



TELSTRA CORPORATION LIMITED

Review of the 2 GHz band spectrum licence technical framework

Public submission

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01 Introduction

We welcome the opportunity to provide our views on the ACMA's proposal to **review the spectrum licence technical framework for the 2 GHz band**, as outlined in ACMA consultation IFC 38/2022. In recent times, the ACMA has updated the technical frameworks in the 850/900 MHz, 1800 MHz, 2.3 GHz and 3.4 GHz bands to support 5G and Active Antenna Systems (AAS). We thank the ACMA for its continued work to modernise International Mobile Telecommunications (IMT) bands, including now the 2 GHz band.

In general, Telstra supports the ACMA's position on the proposed changes to the 2 GHz SLTF following the recent Technical Liaison Group (TLG). However, we remain concerned with the proposed change to the out-of-band emission limits for 2100-2110 MHz that will apply to base-station transmitters operating in the upper 2 GHz band (2110-2170 MHz). Our concern stems from the ACMA's proposal to deviate from international standards.

Telstra's long-held position is for all aspects a technical framework, including out-of-band emissions, should be specified in accordance with established international (3GPP) standards wherever possible. Alignment to international standards ensures that Australian mobile network operators have access to equipment that is built to serve the global market. Development of bespoke base-station solutions to supply the relatively small Australian market is a costly exercise, thereby denying Australian mobile operators savings brought about by global economies of scale, which are passed on to the benefit of Australian mobile customers.

Both options proposed by the ACMA for emission limits in 2100-2110 MHz are more stringent than 3GPP standards. This is being done to protect Television Outside Broadcast (TOB) equipment operating below 2106 MHz. We have determined that off-the-shelf mobile base station equipment for the current mobile generations (4G and 5G, including the use of AAS) can comply with the ACMA's "Option 2" out-of-band emission limits without modification for the Australian market. However, we remain concerned that future generation equipment (6G and beyond) may be developed to take advantage of the higher (less stringent) emission masks currently specified in international 3GPP standards. The ACMA's proposal to deviate from international standards may prove troublesome for future generation mobile base-station equipment in Australia, and we remain concerned at the departure from international standards for the Australian market.

02 Proposed changes

The ACMA proposes several changes to the spectrum licence technical framework largely to accommodate 5G technology and to the uses of Active Antenna Systems (AAS).

Specifically, the proposed changes are as follows:

2.1. Update the metric that is used to define in-band and unwanted emission limits

The ACMA proposes to replace the existing definitions for both in-band power and unwanted emission limits from effective isotropic radiated power (EIRP) or mean power to 'Total Radiated Power' (TRP). This is consistent with similar changes proposed for other spectrum licensed bands and is also being more generally accepted by other administrations, as well as ITU-R and 3GPP.

Telstra supports this proposal.



2.2. Express the level of in-band emission limits as TRP, rather than EIRP

The current in-band emission limit for all services in this band is 77.2 dBm/5 MHz, specified as an EIRP. The proposed new limit is 53.5 dBm/5MHz specified as a TRP, which is equivalent to the current limit.

Telstra supports this proposal.

2.3. Proposed changes to the unwanted emission limits

During the TLG process, concerns with the existing unwanted emission limits in the 2 GHz technical framework (which are more stringent than, and therefore not compliant with 3GPP standards) were raised by spectrum licensees and base station equipment manufacturers. While no particular issues were identified with mobile base station compliance with the current limits, the advice at the time from equipment vendors was the non-standard limits could present a challenge for new 5G base stations where AAS are used. As such, mobile network operators and mobile equipment vendors sought through the TLG to have the out-of-band emission limits brought into line with international (3GPP) standards. Our justification was that development of technical solutions to address unique Australian licence conditions adds to the complexity and cost of such equipment, which is ultimately passed on to end mobile users.

As noted in the introduction, Telstra takes the view that emission limits based on global standards such as those published by 3GPP and adhered to by the vendor community should be incorporated in the core licence conditions to the greatest extent possible.

2.3.1. Unwanted emission limits for transmitters operating in the 2110–2170 MHz band (the upper 2 GHz band) and receivers operating in the 1920–1980 MHz band (the lower 2 GHz band)

In this consultation ACMA proposes unwanted emission limits based on the appropriate 3GPP limits (and as agreed in the TLG process), with one exception being the emission limits in the 2100 – 2110 MHz block. In Australia, this block partially overlaps the 2010 – 2106 MHz block used by TOB licensees for services such as Electronic News Gathering (ENG). There is a 4 MHz wide guard band between the lower edge of the IMT band, and the upper edge of the TOB band.

Telstra supports the proposed amendments to the emission limits as defined in Tables 3 – 12 of the consultation paper since they essentially mimic the emission limits that apply to the 3GPP Category B Option 2 mask. We note Category B Option 2 is the most stringent of the 3GPP masks that can be applied in this band, but we are comfortable this is not an imposition on mobile operators, as it is one of the 3GPP standard options.

However, we are concerned that ACMA have proposed unwanted emission limits for transmitters operating in the upper 2 GHz band at frequencies inside the 2100–2110 MHz band (the ACMA's "Option 1" and "Option 2" as defined in Tables 1 and 2 of the consultation paper) that are more stringent than standard 3GPP unwanted emission limits.

While we have determined that off-the-shelf mobile base station equipment for the current mobile generations (including using AAS) can comply with the ACMA's "Option 2", we are concerned that the imposition of a more stringent mask potentially means either more expensive bespoke base-station hardware or site solutions in future IMT generations. We remain concerned that the compromise solution may not be forward looking enough. Domestic spectrum planning needs to take into account the influence of global market forces when allocating adjacent spectrum blocks so that appropriate guard bands and coordination rules can be put in place. For example, 3GPP emission masks typically have 'break points' at 5 and 10 MHz offsets from the block edge. Having adjacent services only 4 MHz



offset from 2110 MHz is problematic as this is an example of a conflict with the global 3GPP standard. While equipment vendors have confirmed that current hardware could comply, it is not necessarily guaranteed that future base-station hardware architectures and next generation technologies will.

Of the two options proposed by the ACMA, we support Option 2 as our current generations of mobile equipment can meet these out-of-band emission limits.

2.3.2. Unwanted emission limits for transmitters operating in the lower 2 GHz band and receivers operating in the upper 2 GHz band

The ACMA proposes to align the specified emission limits with 3GPP TS 38.101-1 and to express the metric as a TRP value. ACMA have also proposed a slight variation to the frequency range that defines the upper and lower edges of the 'lower 2 GHz band'. While 3GPP specify 1875-2025 MHz as the edges of the lower 2 GHz band, the ACMA propose to specify the lower 2 GHz band as 1920-1980 MHz.

This is of no material consequence, and Telstra supports the proposed amendment.

2.4. Definition of devices exempt from registration

Telstra supports the proposed amendment which is to adopt similar arrangements applied in updates to the technical frameworks for other spectrum licensed bands.

2.5. Unacceptable levels of interference – s.145(4) determination

Telstra supports the proposed amendments which have already been implemented in the 850/900 MHz, 1800 MHz, 2.3 GHz, 3.4 GHz and 26 GHz bands.

The overall intent of these changes is to more accurately model interference and allow licensees to deploy services closer to their licence boundaries. This will result in greater utility of existing spectrum licences. The proposed changes include:

1. **Specifying a relaxed Level of Protection (LOP)** for systems using Active Antenna Systems (AAS). When AAS technology is used, beamforming results in a more dynamic interference environment, and is less likely to cause inter-system interference.
2. **Adopting a higher resolution Digital Elevation Model (DEM)** which is used to define the height of terrain above sea level at specific intervals. This data is used in calculating the device boundary (the Device Boundary Calculation or DBC). The current DBC method specifies a 9-second DEM, which has approximately 250m resolution. Geoscience Australia has now published a 3-second DEM (equivalent to approximately 90m resolution). This higher resolution DEM is progressively being implemented in new and revised spectrum licence technical frameworks. Currently the DBC is calculated at 500m intervals along each of the 360 radials centred on the relevant radiocommunications device. Changing this to a resolution of 100m, which more closely matches the resolution of a 3 second DEM, would result in a more accurate prediction of propagation losses.
3. Inclusion of a provision that states **DBC failures that occur over ocean paths**, where the relevant radial does not cross any land outside the geographic area of the licence, would not result in a device being taken to cause an unacceptable level of interference. Currently, DBC failures (that is, the points at which the DBC results in the device boundary being outside the geographic area of the licence) that are only over ocean paths result in the relevant device



being taken to cause an unacceptable level of interference by the s.145(4) determination. Through experience, 2 GHz band spectrum licensees have identified that this unnecessarily restricts the deployment of some devices that pose no real interference risk.

03 Answers to consultation questions

This section contains our answers to the specific questions asked by the ACMA in the consultation.

1. The ACMA is seeking comment on the 2 options proposed for unwanted emissions in the frequency range 2100–2110 MHz.

During the TLG process the TOB licensees raised concerns that should out-of-band emissions from adjacent frequency IMT base stations be relaxed, they might interfere with TOB 'collection point' receivers. To date, Telstra is not aware of any reported instances of interference between IMT and TOB. In the unlikely event of harmful interference to an outside broadcast link (at either the upper or lower edge of the IMT downlink band), we suggest the TOB operator could select a channel elsewhere in the TOB band further away from the IMT downlink.

As such, Telstra sees no need for either Option 1 or Option 2, and considers that standard 3GPP out-of-band emission masks would suffice.

However, given the ACMA's desire to introduce a tighter out-of-band emission mask, Telstra would seek to have the new emission mask mirror the 3GPP Category B Option 2 mask to the greatest extent possible. As previously stated, our base station vendors manufacture product based on the stringent 3GPP Category B Option 2 standard which is aimed at compatibility with other adjacent band systems, and we take guidance from base-station vendors on the practical ability meet the proposed emission masks. Therefore, of the two options, our preference is the ACMA's Option 2, as this most closely matches 3GPP Category B Option 2 and can be met by our vendors.

2. Comment is sought on the effect the proposed changes to the 2 GHz technical framework may have on incumbent services in the 2 GHz band and adjacent bands.

To maximise the utility of the available spectrum, it seems that there is a need to reach a compromise where: a) IMT base stations are able to migrate to 5G technology with AAS; and b) TOB links can be planned with full knowledge of the RF environment in which they are being deployed. This includes knowledge of the out-of-band emission characteristics of the IMT base stations and the real-world performance of AAS with beam forming. We consider the ACMA's Option 2 achieves this balance, as it informs TOB operators the further they move down from 2106 MHz, the lower the out-of-band emissions from IMT base stations.



3. Comment is sought on:

- > the proposed changes to 2 GHz band spectrum licence conditions
- > the proposed Draft Radiocommunications (Unacceptable Levels of Interference – 2 GHz Band) Determination 2023 (s.145(4) determination)

Telstra supports adoption of the changes proposed in the Draft Radiocommunications (Unacceptable Levels of Interference – 2 GHz Band) Determination 2023 (s.145(4) determination).

4. The Radio Advisory Guidelines for this band will sunset in 2026. The ACMA is proposing to remake the instruments. This will ensure the instruments remain valid for the remainder of the spectrum licence period. Comment is sought on the proposal to remake the following instruments:

- > Draft Radiocommunications Advisory Guidelines (Managing Interference from Spectrum Licensed Transmitters – 2 GHz Band) 2023
- > Draft Radiocommunications Advisory Guidelines (Managing Interference to Spectrum Licensed Receivers – 2 GHz Band) 2023.

We agree that no substantial changes are required to the *Radiocommunications Advisory Guidelines (Managing Interference from Spectrum Licensed Transmitters — 2 GHz Band) 2016* (“the Tx RAG”).

In the Tx RAG, we note that Part 6 Section 16 “Protection requirements” for TOB services only mentions 2170-2300 MHz and that TOB services operating in 1980-2110 MHz are not mentioned, which we suspect might be an oversight.