



**Australian  
Communications  
and Media Authority**

# **Review of the 700 MHz band spectrum licence technical framework**

## Consultation paper

DECEMBER 2024

**Canberra**

Level 3  
40 Cameron Avenue  
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  
Pymont NSW

PO Box Q500  
Queen Victoria Building  
NSW 1230

T +61 2 9334 7700  
F +61 2 9334 7799

**Copyright notice**

<https://creativecommons.org/licenses/by/4.0/>

Except for the Commonwealth Coat of Arms, logos, emblems, images, other third-party material or devices protected by a trademark, this content is made available under the terms of the Creative Commons Attribution 4.0 International (CC BY 4.0) licence.

All other rights are reserved.

The Australian Communications and Media Authority has undertaken reasonable enquiries to identify material owned by third parties and secure permission for its reproduction. Permission may need to be obtained from third parties to re-use their material.

We request attribution as © Commonwealth of Australia (Australian Communications and Media Authority) 2024.

# Contents

<b>Issues for comment</b>	<b>1</b>
<b>Introduction</b>	<b>2</b>
<b>Case for action</b>	<b>4</b>
<b>Background</b>	<b>5</b>
<b>Proposed amendments to the technical framework</b>	<b>6</b>
700 MHz band TLG	6
Conditions on the spectrum licences	7
Radiocommunications advisory guidelines (RAGs)	11
Unresolved issues	11
Effect on incumbent services	15
Proposed changes to the conditions on the spectrum licence	17
Proposed changes to the RAG Tx	24
Proposed changes to the conditions on the 850/900 MHz bands spectrum licences	25
<b>Invitation to comment</b>	<b>26</b>
Making a submission	26
<b>Appendix A: Relevant conditions of current 700 MHz band spectrum licences</b>	<b>27</b>
Licence Schedule 2 Core Conditions	27
Licence Schedule 3 Statutory Conditions	30
<b>Appendix B: Relevant conditions of current 850/900 MHz bands spectrum licences</b>	<b>31</b>
Licence Schedule 3 Statutory Conditions	31
<b>Appendix C: Block E areas</b>	<b>32</b>
<b>Appendix D: Separation distance calculations for services operating in 803–813 MHz</b>	<b>35</b>
Reviewing unwanted emissions limits in 803–813 MHz	35

# Issues for comment

The Australian Communications and Media Authority (ACMA) invites feedback on the issues set out in this consultation paper and draft variation to the Radiocommunications Advisory Guidelines.

We invite comments on:

1. the options proposed for the definition of devices exempt from registration
2. the options proposed for the unwanted emission limits below 694 MHz
3. the effects the proposed changes to the 700 MHz band technical framework may have on incumbent services in the 700 MHz (703–748 MHz and 758–803 MHz) band and adjacent bands
4. proposed changes to the 700 MHz band spectrum licence conditions
5. the proposed Radiocommunications Advisory Guidelines (Managing Interference from Spectrum Licensed Transmitters – 700 MHz Band) 2025.
6. the proposed changes to the exemption from registration requirements in the 850/900 MHz bands spectrum licences.

# Introduction

The review of the 700 MHz band spectrum licence technical framework is part of a broader work program outlined in the [Five-year spectrum outlook 2024–29](#) (the FYSO) to review existing spectrum licence technical frameworks to accommodate new technology developments such as 5G and Advanced Antenna Systems (AAS) technologies.

So far, the ACMA has updated the technical frameworks in the 850/900 MHz, 1800 MHz, 2 GHz, 2.3 GHz and 3.4 GHz bands to support 5G and AAS. Informed by feedback from spectrum licensees across multiple bands, we identified the priorities for these reviews, which are outlined in the FYSO. The 700 MHz band is now being considered under these technical framework reviews.

The 700 MHz band is subject to Australia-wide spectrum licensing. Licences were first allocated in 2013 and the current licensees are mobile network operators (MNOs): Optus, Telstra and TPG. In 2023, the instruments of the 700 MHz band spectrum licence technical framework (the 700 MHz band technical framework) were updated as part of remaking instruments for several spectrum licence bands.

Since the 700 MHz band technical framework was developed, AAS have become commercially available in several frequency bands, enhancing network coverage and/or capacity. The current 700 MHz band technical framework is not optimised for such use and spectrum licensees have indicated this will limit or prevent their ability to deploy AAS in the future. While there is currently no AAS equipment commercially available for the band, there is an opportunity to update the licence to provide the option to deploy future equipment and to align with other spectrum-licensed bands.

In April 2023, we convened a [technical liaison group](#) (TLG)<sup>1</sup> to provide advice on possible changes to the 700 MHz band technical framework, including changes to accommodate AAS while managing interference between spectrum licences and adjacent band services. The TLG also considered a minor change to the 850/900 MHz bands' technical framework. The TLG concluded its work in October 2024 – the outcomes are detailed in the [Review of the 700 MHz band spectrum licence technical framework Technical Liaison Group paper](#) (the 700 MHz band TLG paper).

While the TLG was able to reach consensus on most changes, 2 issues remain unresolved: the exemption from registration requirements and unwanted emission limits below 694 MHz. Television broadcasters expressed concern that relaxing 2 exemption requirements and existing unwanted emission limits could increase the risk of interference to digital television receivers. In this consultation paper, 3 options are provided to further consider the exemption from registration requirements issue. Two options, no change and one other, are proposed for the unwanted emissions issue. We will consider feedback on the proposed options when implementing any changes.

In addition to band-specific considerations, we will also consider aligning arrangements between different bands where it makes sense to do so. For example, we will review changes and lessons learned from the development and review of technical frameworks for

---

<sup>1</sup> A TLG is a short-term advisory body set up by the ACMA as an informal consultation forum between ACMA staff and stakeholders. TLGs consider and provide advice on the technical aspects required for the development or review of a technical framework, and related apparatus licensing frameworks, if needed.

the 850/900 MHz, 1800 MHz, 2 GHz, 2.3 GHz, 3.4 GHz and 26 GHz bands. Subject to consideration of feedback received to this paper, we would start implementing the proposed changes in the second quarter of 2025.

# Case for action

Since the 700 MHz band technical framework was first developed in 2013, 3GPP standards have been developed for 5G. Band n28 (703–748 MHz and 758–803 MHz) has been identified as a 5G band and commercial 5G equipment is now available.

We have received representations from spectrum licensees that they would like to review several aspects of the 700 MHz band technical framework to better accommodate AAS and 5G technologies. This includes unwanted emission limits, in-band emission limits and the definition of devices exempt from registration.

The benefits of reviewing and making possible changes include:

- Aligning technical criteria with international standards, where possible, helps to minimise costs so that manufacturers do not have to develop bespoke equipment to meet Australian requirements.
- Enabling support for 5G and AAS will enhance an operator's network coverage and capacity. This will help reduce network costs to meet the rising demand for additional capacity and improve the end-user experience. 5G technologies will also enable licensees to support ultra-low latency applications (for example, remote control of critical infrastructure, vehicular automation and remote medical procedures), and massive IoT<sup>2</sup> as well as improve reliability for mission critical communications.<sup>3</sup>
- Broadening the scope of devices that are exempt from registration would provide greater flexibility for licensees to support a larger range of end-user equipment (UE) in Australia. Due to the mobile, nomadic and ubiquitous nature of their deployment, it is not always practical to register the location of these devices on the Register of Radiocommunications Licences.
- More accurate modelling of interference will allow licensees to deploy services closer to their licence boundaries. This will result in greater utility of existing spectrum licences.

We also need to consider broader spectrum management factors in seeking to address the case for action. When reviewing a spectrum licence technical framework, the effect any changes may have on other spectrum uses and users needs to be considered.

Consequently, while an aim of the review is to maximise the potential of the technical framework for spectrum-licensed services, ensuring coexistence and the spectrum utility of other spectrum uses and users are also key objectives.

---

<sup>2</sup> Massive IoT (Internet of Things) is the connection of a large number of devices embedded with sensors, processing ability, software and other technologies to exchange data with other devices. The aim is to facilitate the transmission and reception of small amounts of data from a large number of devices while providing low equipment costs and longer battery life.

<sup>3</sup> [What is 5G | Everything You Need to Know About 5G | 5G FAQ | Qualcomm.](#)

# Background

A technical framework for a spectrum-licensed band consists of 3 interlocking regulatory elements enabled by the *Radiocommunications Act 1992* (the Act):

- The conditions specified in the spectrum licence – in particular, the core conditions that define the spectrum space (both frequency and geographical area) and the level of emissions permitted inside and across the frequency boundaries of the licence (section 66 of the Act). Section 71 also provides for the ACMA to include other conditions in a spectrum licence.
- A determination of unacceptable interference for the purpose of device registration in each band (under section 145 of the Act). Under a spectrum licence, a radiocommunications device must not be used unless it is registered on the Register of Radiocommunications Licences or exempt from registration. We may refuse to register a device if we are satisfied it would cause an unacceptable level of interference. A determination under section 145 defines what is an unacceptable level of interference, generally by reference to levels of emissions across geographical licence boundaries, and also by reference to various deployment constraints.
- Radiocommunications advisory guidelines (RAGs) provide assistance and advice for coordination with stations providing other services when and where required (section 262 of the Act). This includes detailing interference management guidelines for apparatus licences and other spectrum licences.

A more comprehensive explanation of spectrum licence technical frameworks is in the document [Spectrum licensees – know your obligations](#).

The current 700 MHz band technical framework is on the [ACMA website](#).



# Proposed amendments to the technical framework

This section of the paper proposes changes to the 700 MHz band technical framework. An assessment is also provided on the effect the proposed changes will have on services within and adjacent to the 700 MHz band.

## 700 MHz band TLG

The ACMA may review or develop a new technical framework with the [assistance of a TLG](#). This is a short-term advisory body convened by us to provide advice on specific technical issues. While not having any decision-making powers, it provides useful advice on the development of, or possible changes to, the technical framework that applies to a particular frequency band.

We convened a TLG for the 700 MHz band to provide advice on changes to the 700 MHz band technical framework to accommodate AAS technologies, while managing interference with other licensed services. The TLG also took the opportunity to review, where appropriate, other aspects of the 700 MHz band technical framework to align with recent updates made and lessons learned in other bands including the 850/900 MHz, 1800 MHz, 2 GHz, 2.3 GHz, 3.4 GHz and 26 GHz bands. Membership of the TLG included:

- Australian Broadcasting Corporation
- Australian Mobile Telecommunications Association
- Ericsson
- Free TV Australia
- Network Ten
- Nine Entertainment
- Nokia
- Optus
- Seven Network
- Telstra
- TPG
- local broadcasting licensees
- land mobile and fixed services licensees.

The TLG concluded its work in October 2024. The outcomes are detailed in the [700 MHz band TLG paper](#).

We propose to largely adopt the changes identified by the TLG, except for outstanding issues concerning the unwanted emission below 694 MHz and the exemption from registration requirements for transmitters operating in the lower 700 MHz band. We have proposed and seek comment on the options for each issue. Further details are provided in the 'Proposed changes' section.

The TLG considered the following issues for review in the 700 MHz band technical framework.

## Conditions on the spectrum licences

The changes proposed to conditions on the spectrum licence are intended to provide support for 5G and AAS, align technical conditions with 3GPP standards, where coexistence with other licensed services is still achieved and provide greater flexibility for licensees to support a larger range of end user equipment. The proposed changes are described below.

### Metric used for defining in-band and unwanted emission limits

Currently, emission limits on spectrum licences in the 700 MHz band are defined in terms of either an equivalent isotropic radiated power (EIRP) or mean power (the power measured at the antenna connector, often referred to as 'conducted power'). However, these are not considered appropriate for AAS, as:

- Due to the integrated nature of radio units and antenna elements in AAS, it is not possible to measure conducted power. For this reason, 3GPP standards define unwanted emission limits for AAS in terms of total radiated power (TRP). TRP is equivalent to the conducted power minus the antenna efficiency (typically  $\leq 3$  dB for AAS). Consequently, in practice, there is little difference between the use of TRP or mean power.
- In some cases, the use of TRP is considered to more accurately reflect and limit the risk of interference presented by AAS. Section 6.3.2.1 of [ECC Report 281](#) provides a comparison on the use of TRP vs EIRP metrics to specify AAS emissions. 3GPP studies<sup>4</sup> state that the impact of unwanted emission on the adjacent mobile systems (in this context, spectrum-licensed services) is best represented and limited by use of TRP.

Importantly, although using TRP (as opposed to EIRP) may be beneficial for spectrum-licensed services, the ACMA must also consider the impact of doing so on other uses/users of the spectrum. Approaches that may be beneficial to spectrum licensees are not necessarily automatically consistent with overall spectrum management considerations. In this context, it is not intended that the adoption of TRP replace the need for spectrum licensees to coordinate with other services using actual EIRP values. This requirement, along with the defined protection criteria for other services detailed in the technical framework, is not proposed to change.

The European Conference of Postal and Telecommunications Administrations (CEPT)<sup>5</sup> and bodies such as the International Telecommunication Union (ITU) are moving to set unwanted emission limits in terms of TRP to support AAS. Use of TRP for AAS was also identified by the TLG.

### Level of in-band emission limits

The current in-band emission limit for 700 MHz band spectrum licences is 47 dBm/30 kHz equivalent isotropically radiated power (EIRP).

The proposed new limit is 53.2 dBm/5 MHz specified as a TRP, which is effectively equivalent to the existing EIRP limit. It was derived using the current EIRP limit and a typical non-AAS gain of approximately 16 dBi. That is  $47 \text{ dBm/30 kHz EIRP} = 69.2 \text{ dBm/5 MHz EIRP}$ ,  $-16 \text{ dBi} = 53.2 \text{ dBm/5 MHz TRP}$ .

---

<sup>4</sup> 3GPP R4-168430, 'On NRb BS ACLR requirement', Huawei, 3GPP TSG-RAN WG4 Meeting #80bis, October 2016.

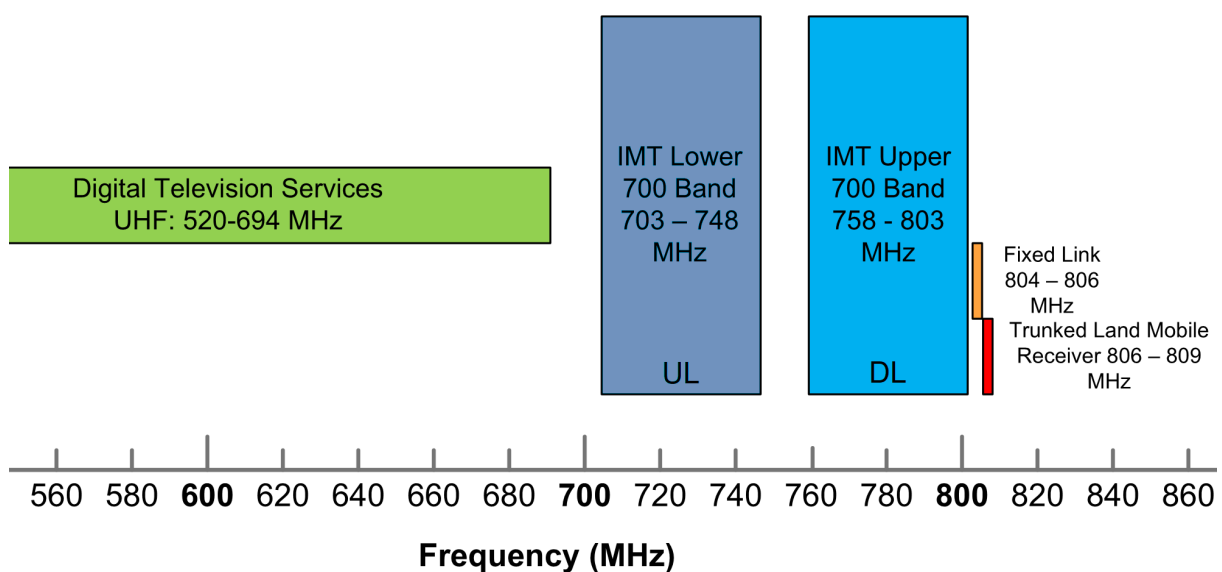
<sup>5</sup> [ECC Report 281](#).

## Level of unwanted emission limits

Issues with the existing unwanted emission limits in the 700 MHz band technical framework were raised by spectrum licensees and equipment manufacturers. Unwanted emissions include both out-of-band and spurious emissions. 3GPP standards defined different limits for each case.

The current limits present a challenge for the manufacture of cost effective and compliant AAS equipment. When reviewing the unwanted emission limits, the TLG also considered the impact any potential change might have on adjacent band services. Figure 1 shows the current arrangements for the 700 MHz band and adjacent bands. The 700 MHz band uses a frequency division duplex (FDD) arrangement, with the lower 700 band as the uplink (base receive) and the upper 700 MHz band as the downlink (base transmit).

**Figure 1: Current arrangements in the 700 MHz and adjacent band arrangements**

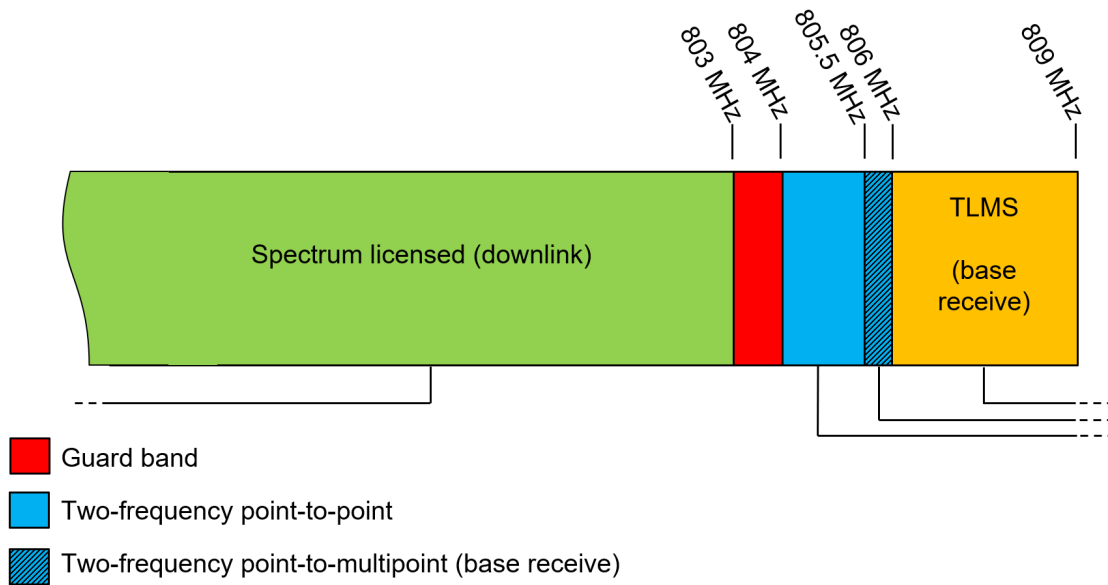


## Unwanted emission limits for transmitters operating in the 758–803 MHz band (upper 700 MHz band)

For the upper (downlink) segment of the 700 MHz band, out-of-band emissions are those that fall outside the lower and upper frequency limits of the licence and within the 748–813 MHz frequency range (that is, within the operating band and 10 MHz either side). Spurious emissions are all emissions that fall outside the 748–813 MHz frequency range.

Aligning with 3GPP standards for out-of-band emission limits above the upper 700 MHz band between 803–813 MHz could increase the risk of interference to existing apparatus licences. Figure 2 illustrates the arrangements for apparatus licensees in the adjacent upper 700 MHz band.

**Figure 2: Frequency arrangements around the 803 MHz boundary (paired frequency segments not shown)**



Separation distance calculations using 3GPP 38.104 Category B Option 1 requirements for 5G new radio (NR) bands below 1 GHz for non-AAS devices<sup>6</sup> showed a modest increase in required separation distances for point-to-point services in 804–805.5 MHz, and more significant increases for point-to-multipoint (PMP) services and trunked land mobile services (TLMS) in 805.5–809 MHz.

The TLG proposed a range of options to relax the unwanted emission limit, however the impact on PMP services would be an increase of between 20 and 50 km in separation distance between these services. Also, the narrower operating bandwidths of adjacent TLMS make these services more susceptible to increases in unwanted emissions.

We propose to adopt the 3GPP standard limit up to 805.5 MHz, where separation distance calculations show a lower potential of interference to PTP services, but maintain existing limits for the remaining frequency range.

For unwanted emission below the upper 700 MHz band between 758–803 MHz, the TLG recommended adopting 3GPP 38.104 Category B option 1 requirements for NR bands below 1 GHz for non-AAS devices, with an additional allowance of 9 dB for AAS devices.<sup>7</sup> Non-AAS limits are defined in terms of conducted power (mean power) per antenna port. AAS limits are defined in terms of TRP, that is, an aggregate of emissions from all transmitters and receivers contained in a piece of equipment.

For spurious emissions, the TLG recommended adopting spurious emission limits specified in 3GPP TS 38.104 (conducted power for non-AAS and TRP for AAS) for transmitters operating in the upper 700 MHz band.

<sup>6</sup> 3GPP TS 38.104 Table 6.6.4.2.2.1-1.

<sup>7</sup> As defined in 3GPP TS 38.104 section 9.7.4.2.

### **Unwanted emission limits for receivers operating in the 703–748 MHz (lower 700 MHz band)**

For the lower 700 MHz band used for the uplink (base receive), the TLG recommended adopting spurious emissions limits specified in the 3GPP TS 38.104 (conducted power for non-AAS and TRP for AAS) for receivers operating in the lower 700 MHz band.

### **Unwanted emission limits for transmitters operating in the lower 700 MHz band**

In the lower 700 MHz band, transmitters are generally user equipment (UE) with base stations receiving. The frequency range in which spurious emission limits apply are defined based on the operating channel bandwidth. They are defined as applying (channel bandwidth + 5) MHz above the upper edge and below the lower edge of a device's assigned channel. Out-of-band emission limits would therefore apply within the (channel bandwidth + 5) MHz above and below the lower 700 MHz band edges and outside the lower and upper frequency limits of the licence.

For the lower 700 MHz band, the TLG agreed to adopt 3GPP TS 38.101-1 unwanted emission limits, except in the first/nearest-adjacent 1 MHz offset where the 3GPP limit can potentially be stricter than the current limit,<sup>8</sup> so it is proposed to retain the current limit on the existing spectrum licences converted to TRP in that 1 MHz segment.

Similar to the proposed decision for the upper 700 MHz band, the TLG recommended adopting the spurious emissions specified in 3GPP TS 38.101-1 but in terms of TRP rather than conducted power.

### **Unwanted emission limits for receivers operating in the upper 700 MHz band**

Receivers in the upper 700 MHz band are generally UE with base stations transmitting. The TLG recommended adopting the receiver spurious emissions limits specified in the 3GPP TS 38.101-1, but specifying them in terms of TRP rather than conducted power.

### **Removal of redundant interference management conditions**

The TLG proposed removing conditions to protect broadcasting and retransmission services in the 700 MHz band that were in the process of transitioning out of the band when the spectrum licences were first issued. Since then, all the services have transitioned out of the 700 MHz band and these conditions are no longer needed on the licence. This clause is not present in spectrum licences issued in 2018.

### **Removal of redundant payment conditions**

The TLG proposed removing Licence Schedule 4 Part 9, which contained provisions for payment of licence fees by instalment. As all instalments have been received, these conditions are no longer needed on the licence. This clause is not present in spectrum licences issued before 2018.

### **Exemption from registration requirements in the upper 700 MHz band**

In the technical framework, the exemption from registration requirements is defined by reference to their maximum EIRP. The TLG proposed changing the definition of the condition to TRP. The requirement exempts low power, usually portable devices, from needing to be registered on the Register of Radiocommunications Licences (RRL), as their transmissions are not considered to pose a material risk of interference to other services.

---

<sup>8</sup> Due to the measurement, bandwidth defined as a percentage of the channel bandwidth.

The current exemption requirement for devices defined on 700 MHz band spectrum licences (for the upper 700 MHz band) is a radiated maximum true mean power of less than or equal to 30 dBm EIRP per occupied bandwidth.

Due to base stations operating at significantly higher powers in the upper 700 MHz band, the change from EIRP to TRP is unlikely to materially alter the interference environment above the upper 700 MHz band.

### **Exemption from registration requirements in the 850/900 MHz bands**

The 850/900 MHz bands were allocated in December 2021, with the spectrum licences coming into effect on 1 July 2024. The associated technical frameworks were established in 2021. The registration exemption requirements in those frameworks are defined using in terms of maximum EIRP, which the 700 MHz TLG proposed to change to TRP to align with the 700 MHz band. As it is only a minor amendment to the 850/900 MHz band spectrum licences, and noting that the relevant 850/900 MHz licence holders were present in the 700 MHz band TLG, it was agreed that this change can be considered under this consultation process.

### **Radiocommunications advisory guidelines (RAGs)**

The following RAGs are part of the 700 MHz band technical framework:

- [Radiocommunications Advisory Guidelines \(Managing Interference from Spectrum Licensed Transmitters – 700 MHz Band\) 2023](#)
- [Radiocommunications Advisory Guidelines \(Managing Interference to Spectrum Licensed Receivers – 700 MHz Band\) 2023](#)

The TLG did not propose changes to any of these RAGs, however potential changes to the unwanted emission limits below 694 MHz (discussed in ‘Unresolved issues’ below) would require consequential changes to the Radiocommunications Advisory Guidelines (Managing Interference from Spectrum Licensed Transmitters – 700 MHz Band) 2023 (RAG Tx).

### **Unresolved issues**

The issues remaining unresolved from the TLG are the exemption from registration requirements for the lower 700 MHz band and the unwanted emission limits below 694 MHz. These 2 issues are interrelated.

#### **Issue 1: Exemption from registration requirements in the lower 700 MHz band**

MNOs represented in the TLG proposed changes to the exemption from registration provision for the lower 700 MHz band. This provides for the exemption of low power, usually portable devices from registration on the RRL, as their transmissions are considered to not unduly cause interference to other services. Transmitters that exceed the requirements need to be coordinated and registered before they can operate.

Spectrum licensees would prefer to adopt similar exemption provisions as other spectrum-licensed bands, however adjusting these requirements needs consideration of the specific environment and the effect on adjacent services. In particular, digital terrestrial television (DTT) broadcasting services operate lower-adjacent to the lower band, the potential for interference caused by the overload of DTT receivers from transmitters in the lower 700 MHz band will need to be considered carefully.

Relaxing the requirements would allow for the deployment of higher power portable equipment and for the use of external antennas to increase range. However, uncoordinated ubiquitous higher power transmitters operating exempt from registration may increase the risk of overloading DTT receivers and causing interference.

The current exemption from registration limit defined for the 700 MHz band spectrum licences in the lower 700 MHz band is a radiated maximum true mean power of less than or equal to 23 dBm EIRP per occupied bandwidth.

Two limits were discussed within the TLG:

- 37 dBm EIRP per occupied bandwidth to support Power Class 3 (PC-3)<sup>9</sup> User Equipment (UE) (23 dBm +2 / -2.5 dBm + 12 dBi antenna gain)
- 40.5 dBm EIRP per occupied bandwidth to support Power Class 1 (PC-1)<sup>10</sup> UE (31 dBm +2 / -3 dBm + 7.5 dBi antenna gain).

Some members of the TLG are conducting further investigations on the proposed new limits, however no consensus has been reached on a preferred approach.

### ***Proposed options for issue 1***

We have considered the issue and propose 3 options. The proposed limit of 40.5 dBm EIRP cannot be considered without further evidence that the potential for increased interference to broadcasting services is sufficiently low. Adopting a 40.5 dBm EIRP limit would also require consideration of a change to the unwanted emission limits, as the increase to 40.5 dBm EIRP would increase the unwanted emission levels below 694 MHz.

- **Option A1:** No change to the exemption from registration requirements in the lower 700 MHz band.

The exemption from registration requirements in the lower 700 MHz band would remain 23 dBm EIRP per occupied bandwidth. The potential of interference due to overload to DTT receivers would not change under this option. However, this would not resolve an issue expressed by the MNOs that the 23 dBm EIRP does not account for the +2 dB margin in the 3GPP specifications for PC-3 devices. Additionally, it would continue to limit the use-cases and types of equipment that can be deployed in the lower 700 MHz band.

- **Option A2:** Relaxation of the exemption from registration requirements in the lower 700 MHz band to 25 dBm EIRP per occupied bandwidth.

This option would address the issue of a lack of margin on the current licences so that PC-3 compliant devices can operate without having to apply additional mitigation measures. There may be a modest increase to the potential for interference due to overload, and it would still restrict the use cases and types of equipment that can be deployed in the lower 700 MHz band.

- **Option A3:** Relaxation of the exemption from registration requirements in the lower 700 MHz band to 37 dBm EIRP per occupied bandwidth.

An increase to 37 dBm EIRP would provide for the use of external antennas up to 12 dBi of gain with an unregistered PC-3 device (with +2 dB margin), while ensuring that devices with high power and higher gain antennas would still need to be registered.

---

<sup>9</sup> 3GPP Specification 36.101-1, Table 6.2.2-1.

<sup>10</sup> 3GPP Specification 36.101-1, Table 6.2.2-1.

Our current preliminary preferred option is Option A2, on the basis that:

- Potential cases of interference to DTT services are difficult to document and identify due to the intermittent and transient use of portable devices. Fixed transmitters can present a higher risk of interference due to higher power and/or antenna gain, but they can operate if registered which ensure that they are coordinated with other services.
- This option would allow for PC-3 devices to be operated in accordance with 3GPP standards without having to apply additional mitigation measures.

Option A1 is not considered to be viable, as it does not reflect the review's intent to account for changes in technology and use cases in the 700 MHz band. Any consideration of Option A3 would need to be supported by detailed analysis and consultation with affected broadcasting stakeholders.

**1. We invite comments on the options proposed for definition of devices exempt from registration.**

**Issue 2: Unwanted emission limit below 694 MHz**

The existing unwanted emission limit below 694 MHz is defined in terms of EIRP and was originally developed to ensure coexistence with broadcasting services. Additionally, broadcasting services operate in 'Block E' channels that are adjacent to the lower 700 MHz lower band in some areas where transmitters have stricter unwanted emission limits (see Appendix B).

The existing limit applies to all transmitters that operate in the lower 700 MHz band, whether registered or exempt from registration. However, registration-exempt devices are more difficult to coordinate and locate due to their portable and intermittent operation. Transmitters that are not exempt from registration need to be coordinated and registered before they can operate, which makes coexistence with adjacent services easier to manage.

The TLG noted that under the current Australian standard,<sup>11</sup> equipment in Australia is required to comply with the ETSI standards for Band 28. This specifies a limit of -42 dBm/8 MHz TRP in 470–694 MHz. This limit is also specified in the 3GPP standards.<sup>12</sup> Some TLG members recommended that this limit be adopted as it is generally stricter than the current limits, outside of and inside Block E areas, and would align with 3GPP standards.

Figure 3 provides a comparison of the following limits:

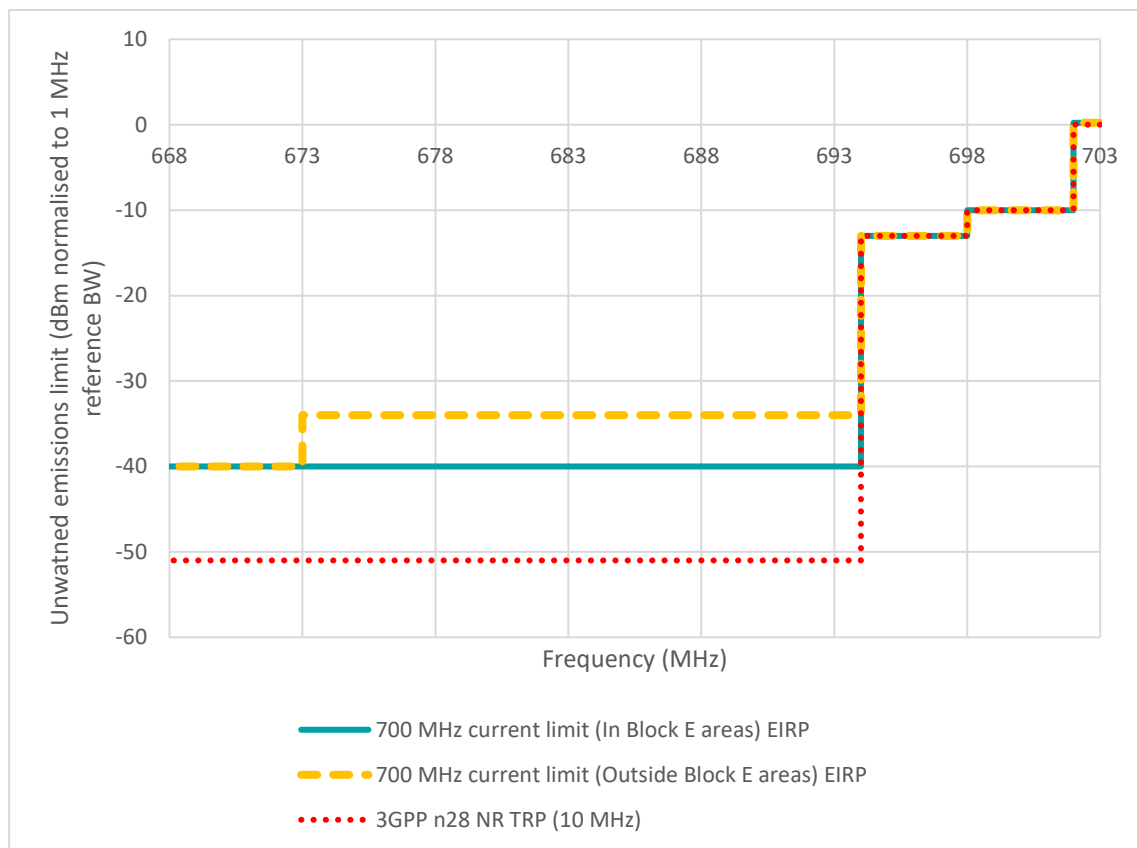
- Blue: the current unwanted emission limit in defined Block E areas (EIRP)
- Dashed yellow: the current unwanted emission limit outside of defined Block E areas (EIRP)
- Dotted red: the ETSI/3GPP NR standard for Band 28 (TRP)

<sup>11</sup> [Australian standard AS/CA S042.4:2022 Requirements for connection to an air interface of a Telecommunications Network—Part 4: IMT Customer Equipment](#) which requires compliance with [ETSI EN 301 908-13](#).

<sup>12</sup> 3GPP TS 38.101-1 V18.1.0 Table 6.5.3.2-1.



**Figure 3: Possible unwanted emission limits for transmitters operating in 703–748 MHz (lower 700 MHz band)**



**Proposed options for issue 2**

The following options are proposed:

- **Option B1, No change:** Keep the current unwanted emission limit below 694 MHz defined in terms of EIRP and retain a stricter limit in Block E areas.

This option would not present an increase in the potential for interference to DTT reception from unwanted emissions, when implemented with the potential options for the exemption from registration requirement. Under options A1 and A2 of the exemption from registration requirement, the current unwanted emission limit is more lenient (for devices exempt from registration) than the proposed ETSI standard for Band 28, which all devices in Australia must meet, making it an unnecessary compliance requirement.

- **Option B2, adoption of ETSI standard for Band 28:** Adopt the ETSI-specified unwanted emission limit below 694 MHz.

The ETSI standard specifies the limit in terms of TRP rather than an EIRP, allowing for the use of higher gain antennas. The TRP metric could allow for the use of high antenna gains, which result in unwanted emission power levels exceeding the current EIRP limits on the spectrum licences. However, the proposed options in Issue 1, the exemption from registration requirements, are defined as an EIRP, which limits the antenna gain that can be deployed.

Under options A1 and A2 of the exemption from registration requirements, unregistered devices operating in the lower band, would have a typical antenna gain of 0 dBi, resulting in a maximum unwanted emission level 11 dB lower than the existing Block E limit and

17 dB lower than the existing limit outside of Block E areas. Therefore, the potential for interference due to unwanted emissions to DTT receivers is not expected to increase.

Option A3 of the exemption from registration requirements limits the antenna gain on unregistered devices to a maximum of 12 dBi, which could increase unwanted emission levels below 694 MHz by 1 dB in Block E areas.

Our current preferred option is Option B2, that is, adoption of the ETSI-specified unwanted emission limits below 694 MHz, on the basis that:

- Under options A1 and A2 for the exemption from registration requirement, the ETSI/3GPP standard is stricter than the current unwanted emission limits on the 700 MHz band spectrum licence.
- Although expressing the limit in terms of TRP can, in theory, result in higher emission levels than an EIRP limit, the registration exemption options limit the antenna gain on transmitters operating in the lower 700 MHz band, so they could not exceed the current limits.
- Transmitters that are not exempt from registration need to be coordinated and registered before they can operate, which assists in managing coexistence with other services.
- The need for separate limits for Block E areas would be removed.
- The unwanted emission limit below 694 MHz would align with 3GPP standards, easing compliance requirements for suppliers.
- The change would not affect currently operating devices (both exempt from registration and registered) as they already must meet this requirement.<sup>13</sup>

The adoption of the preferred Option B2 for the unwanted emission limit below 694 MHz, along with Option A3 for the exemption from registration requirements, could modestly increase the potential for unwanted emission power levels greater than the current limit.

**2. We invite comments on the options proposed for the unwanted emission limits below 694 MHz.**

## Effect on incumbent services

When reviewing a spectrum licence technical framework, the effect any proposed changes may have on other spectrum uses and users needs to be considered, as is the case when a spectrum licence technical framework is first developed. This ensures that there are adequate measures in place to manage interference and facilitate coexistence with other services. While industry standards, such as those developed by the 3GPP, are established to support wireless broadband services, we must also consider broader implications of adopting these standards without any changes.

**3. We invite comments on the effect the proposed changes to the 700 MHz band technical framework may have on incumbent services in the 700 MHz (703–748 MHz and 758–803 MHz) band and adjacent bands.**

<sup>13</sup> [Australian standard AS/CA S042.4:2022 Requirements for connection to an air interface of a Telecommunications Network—Part 4: IMT Customer Equipment](#) which requires compliance with [ETSI EN 301 908-13](#).

## 700 MHz band spectrum licensees

Any changes to in-band and unwanted emission limits have the potential to affect compatibility between current and future services deployed by spectrum licensees. Advice from the TLG is that the proposed changes are acceptable and are supported by the existing spectrum licensees. Existing devices would not exceed any of the proposed new limits, so no modifications would need to be made to any existing operation under a 700 MHz band spectrum licence.

## Digital terrestrial television services

Digital television broadcasting and retransmission (DTT) services operate in the 520–694 MHz range. Ultra high frequency (UHF) broadcast channels 49, 50 and 51 (Block E) are adjacent to the 700 MHz lower band. The current 700 MHz band spectrum licence and RAG Tx contain conditions that were put in place to manage coexistence with DTT, including specific unwanted emission limits in areas where these Block E channels are used.

Proposed options A2 and A3 for the exemption from registration requirements issue have the potential to increase interference into DTT services. The relaxation of the threshold for the definition of devices exempt from registration in the lower 700 MHz band could increase the potential for overloading DTT receivers. Proposed Option A3 for the exemption from registration requirements issue, with the allowance for the use of external antennas, could result in unwanted emission levels higher than the current limits on the spectrum licence.

## Fixed link services

Fixed services operate in the 804–806 MHz frequency range.<sup>14</sup> These are divided into fixed point-to-point (PTP) services operating in 804–805.5 MHz (paired with 849–850.5 MHz) and fixed point-to-multipoint (PMP) services in 805.5–806 MHz (paired with 850.5–851 MHz).

RALI FX22<sup>15</sup> contains protection criteria for PTP services. The proposed adoption of the 3GPP standard up to 805.5 MHz is expected to have a minimal impact on PTP services for the following reasons:

- Calculations (see Appendix D) show a modest increase in required off-axis separation distances.
- PTP links use directional antennas, which provide good rejection of interference from adjacent services. RALI FX22 requires that PTP links with bandwidths >25 kHz, when located in high/medium density areas, use high performance antennas with increased off-boresight rejection.
- PTP links are predominately located in regional areas away from population centres and therefore may be less likely to be near spectrum-licensed services.
- Most importantly, existing PTP licences are protected by a first-in-time coordination process, where new devices operated under a spectrum licence must protect them to the levels defined in RALI FX22, regardless of changes in the unwanted emission limits.

Consequently, it is considered that the existing arrangements in place to manage interference with PTP services remain adequate and will not require modification to account for proposed changes to the 700 MHz band technical framework.

---

<sup>14</sup> [RALI MS 40 - 800 MHz band plan | ACMA.](#)

<sup>15</sup> [RALI FX22: Frequency assignment requirements for the fixed service in the 800 MHz band | ACMA.](#)

RALI FX16<sup>16</sup> contains protection criteria for PMP services. Since no changes are proposed to the unwanted emission limits in 805.5–806 MHz for transmitters operating in the upper 700 MHz band, there will be no change to the interference environment for PMP services. This means there will be no need to modify existing arrangements for coexistence with PMP services.

### **Trunked land mobile services**

Trunked land mobile services (TLMS) operate in the 806–809 MHz frequency range, paired with 851–854 MHz. RALI MS08<sup>17</sup> contains protection criteria for these services. Since no changes are proposed to the unwanted emission limits in 806–809 MHz for transmitters operating in the upper 700 MHz band, there will be no change to the interference environment for TLMS. There will be no need to modify existing arrangements for coexistence with TLMS.

### **Class-licensed services**

The [Radiocommunications \(Low Interference Potential Devices\) Class Licence 2015](#) (the LIPD Class Licence) defines arrangements for a range of different types of transmitters in and adjacent to the 700 MHz band. This includes wireless audio transmitters in the 520–694 MHz frequency range and ground penetrating radars in the 30–12400 MHz frequency range.

Devices operated under the LIPD Class Licence operate on a ‘no interference, no protection’ basis and transmitters operated under a 700 MHz band spectrum licence are not deemed to cause unacceptable interference to LIPD class-licence authorised devices. The changes proposed will have negligible impact on the existing interference environment. No changes are proposed to the technical framework to manage interference to class-licensed services.

### **Wireless audio devices (apparatus licensed)**

RALI LM09<sup>18</sup> provides additional apparatus licence options for wireless audio devices that are not covered by the LIPD class licence. Frequency ranges for this use are 520–694 MHz with allowances for 694–703 MHz, 748–758 MHz and 803–820 MHz on an interim basis. Devices operated under RALI LM09 provisions operate on a ‘no interference, no protection’ basis with respect to other licensed services. The changes proposed will have negligible impact on the existing interference environment. No changes are proposed to the technical framework to manage interference to apparatus licensed wireless audio devices.

## **Proposed changes to the conditions on the spectrum licence**

This section describes proposed changes to 700 MHz band spectrum licences. [Existing 700 MHz band spectrum licences](#) are available on the RRL and the relevant sections of those licences where changes are proposed have been reproduced at Appendix A.

For more information on the proposed changes, refer to ‘700 MHz band TLG’ in this document and the 700 MHz band TLG paper.

**4. We invite comments on proposed changes to the 700 MHz band spectrum licence conditions.**

<sup>16</sup> [RALI FX16: Frequency assignment requirements for the point to multipoint service in the VHF high, 400 MHz and 800 MHz bands | ACMA.](#)

<sup>17</sup> [RALI LM08: Land mobile service | ACMA.](#)

<sup>18</sup> [Frequency assignment procedures for apparatus licensed wireless audio devices | ACMA.](#)

We propose to seek agreement from 700 MHz band spectrum licensees to vary their licences, under section 72 of the Act, as detailed below.

### **In-band emission limits**

It is proposed to change the existing in-band emissions limits by changing Core Condition 17 of Licence Schedule 2 of existing 700 MHz band spectrum licensees:

- TRP of 53.5 dBm/5 MHz for all radiocommunication transmitters.

### **Unwanted emission limits**

It is proposed to replace the unwanted emission limits clauses (both spurious and non-spurious) defined in Core Conditions 6 to 13 of Licence Schedule 2 of existing spectrum licences with the unwanted emission limits detailed below, in tables 1 to 17.

We note that:

- For tables 1, 2, and 11, the term  $f_{\text{offset}}$  refers to the frequency offset from the upper or lower frequency limits for each geographic area specified in Licence Schedule 1 of a 700 MHz band spectrum licence. The closest -3dB point of the measurement bandwidth to the upper or lower frequency limits is placed at  $f_{\text{offset}}$ .
- For tables 3, 4, 5 and 6, the term  $f_{\text{offset}}$  refers to the frequency offset from the upper or lower band edge of the upper 700 MHz band. The closest -3dB point of the measurement bandwidth to the relevant band edge is placed at  $f_{\text{offset}}$ .
- The out-of-band emission limits specified in 3GPP TS 38.101-1 are proposed for transmitters operating in the lower 700 MHz band in Table 11. The frequency range of the associated unwanted and spurious emission limits are also aligned with 3GPP TS 38.101-1 in tables 11, 12 and 13.
- We have identified 2 options for the unwanted emission limits below 694 MHz. These are presented in tables 15, 16 and 17.
- The term 'radiated maximum true mean power' is taken to mean the EIRP of a device on a particular azimuth and elevation. It is the result of a measurement of the combination of all radiating elements of an antenna panel or individual device.
- The term 'total radiated power' is defined as the integral of the power transmitted in all different directions over the entire radiation sphere of a device. It is the result of a measurement of the combination of all radiating elements of an antenna panel or individual device.
- The term 'mean power' refers to the power delivered to an antenna port. It can be considered equivalent to the term 'conducted power', which is commonly used in radiocommunications.

**Out-of-band emission limits within the upper 700 MHz band**

**Table 1: Unwanted emission limits in the 758 MHz to 803 MHz range for transmitters operating in the upper 700 MHz band – non-AAS devices**

Frequency offset of measurement filter -3dB point from upper/lower limit of licence ( $f_{offset}$ )	Mean power (dBm) per transmitter port	Measurement bandwidth
$0 \text{ MHz} \leq f_{offset} < 5 \text{ MHz}$	$-7 \text{ dBm} - \frac{7}{5} \left( \frac{f_{offset}}{\text{MHz}} - 0.05 \right) \text{ dB}$	100 kHz
$5 \text{ MHz} \leq f_{offset} < 10 \text{ MHz}$	-14	100 kHz
$10 \text{ MHz} \leq f_{offset}$	-16	100 kHz

**Table 2: Unwanted emission limits in the 758 MHz to 803 MHz range for transmitters operating in the upper 700 MHz band – AAS devices**

Frequency offset of measurement filter -3dB point from upper/lower limit of licence ( $f_{offset}$ )	Total radiated power per sector (dBm)	Measurement bandwidth
$0 \text{ MHz} \leq f_{offset} < 5 \text{ MHz}$	$2 \text{ dBm} - \frac{7}{5} \left( \frac{f_{offset}}{\text{MHz}} - 0.05 \right) \text{ dB}$	100 kHz
$5 \text{ MHz} \leq f_{offset} < 10 \text{ MHz}$	-5	100 kHz
$10 \text{ MHz} \leq f_{offset}$	-7	100 kHz

**Out-of-band emission limits below the upper 700 MHz band**

**Table 3: Unwanted emission limits in the 748 MHz to 758 MHz range for transmitters operating in the upper 700 MHz band – non-AAS devices**

Frequency offset of measurement filter -3dB point from upper/lower limit of licence ( $f_{offset}$ )	Mean power (dBm) per transmitter port	Measurement bandwidth
$0 \text{ MHz} \leq f_{offset} < 5 \text{ MHz}$	$-7 \text{ dBm} - \frac{7}{5} \left( \frac{f_{offset}}{\text{MHz}} - 0.05 \right) \text{ dB}$	100 kHz
$5 \text{ MHz} \leq f_{offset} < 10 \text{ MHz}$	-14	100 kHz
$10 \text{ MHz} \leq f_{offset}$	-16	100 kHz

**Table 4: Unwanted emission limits in the 748 to 758 MHz range for transmitters operating in the upper 700 MHz band – AAS devices**

Frequency offset of measurement filter -3dB point from upper/lower limit of licence ( $f_{\text{offset}}$ )	Total radiated power per sector (dBm)	Measurement bandwidth
$0 \text{ MHz} \leq f_{\text{offset}} < 5 \text{ MHz}$	$2\text{dBm} - \frac{7}{5} \left( \frac{f_{\text{offset}}}{\text{MHz}} - 0.05 \right) \text{dB}$	100 kHz
$5 \text{ MHz} \leq f_{\text{offset}} < 10 \text{ MHz}$	-5	100 kHz
$10 \text{ MHz} \leq f_{\text{offset}}$	-7	100 kHz

***Out-of-band emission limits above the upper 700 MHz band***

**Table 5: Unwanted emission limits in the 803 MHz to 805.5 MHz range for transmitters operating in the upper 700 MHz band – non-AAS devices**

Frequency offset of measurement filter -3dB point from upper/lower limit of licence ( $f_{\text{offset}}$ )	Mean power (dBm) per transmitter	Measurement bandwidth
$0 \text{ MHz} \leq f_{\text{offset}} < 2.5 \text{ MHz}$	$-7\text{dBm} - \frac{7}{5} \left( \frac{f_{\text{offset}}}{\text{MHz}} - 0.05 \right) \text{dB}$	100 kHz

**Table 6: Unwanted emission limits in the 803 to 805.5 MHz range for transmitters operating in the upper 700 MHz band – AAS devices**

Frequency offset of measurement filter -3dB point from upper/lower limit of licence ( $f_{\text{offset}}$ )	Total radiated power per sector (dBm)	Measurement bandwidth
$0 \text{ MHz} \leq f_{\text{offset}} < 2.5 \text{ MHz}$	$2\text{dBm} - \frac{7}{5} \left( \frac{f_{\text{offset}}}{\text{MHz}} - 0.05 \right) \text{dB}$	100 kHz

**Table 7: Unwanted emission limits in the 805.5 to 813 MHz range for transmitters operating in the upper 700 MHz band – all transmitters**

Frequency range (f)	Radiated maximum true mean power (dBm EIRP)	Measurement bandwidth
$805.5 \text{ MHz} \leq f < 806 \text{ MHz}$	15	1 MHz
$806 \text{ MHz} \leq f \leq 813 \text{ MHz}$	-6	1 MHz

**Spurious emission limits for devices in the upper 700 MHz band**

**Table 8: Unwanted emission limits outside the 748 MHz to 813 MHz range for transmitters operating in the upper 700 MHz band – non-AAS transmitters**

Frequency range (f)	Mean power (dBm) per transmitter	Measurement bandwidth
$9 \text{ kHz} \leq f < 150 \text{ kHz}$	-36	1 kHz
$150 \text{ kHz} \leq f < 30 \text{ MHz}$	-36	10 kHz
$30 \text{ MHz} \leq f < 1 \text{ GHz}$	-36	100 kHz
$1 \text{ GHz} \leq f < 12.75 \text{ GHz}$	-30	1 MHz

**Table 9: Unwanted emission limits outside the 748 MHz to 813 MHz range for transmitters operating in the upper 700 MHz band – AAS transmitters**

Frequency range (f)	Total radiated power per sector (dBm)	Measurement bandwidth
$9 \text{ kHz} \leq f < 150 \text{ kHz}$	-27	1 kHz
$150 \text{ kHz} \leq f < 30 \text{ MHz}$	-27	10 kHz
$30 \text{ MHz} \leq f < 1 \text{ GHz}$	-27	100 kHz
$1 \text{ GHz} \leq f < 12.75 \text{ GHz}$	-21	1 MHz

**Table 10: Unwanted emission limits for receivers operating in the upper 700 MHz band – all receivers**

Frequency range (f)	Total radiated power (dBm)	Measurement bandwidth
$30 \text{ MHz} \leq f < 1 \text{ GHz}$	-57	100 kHz
$1 \text{ GHz} \leq f < 12.75 \text{ GHz}$	-47	1 MHz

**Out-of-band emission limits for transmitters in the lower 700 MHz band**

**Table 11: Unwanted emission limits for transmitters operating in the lower 700 MHz band at frequency offsets of channel bandwidth + 5 MHz – all transmitters**

Frequency offset ( $f_{\text{offset}}$ )	Total radiated power per sector (dBm)	Measurement bandwidth
$0 \text{ MHz} \leq f_{\text{offset}} < 1 \text{ MHz}$	-15	30 kHz
$1 \text{ MHz} \leq f_{\text{offset}} < 5 \text{ MHz}$	-10	1 MHz
$5 \text{ MHz} \leq f_{\text{offset}} < \max(\text{Channel BW}, 6)$	-13	1 MHz
$\max(\text{Channel BW}, 6) \leq f_{\text{offset}} < \max(\text{Channel BW} + 5, 10)$	-25	1 MHz



**Spurious emission limits for devices in the lower 700 MHz band**

**Table 12: Unwanted emission limits for transmitters operating in the lower 700 MHz band at frequency offsets greater than channel bandwidth + 5 MHz – all transmitters**

Frequency range (f)	Total radiated power (dBm)	Measurement bandwidth
$9 \text{ kHz} \leq f < 150 \text{ kHz}$	-36	1 kHz
$150 \text{ kHz} \leq f < 30 \text{ MHz}$	-36	10 kHz
$30 \text{ MHz} \leq f < 1 \text{ GHz}$	-36	100 kHz
$1 \text{ GHz} \leq f < 12.75 \text{ GHz}$	-30	1 MHz

**Table 13: Unwanted emission limits for receivers operating in the lower 700 MHz band - non-AAS receivers**

Frequency range (f)	Mean power (dBm) per receiver port	Measurement bandwidth
$30 \text{ MHz} \leq f < 1 \text{ GHz}$	-57	100 kHz
$1 \text{ GHz} \leq f < 12.75 \text{ GHz}$	-47	1 MHz

The proposed spurious emission limits for non-AAS receivers operating in the lower 700 MHz band are provided in Table 13. However, consistent with 3GPP TS 38.104, for a radiocommunications receiver where the antenna or transceiver array boundary connectors support both a radiocommunications receiver and a radiocommunications transmitter, the limits in Table 8 will instead apply.

Due to the integrated nature of AAS, the proposed spurious emission limits for AAS receivers operating in the lower 700 MHz band, detailed in Table 14, are the same as the AAS transmitter spurious emission limits specified in Table 9.

**Table 14: Unwanted emission limits for receivers operating in the lower 700 MHz band - AAS receivers**

Frequency range (f)	Total radiated power (dBm)	Measurement bandwidth
$30 \text{ MHz} \leq f < 1 \text{ GHz}$	-27	100 kHz
$1 \text{ GHz} \leq f < 12.75 \text{ GHz}$	-21	1 MHz

**Unwanted emission limits below 694 MHz, Issue 2: Option B1, No Change**

Table 15 and 16 detail the proposed unwanted emission limit below 694 MHz for Option B1, No change of Unwanted emission limit below 694 MHz (Issue 2) as described in the *Unresolved Issues* section.

**Table 15: Unwanted emission limits for transmitters operating in the lower 700 MHz band into frequencies below 694 MHz (within Block E areas)**

Frequency range (f)	Radiated maximum true mean power (dBm EIRP)	Measurement bandwidth
$f < 694 \text{ MHz}$	-40	1 MHz

**Table 16: Unwanted emission limits for transmitters operating in the lower 700 MHz band into frequencies below 694 MHz (outside of Block E areas)**

Frequency range (f)	Radiated maximum true mean power (dBm EIRP)	Measurement bandwidth
$f < 673 \text{ MHz}$	-40	1 MHz
$673 \text{ MHz} \leq f \leq 694 \text{ MHz}$	-34	1 MHz

**Unwanted emission limits below 694 MHz, Issue 2: Option B2, adoption of ETSI standard for Band 28**

Table 17 details the proposed unwanted emission limit below 694 MHz for Option B2 of Unwanted emission limit below 694 MHz (Issue 2), as described in the *Unresolved Issues* section.

**Table 17: Unwanted emission limits for transmitters operating in the lower 700 MHz band into frequencies below 694 MHz**

Frequency range (f)	Total radiated power (dBm)	Measurement bandwidth
$f < 694 \text{ MHz}$	-42	8 MHz

## Devices exempt from registration

We propose to amend the existing definition of devices that are exempt from registration, as defined in statutory condition 4 of schedule 3 of existing 700 MHz band spectrum licences, to give effect to one of the three options proposed under the exemption from registration requirements issue.

### Option A1:

#### Exemption from registration requirements

4. The following kinds of radiocommunications transmitters are exempt from the registration requirement in statutory condition 3:
- (a) a radiocommunications transmitter that operates within the band 703 MHz to 748 MHz band with a radiated maximum true mean power of less than or equal to 23 dBm EIRP per occupied bandwidth; or
  - (b) a radiocommunications transmitter that operates within the band 758 MHz to 803 MHz band with a maximum total radiated power of less than or equal to 30 dBm per occupied bandwidth.

### Option A2:

#### Exemption from registration requirements

4. The following kinds of radiocommunications transmitters are exempt from the registration requirement in statutory condition 3:
- (a) a radiocommunications transmitter that operates within the band 703 MHz to 748 MHz band with a radiated maximum true mean power of less than or equal to 25 dBm EIRP per occupied bandwidth; or
  - (b) a radiocommunications transmitter that operates within the band 758 MHz to 803 MHz band with a maximum total radiated power of less than or equal to 30 dBm per occupied bandwidth.

### Option A3:

#### Exemption from registration requirements

4. The following kinds of radiocommunications transmitters are exempt from the registration requirement in statutory condition 3:
- (a) a radiocommunications transmitter that operates within the band 703 MHz to 748 MHz band with a radiated maximum true mean power of less than or equal to 37 dBm EIRP per occupied bandwidth; or
  - (b) a radiocommunications transmitter that operates within the band 758 MHz to 803 MHz band with a maximum total radiated power of less than or equal to 30 dBm per occupied bandwidth.

## Proposed changes to the RAG Tx

We propose to amend the RAG Tx as detailed in the variation instrument, available in the key documents section of this consultation.

Changes are proposed to Section 10 of Part 3 Television Broadcast Services to give effect to the proposed adoption of the ETSI standard for out-of-band emissions from transmitters in the 700 MHz lower band.

5. **We invite comments on the proposed Radiocommunications Advisory Guidelines (Managing Interference from Spectrum Licensed Transmitters – 700 MHz Band) 2025.**

## **Proposed changes to the conditions on the 850/900 MHz bands spectrum licences**

We propose to seek agreement from 850/900 MHz bands spectrum licensees to vary their licences, under section 72 of the Act, as detailed below. Full copies of [existing 850/900 MHz bands spectrum licences](#) are available on the RRL, and the relevant section of the licence has been reproduced in Appendix B of this document.

6. **We invite comments on the proposed changes to the exemption from registration requirements on the 850/900 MHz bands spectrum licences.**

### **Devices exempt from registration**

It is proposed to amend the existing definition of devices that are exempt from registration, as defined in statutory condition 4 of schedule 3 of existing 850/900 MHz bands spectrum licences:

#### **Exemption from registration requirements**

4. The following kinds of radiocommunications transmitters are exempt from the registration requirement in Statutory Condition 3:
- (a) a radiocommunications transmitter that operates with a maximum total radiated power that is less than or equal to 25 dBm per occupied bandwidth in:
    - (i) the frequency range 814 MHz to 825 MHz; or
    - (ii) the frequency range 890 MHz to 915 MHz;
  - (b) a radiocommunications transmitter that operates with a maximum total radiated power that is less than or equal to 30 dBm per occupied bandwidth in:
    - (i) the frequency range 859 MHz to 870 MHz; or
    - (ii) the frequency range 935 MHz to 960 MHz.

# Invitation to comment

## Making a submission

We invite 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  
Wireless Broadband Section  
Australian Communications and Media Authority  
PO Box 78  
Belconnen ACT 2616

The closing date for submissions is COB, **Friday 28 February 2025**.

Consultation enquiries can be emailed to [fregplan@acma.gov.au](mailto:fregplan@acma.gov.au)

## Publication of submissions

We publish 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.

Confidential information will not be published or otherwise released unless required or authorised by law.

## Privacy

View information about our policy on the publication of submissions, including collection of personal information during consultation and how we handle that information.

Information on the *Privacy Act 1988*, how to access or correct personal information, how to make a privacy complaint and how we will deal with any complaints, is available in our [privacy policy](#).

# Appendix A: Relevant conditions of current 700 MHz band spectrum licences

This appendix contains a reproduction of the relevant conditions of existing 700 MHz band spectrum licences where changes are proposed. This includes:

- Licence Schedule 2 – Core Conditions
- Clause 4 of Licence Schedule 3 – Exemption from registration requirements

Full copies of [existing 700 MHz band spectrum licences](#) are available on the RRL.

## Licence Schedule 2 Core Conditions

### Frequency band and geographic areas

1. This licence authorises the operation of radiocommunications devices in the frequency bands and within the geographic areas set out at Part 2 of Licence Schedule 1.

### Emission limits outside the band

2. Core conditions 3 to 13 apply in relation to those frequencies that are outside the frequency bands set out in Part 2 of Licence Schedule 1.
3. Where a written agreement specifying the maximum permitted level of radio emission for frequencies described in core condition 2 exists between:
  - (a) the licensee; and
  - (b) all the affected licensees of frequency-adjacent and area-adjacent spectrum licences;the licensee must comply with that specified maximum permitted level of radio emission.
4. Where there is no written agreement for the purposes of core condition 3 in force, the licensee must comply with core conditions 5 to 13.

### Nonspurious emission limits

5. The licensee must ensure that radiocommunications devices operated under the licence do not exceed the non spurious emission limits in core conditions 6 to 10.
6. The non spurious emission limits in Table 3 apply:
  - (a) to a radiocommunications transmitter operating in the band 703 to 748 MHz; and
  - (b) at frequencies outside the upper or lower frequency limits set out in Part 2 of Licence Schedule 1; and
  - (d) at frequencies above 694 MHz; and
  - (e) offset from the upper and lower limits set out in Part 2 of Licence Schedule 1.where:

$f_{\text{offset}}$ : is the frequency offset from the upper or lower frequency limits set out in Part 2 of Licence Schedule 1.

Table 3: Non spurious emission limits at frequencies outside the band

Frequency offset range ( $f_{\text{offset}}$ )	Radiated maximum true mean power (dBm EIRP)	Specified Bandwidth
$0 \text{ Hz} \leq f_{\text{offset}} < 1 \text{ MHz}$	-15	30 kHz
$1 \text{ MHz} \leq f_{\text{offset}} < 5 \text{ MHz}$	-10	1 MHz
$5 \text{ MHz} \leq f_{\text{offset}} < 20 \text{ MHz}$	-13	1 MHz
$f_{\text{offset}} \geq 20 \text{ MHz}$	-25	1 MHz

7. The non spurious emission limits in Table 4 apply:
- to a radiocommunications transmitter operating in the band 758 MHz to 803 MHz;
  - at frequencies outside the upper or lower frequency limits set out in Part 2 of Licence Schedule 1;
  - within the band 748 to 806 MHz; and
  - offset from the upper and lower limits set out in Part 2 of Licence Schedule 1.

where:

$f_{\text{offset}}$ : is the frequency offset from the upper or lower frequency limits set out in Part 2 of Licence Schedule 1.

Table 4: Non spurious emission limits at frequencies outside the band

Frequency offset range ( $f_{\text{offset}}$ )	Radiated maximum true mean power (dBm EIRP)	Specified Bandwidth
$0 \text{ Hz} \leq f_{\text{offset}} < 5 \text{ MHz}$	15	1 MHz
$5 \text{ MHz} \leq f_{\text{offset}} < 10 \text{ MHz}$	11	1 MHz
$f_{\text{offset}} \geq 10 \text{ MHz}$	9	1 MHz

8. The non spurious emission limits in Table 5 apply to a radiocommunications transmitter operating in the band 758 MHz to 803 MHz where:

$f_{\text{offset}}$ : is the range of frequencies at which the limit applies.

Table 5: Non spurious emission limits at frequencies outside the band

Frequency offset range ( $f_{\text{offset}}$ )	Radiated maximum true mean power (dBm EIRP)	Specified Bandwidth
$f_{\text{offset}} < 748 \text{ MHz}$	-15	1 MHz
$806 \text{ MHz} \leq f_{\text{offset}} < 813 \text{ MHz}$	-6	1 MHz
$813 \text{ MHz} \leq f_{\text{offset}}$	-15	1 MHz

9. The non spurious emission limits in Table 6 apply:
- to a radiocommunications transmitter operating in the band 703 MHz to 748 MHz;
  - within an area referred to in paragraph 3.2(1)(a) of the *Radiocommunications Advisory Guidelines (Managing Interference from Transmitters — 700 MHz Band) 2012 (affected areas)*;

where:

$f_{\text{offset}}$ : is the range of frequencies at which the limit applies.

Table 6: Non spurious emission limits at frequencies outside the band

Frequency offset range ( $f_{\text{offset}}$ )	Radiated maximum true mean power (averaged over a 7 MHz television channel bandwidth) (dBm EIRP)	Specified Bandwidth
$f_{\text{offset}} < 694$ MHz	-40	1 MHz

10. The non spurious emission limits in Table 7 apply:
- to a radiocommunications transmitter operating in the band 703 MHz to 748 MHz;
  - outside of the affected areas;
- where:
- $f_{\text{offset}}$ : is the range of frequencies at which the limits applies.

Table 7: Non spurious emission limits at frequencies outside the band

Frequency offset range ( $f_{\text{offset}}$ )	Radiated maximum true mean power (averaged over a 7 MHz television channel bandwidth) (dBm EIRP)	Specified Bandwidth
$f_{\text{offset}} < 673$ MHz	-40	1 MHz
$673 \text{ MHz} \leq f_{\text{offset}} < 694$ MHz	-34	1 MHz

### Spurious emission limits

11. The licensee must ensure that radiocommunications devices operated under the licence do not exceed the spurious emission limits in core conditions 12 and 13.
12. For radiocommunications transmitters operated under the licence, the spurious emission limits in Table 8 apply at frequencies outside the 703-748 MHz and 758-803 MHz frequency bands.

Table 8: Radiocommunications transmitter spurious emission limits

Frequency range ( $f$ )	Radiated mean power (dBm EIRP)	Specified Bandwidth
$9 \text{ kHz} \leq f < 150 \text{ kHz}$	-36	1 kHz
$150 \text{ kHz} \leq f < 30 \text{ MHz}$	-36	10 kHz
$30 \text{ MHz} \leq f < 1 \text{ GHz}$	-36	100 kHz
$1 \text{ GHz} \leq f < 12.75 \text{ GHz}$	-30	1 MHz

13. For radiocommunications receivers operated under the licence, the spurious emission limits in Table 9 apply at frequencies outside the 703-748 MHz and 758-803 MHz frequency bands.

Table 9: Radiocommunications receiver spurious emission limits

Frequency range ( $f$ )	Radiated mean power (dBm EIRP)	Specified Bandwidth
$30 \text{ MHz} \leq f < 1 \text{ GHz}$	-57	100 kHz
$1 \text{ GHz} \leq f < 12.75 \text{ GHz}$	-47	1 MHz

### Emission limits outside the geographic area

14. Core conditions 15 to 17 apply in relation to those areas that are outside the geographic areas set out at Part 2 of Licence Schedule 1.
15. Where a written agreement specifying the maximum permitted level of radio emission for areas described in core condition 14 exists between:
- the licensee; and
  - all the affected licensees of frequency-adjacent and area-adjacent spectrum licences;
- the licensee must comply with that specified maximum permitted level of radio emission.



16. Where there is no written agreement for the purposes of core condition 15 in force, core condition 17 applies.
17.
  - (1) The maximum permitted level of radio emission for an area described in core condition 14 caused by operation of radiocommunications devices under the licence must not exceed a horizontally radiated power of 47 dBm EIRP per 30 kHz.
  - (2) The licensee complies with sub-condition 17(1) by ensuring that no radiocommunications device is operated under the licence in excess of a horizontally radiated power of 47 dBm EIRP per 30 kHz.

## **Licence Schedule 3 Statutory Conditions**

### **Exemption from registration requirements**

4. The following kinds of radiocommunications transmitters are exempt from the registration requirement in statutory condition 3:
  - (a) a radiocommunications transmitter that operates within the band 703 MHz to 748 MHz band with a radiated maximum true mean power of less than or equal to 23 dBm EIRP per occupied bandwidth; or
  - (b) a radiocommunications transmitter that operates within the band 758 MHz to 803 MHz band with a radiated maximum true mean power of less than or equal to 30 dBm EIRP per occupied bandwidth.

# Appendix B: Relevant conditions of current 850/900 MHz bands spectrum licences

This appendix contains a reproduction of the relevant conditions of existing 850/900 MHz bands spectrum licences where changes are proposed.

Full copies of [existing 850/900 MHz bands spectrum licences](#) are available on the RRL.

## **Licence Schedule 3      Statutory Conditions**

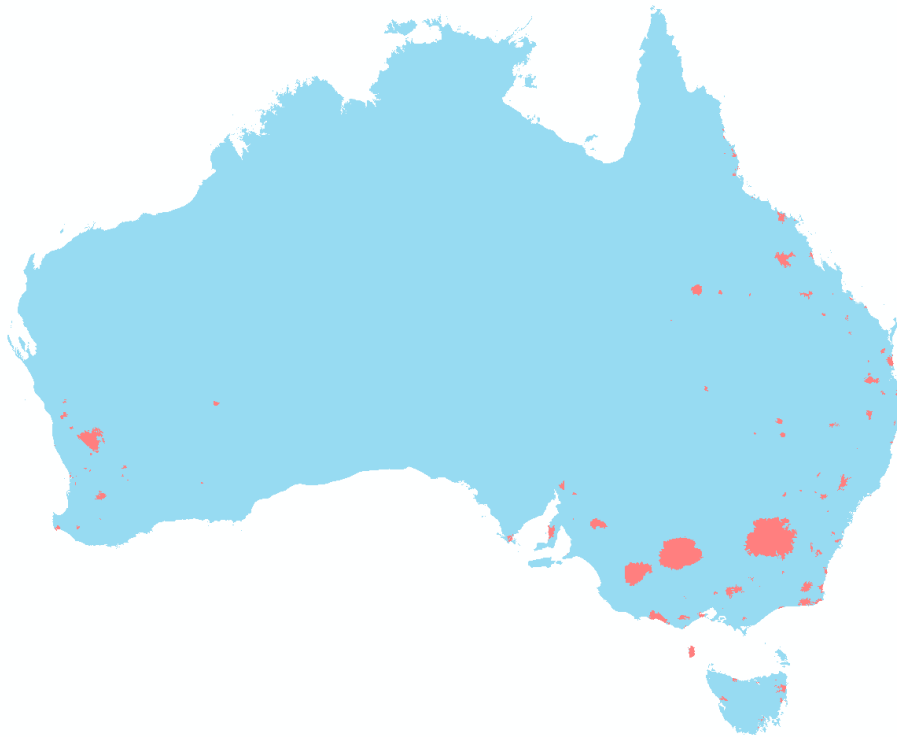
### **Exemption from registration requirements**

4. The following kinds of radiocommunications transmitters are exempt from the registration requirement in Statutory Condition 3:
  - (a) a radiocommunications transmitter that operates with a radiated maximum true mean power that is less than or equal to 25 dBm per occupied bandwidth in:
    - (i) the frequency range 814 MHz to 825 MHz; or
    - (ii) the frequency range 890 MHz to 915 MHz;
  - (b) a radiocommunications transmitter that operates with a radiated maximum true mean power that is less than or equal to 30 dBm per occupied bandwidth in:
    - (i) the frequency range 859 MHz to 870 MHz; or
    - (ii) the frequency range 935 MHz to 960 MHz.

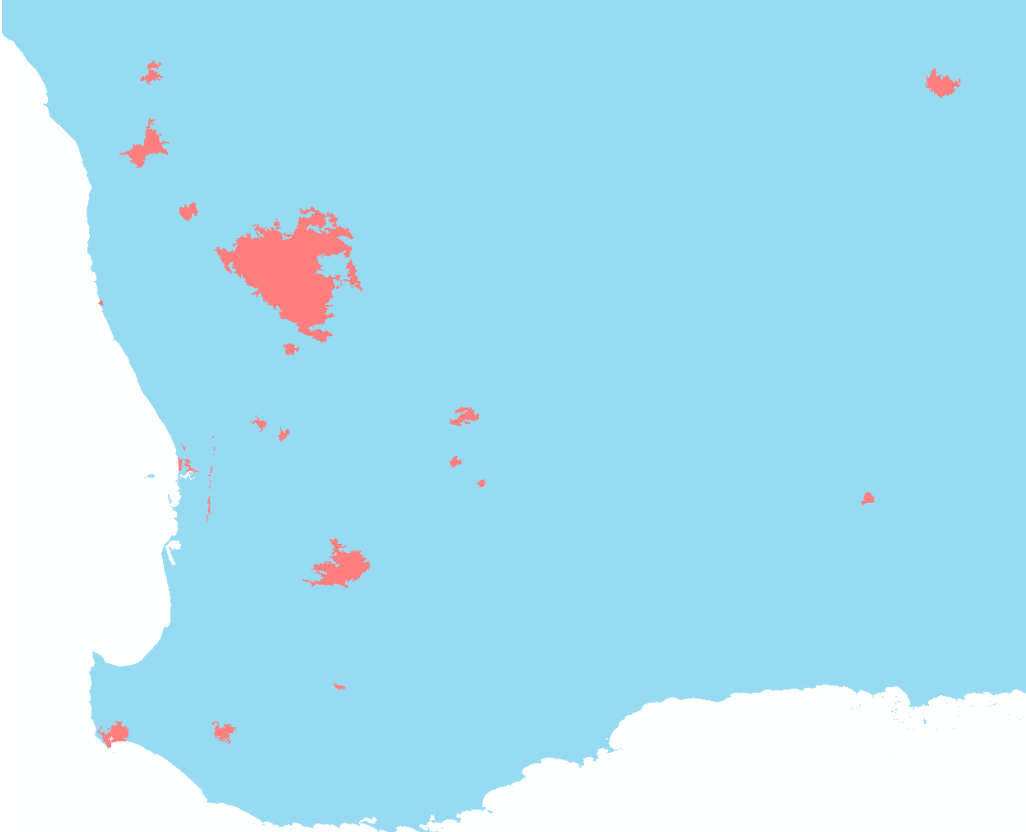
# Appendix C: Block E areas

DTT services operate in 520–694 MHz with channel planning Block E channels 49, 50 and 51 (673 – 694 MHz) adjacent to the 700 MHz lower band. The current 700 MHz spectrum licences stipulate stricter unwanted emission limits outside the band where these channels are used.

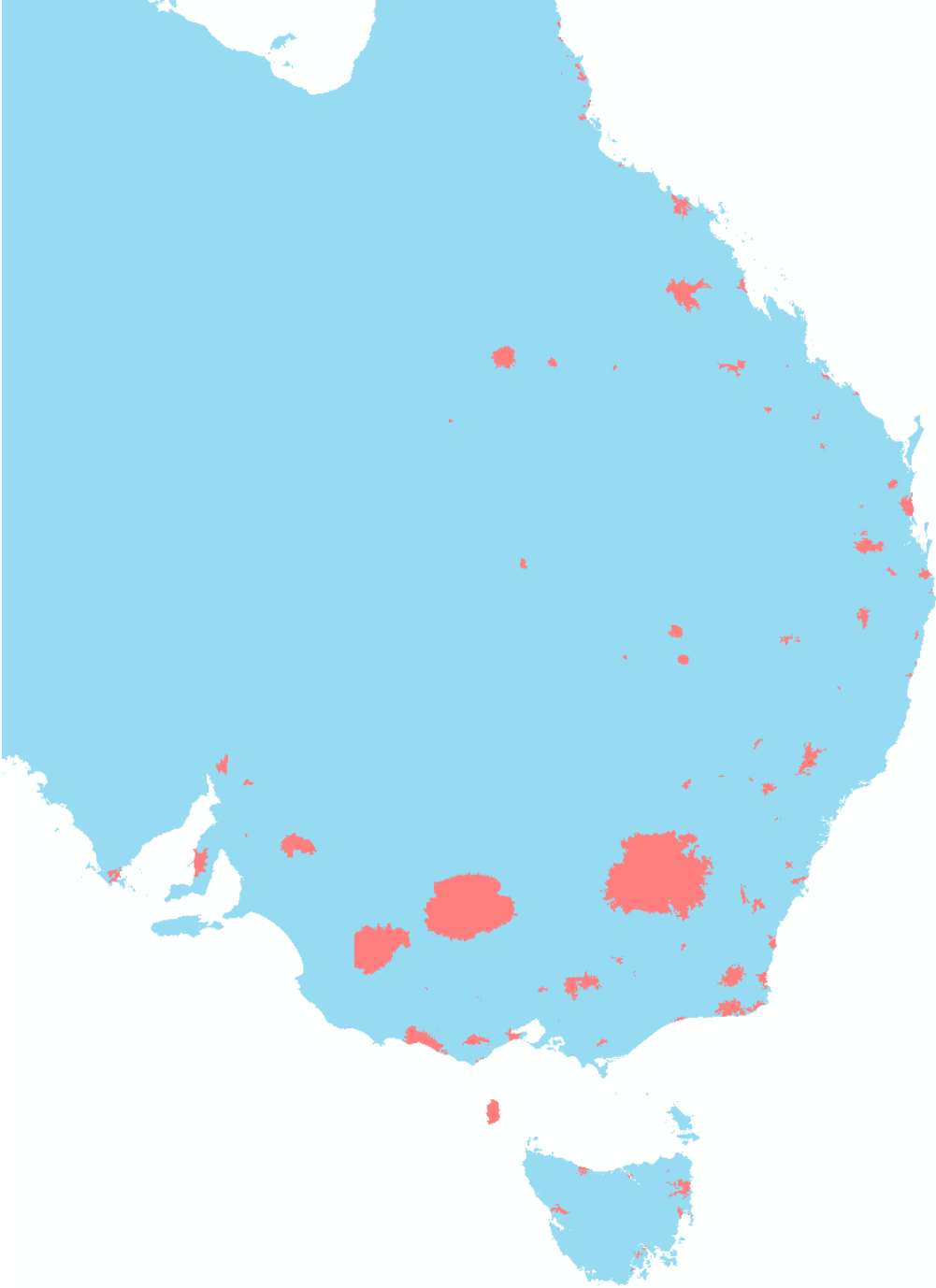
**Figure 4: Block E predicted areas of digital coverage**



**Figure 5: Block E predicted areas of digital coverage in south-western Australia**



**Figure 6: Block E predicted areas of digital coverage in eastern Australia**



# Appendix D: Separation distance calculations for services operating in 803–813 MHz

## Reviewing unwanted emissions limits in 803–813 MHz

Any proposal to relax unwanted emissions limits in this frequency range requires consideration of the impact on the adjacent services, the apparatus-licensed PTP, PMP and TLMS services. To determine the impact of this change, the separation distances have been calculated using the method in the consultation paper *Proposed updates to RALIs LM08, FX16 and FX22*<sup>19</sup> with the unwanted transmitter emissions level equivalent to the 3GPP limits. The non-AAS 3GPP limits are defined as conducted power per antenna port, as low order MIMO configurations of 2 or 4 (potentially up to 8) different transmitters are common, an additional 6 dB is included in the unwanted emissions power to account for this.

The existing unwanted emission limits in 803–813 MHz<sup>20</sup> are stricter than the 3GPP limits for band n28 defined in 3GPP TS 38.104 Category B Option 1,<sup>21</sup> except between 805–806 MHz where they are slightly more relaxed. However, the need to comply with the 806–813 MHz limit will most likely result in actual emissions being significantly less than the 15 dBm/MHz limit in that segment.

The current limits specified in the 700 MHz spectrum licence are compared to the 3GPP limits in Figure 7 below. The current limits are described as the radiated true mean power while the 3GPP limits are described as total radiated power. To compare the values, an antenna gain of 15 dBi (including antenna losses) has been assumed (this was the value used in the 700 MHz TLG to derive the existing EIRP masks). The AAS unwanted limits follow the general rule of using the proposed level +9 dB.

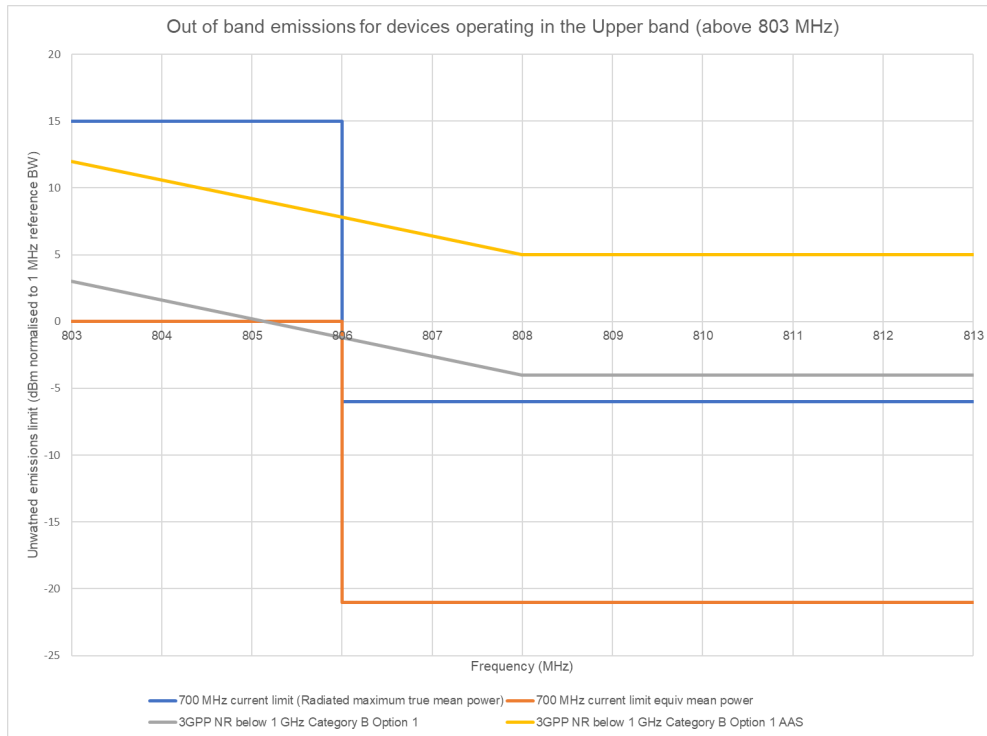
---

<sup>19</sup> [Proposed updates to RALIs LM08, FX16 and FX22 | ACMA](#).

<sup>20</sup> Spectrum licence for the 700 MHz Band Tables 4 and 5.

<sup>21</sup> 3GPP TS 38.104 Table 6.6.4.2.2.1-1.

**Figure 7: Emissions mask above 803 MHz**



**PTP services**

The 3GPP unwanted emission limits in the 800 MHz PTP lower segment (804–805.5 MHz) can vary from being greater than the current limits by 1.6 dB and less than the current limits by -0.5 dB. However, it is likely that due to current stricter limits in 806–813 MHz the actual emissions near the 806 MHz boundary will be lower than the 15 dBm/MHz EIRP limit.

The separation distance calculation results in Table 18 include results using the current limit of -6 dBm/MHz EIRP. Although this limit does not apply in the PTP segment, it is likely that because of the significant drop from 15 to -6 dBm/MHz at the 806 MHz boundary the separation distances close to the boundary will be operating close to the -6 dBm/MHz EIRP level.

**Table 18: Comparison of calculated minimum separation distances for PTP with additional 6 dB for multiple transmitters**

	Limits	PTP master station receiver (For 45 km link)
Current limits	-6 dBm/MHz EIRP	<ul style="list-style-type: none"> <li>• 5.7 km @ 0°</li> <li>• 1.3 km @ 30°</li> <li>• 500 m @ &gt;45°</li> </ul>
	15 dBm/MHz EIRP	<ul style="list-style-type: none"> <li>• 63.5 km @ 0°</li> <li>• 14 km @ 30°</li> <li>• 5.3 km @ &gt;45°</li> </ul>
3GPP limits + 6 dB for multiple transmitters	5.5 dBm/MHz TRP	<ul style="list-style-type: none"> <li>• 120 km @ 0°</li> <li>• 27 km @ 30°</li> <li>• 10 km @ &gt;45°</li> </ul>
	7.6 dBm/MHz TRP	<ul style="list-style-type: none"> <li>• 152 km @ 0°</li> </ul>

	Limits	PTP master station receiver (For 45 km link)
		<ul style="list-style-type: none"> <li>• 34 km @ 30°</li> <li>• 13 km @ &gt;45°</li> </ul>

The adoption of 3GPP limits for a single transmitter would increase the required separation distance outside the main beam from 5.3 km to 6.4 km at angles greater than 45 degrees; and from 14 km to 17.1 km at 30 degrees. When accounting for multiple transmitters, this increases to 13 km at angles greater than 45 degrees and 27 km at 30 degrees. Closer to the 806 MHz boundary, the difference in separation distances increases significantly.

### TLMS services

Adopting 3GPP limits would result in an increase of unwanted emissions by up to 19.8 dB into the TLMS frequency segment. In 806 to 809 MHz, the 3GPP limit ranges from -1.2 to -4 dBm/MHz TRP.

**Table 19: Comparison of calculated minimum separation distances for TLMS with additional 6 dB for multiple transmitters**

	Limits	TLMS base station receiver: current criteria	TLMS base station receiver: proposed criteria
Current limits	-6 dBm/MHz EIRP	2.3 km	1.2 km
3GPP limits + 6 dB for multiple transmitters	2 dBm/MHz TRP	33 km	17 km
	4.8 dBm/MHz TRP	46 km	23 km

With the current protection criteria for adjacent-band services, adoption of 3GPP limits would increase the separation distances from 2.3 km to 17 km in the best case and 1.2 km to 8.3 km with the proposed protection criteria. With the proposed protection criteria, the separation distances would still be greater than those for the current limits and current protection criteria.

### PMP services

In the PMP frequency segment (805.5–806 MHz) the 3GPP limits are stricter than the current limits, except at the 806 MHz boundary where it is 19.8 dB greater. Similar to the PTP segment, it is likely that due to current stricter limits in 806–813 MHz the actual emissions near the 806 MHz boundary would be less than the 15 dBm/MHz EIRP limit. This is reflected in the separation distance calculation results. Below the 806 MHz boundary separation distances would be slightly better under the adoption of 3GPP limits, being 57 km compared to 60 km assuming the current coordination criteria, 29 km compared to 30 km under the proposed coordination criteria.



**Table 20: Comparison of calculated minimum separation distances for PMP with additional 6 dB for multiple transmitters**

	<b>Limits</b>	<b>PMP master station receiver: current criteria</b>	<b>PMP master station receiver: proposed criteria</b>
Current limits	-6 dBm/MHz EIRP	5.4 km	2.7 km
	15 dBm/MHz EIRP	60 km	30 km
3GPP limits + 6 dB for multiple transmitters	4.8 dBm/MHz TRP	105 km	53 km
	5.5 dBm/MHz TRP	114 km	57 km