1800 MHz Band) Amendment Determination 2021 (No. 1) as proposed in the consultation paper with the following insertion in section 11 ‘Transition – radiocommunications transmitter registered before commencement of this section’:

new subsections (3) and (4):

(3) For the purposes of subsection 145(4) of the Act, if:

(a) after the commencement of this section, both:

(i) a detail of a relevant transmitter changes (***relevant change***); and

(ii) the change to the detail is recorded in the Register; and

(b) the distance of the new device boundary of the relevant transmitter is, on each radial mentioned in Part 1 of Schedule 2, equal to or less than the distance of the old device boundary of the relevant transmitter on that radial; and

(c) but for the effect of this subsection, a level of interference caused by the relevant transmitter, immediately after the change time, would be unacceptable;

the level of interference caused by the relevant transmitter, immediately after the change time, is not unacceptable because of the relevant change.

(4) In subsection (3):

***change time***, for a relevant transmitter, means the time the relevant change is recorded in the Register.

***new device boundary***, of a relevant transmitter, means the device boundary of the transmitter established immediately after the change time, in accordance with this Determination as in force at the change time.

***old device boundary***, of a relevant transmitter, means the device boundary of the transmitter established immediately before the change time, in accordance with this Determination as in force at the registration time.

***registration time***, for a relevant transmitter, means the time the transmitter was included in the Register.

1. The grandfathering clause states that device registrations are required to meet the requirements of the s.145(4) Determination that applied at the time of registration. It ensures existing device registrations are not affected by any future changes to the s.145(4) Determination. [↑](#footnote-ref-1)