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## **TELSTRA GROUP LIMITED**

### **Submission to ACMA Consultation:**

### **Satellite Direct-to-Mobile Services – Regulatory Issues**

#### **Public Submission**

7 February 2024



## Executive Summary

We welcome the opportunity to provide our views to the ACMA's consultation on **Satellite Direct-to-Mobile Services: Regulatory Issues**. To expedite the introduction of Satellite Direct-to-Mobile (Satellite DTM) services in Australia, we support the ACMA's view<sup>1</sup> that the spectrum licensing technical framework, coupled with using Article 4.4 of the ITU-R Radio Regulations (RR4.4), is the most expeditious means to introduce Satellite DTM into Australia. However, we consider it is also necessary for the ACMA to issue s.195 written permission to the satellite operators for compliance with the *Radiocommunications Act 1992* (the Act). This permission is also a convenient mechanism through which the ACMA can insist that an inter-operator agreement be established between the satellite operator and the terrestrial mobile network operator (MNO) to prevent harmful interference. This will not impose any undue additional burden on the ACMA, satellite operators or MNOs and will not delay the introduction of Satellite DTM services in Australia.

For the long-term, we believe it is necessary for industry to transition to a licensing framework which is more fit-for-purpose. We are concerned the initial approach of using RR4.4 to permit satellites to operate in IMT bands, coupled with the absence of an established domestic licensing regime for them, leaves Satellite DTM services at risk of interruption – either due to interference from other operators of services under RR4.4 or claims for protection from interference by operators of services that conform with the Radio Regulations. There will be greater vulnerability to these claims for so long as Satellite DTM services are not assigned through the ITU-R and remain unlicensed under our domestic regulatory arrangements. Any claim of harmful interference to existing terrestrial or satellite services will require the satellite operator to reduce, or even cease operation. This would be an entirely unacceptable outcome for Australians who we expect will benefit greatly from Satellite DTM services and increasingly rely on them. In short, while RR4.4 facilitates an expedited path for satellite operators to bring services to market, it does not provide sufficient longer-term regulatory certainty for Satellite DTM services.

During the current World Radiocommunications Conference cycle (WRC-27), coexistence studies between the Mobile Satellite Service (MSS) and other services in bands used for International Mobile Telecommunications (IMT) are being conducted under Agenda Item 1.13 (AI1.13). If the studies show a feasible outcome, it is expected that WRC-27 will identify appropriate arrangements for MSS to operate in IMT bands which Australia can leverage. Any such arrangements must not undermine the rights of mobile spectrum licence holders to determine how the spectrum they have acquired at substantial cost is best used. We consider the ACMA and Department of Communications have a significant advocacy role in shaping the outcomes of the ITU-R work to help create a robust allocation framework. In section 4 of our submission, we set out some objectives we consider should guide Australia's advocacy at the ITU-R working groups associated with AI1.13 to develop a more robust licensing framework which creates increased certainty for service continuity and investment by the Satellite DTM industry.

Once there is greater certainty for Satellite DTM services in the ITU-R Radio Regulations, a complementary domestic licensing regime can be introduced for these services. At this point the need for s.195 written permission falls away, as the s.195 written permission will be replaced by the licensing regime. However, we expect the need for an inter-operator agreement between the MNO and the satellite operator will remain, and depending on the future licensing framework, there may still be a need for the ACMA to publish summary details of such agreements on its website.

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<sup>1</sup> Five Year Spectrum Outlook (FYSO) 2023-28, pp.21-22.



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Telstra also acknowledges that Satellite DTM technology will need to co-exist with radio astronomy. Each of these technologies have great potential to benefit Australians in different ways. It will be necessary for operators of radio astronomy facilities and operators of both satellite and terrestrial mobile services to co-ordinate closely so that each of these benefits can be realised, and we look forward to continued engagement with the radio astronomy community as we develop workable solutions for the future.



## 1 Introduction

We welcome the opportunity to provide our views to the ACMA's consultation on **Satellite Direct-to-Mobile Services: Regulatory Issues**.

Satellite DTM services are expected to be immensely beneficial for Australia. Transcending the existing limitations of terrestrial mobile networks in some geographical areas, Low Earth Orbit (LEO) satellites will offer complementary mobile communication to Australians living and working in the remotest parts of our nation where today the only option is traditional satellite services. Satellite DTM has the potential to improve the way people in remote areas communicate, access information, and conduct business, in a manner that complements the existing terrestrial network. The versatility of DTM services from satellites also opens opportunities for innovative applications, including real-time monitoring in various industries, improved disaster response capabilities, and calling for help in an emergency. The potential benefits are indeed an exciting prospect for Australia's future, and we welcome the opportunity to play our part in bringing this technology to Australians.

Bringing Satellite DTM technology to Australians as early as possible is Telstra's priority. We are also strongly in favour of a licensing framework which provides certainty for industry in the long term, particularly as the technology matures and evolves, and the field of industry players and interested parties expands. For this reason, in this submission we propose an approach which supports industry to bring services to Australians as early as possible, but also provides for industry to transition to a licensing framework which is more fit-for-purpose in the long term.

Our submission is structured as follows:

- Section 2 explains the basis of our support for the ACMA's view that the spectrum licensing technical framework, coupled with RR4.4 is the most expeditious means to introduce Satellite DTM into Australia. We explain why the Act requires the ACMA to also issue s.195 written permission.
- Section 3 explains why we believe industry should transition to a licensing framework which is more fit-for-purpose in the long term, to reduce the uncertainty that will subsist for industry if this does not occur.
- Section 4 explains there is a pivotal role for the ACMA and Department of Communications to play through AI1.13 at WRC-27. To this end, we set out what we consider are the objectives for a robust regulatory framework for satellites operating in IMT bands.
- Section 5 addresses matters raised by CSIRO at the 31 October Tune Up session regarding the Australian Radio Quiet Zone in Western Australia (ARQZWA) and highlights the importance of spectrum licence holders being able to use spectrum they have acquired in accordance with their licence conditions. We acknowledge the need for engagement and coordination to enable the benefits of both satellite DTM technology and radio astronomy science to be realised.
- Section 6 raises a question we have on a matter raised during the 31 October Tune Up session in relation to the adequacy of the LIPD class licence for satellite-direct-to-IoT.
- Finally, Appendix 1 contains our answers to the three specific consultation questions posed by the ACMA.



## 2 Applying the existing licensing framework to ensure DTM technology is available as early as possible

Note: In this section, our comments only apply to the scenario where Satellite DTM is provided in bands with an International Mobile Telecommunications (IMT) identification. Our comments do not apply to the scenario where Satellite DTM is provided in bands carrying the Mobile Satellite Service (MSS) identification. For Satellite DTM operating in bands already carrying an MSS identification, the operator of the satellite will require Space (transmit) and Space Receive apparatus licences from the ACMA, and mobile handsets (when capable of operating in MSS bands), will be licensed under the Communication with Space Object (CSO) class licence.<sup>2</sup>

We support the ACMA's view<sup>3</sup> on the suitability of the existing spectrum licensing technical framework to facilitate the introduction of Satellite DTM in IMT bands, but we believe an additional step is necessary: the ACMA must also provide written permission under s.195 of the Act to the satellite operator. We also believe that a mechanism is required to ensure an **inter-operator agreement** is in place between the satellite operator and the terrestrial MNO to prevent harmful interference. We propose that the s.195 written permission is a convenient mechanism to achieve this.

### 2.1. The ACMA must issue a s.195 written permission to the LEO operator

Section 195(1)(b) of the Act requires that:

*... a person must not, outside Australia and without the ACMA's written permission, use a transmitter that is on board a ... foreign space object:*

....

*(b) in a manner that the person knows is likely to interfere substantially with radiocommunications:*

- (i) within Australia; or*
- (ii) between a place in Australia and a place outside Australia.*

We submit that, since unsolicited and uncoordinated transmissions in IMT bands emanating from space are likely to substantially interfere with terrestrial IMT services, s.195(b) requires that written permission from the ACMA is obtained to use a transmitter on board a foreign space object when transmitting into IMT bands.

Versions of s.195 have been present in Australian law since 1967.<sup>4</sup> The purpose of the provision has been to maintain domestic sovereignty over permissible use of the radiocommunications frequency spectrum in circumstances where a transmitter is geographically outside the boundaries of the domestic licensing

<sup>2</sup> Radiocommunications (Communication with Space Object) Class Licence 2015.

<sup>3</sup> Expressed on pp.21-22 of the FYSO FY23-28 and at the Tune Up session, Regulatory Overview pack presented by Chris Hose, pp.3-4.

<sup>4</sup> s.6A(1) of the *Wireless Telegraphy Act 1905*, inserted by the *Wireless Telegraphy Act 1967*.



scheme. Historically the focus was on “pirate radio” transmissions, i.e., broadcast content,<sup>5</sup> but the provision was reframed in the 1983 *Radiocommunications Act* to additionally and expressly address the risk of harmful interference to radiocommunications.<sup>6</sup> The current s.195 is the same provision as was contained in the 1983 Act, with a significant addition in 2000 to add a transmitter on board a “foreign space object”; until then it had only covered transmitters on board foreign vessels and foreign aircraft.<sup>7</sup>

It is therefore incontrovertible, and a matter of the plain words of the provision, that it covers “foreign space objects” that would (absent appropriate interference management arrangements) interfere substantially with radiocommunications in Australia. It is also incontrovertible that Satellite DTM transmissions require the use of a dedicated terrestrial IMT spectrum frequency range, be it 5 MHz or 10 MHz paired, which cannot simultaneously be used for a terrestrial mobile network. A satellite operator must therefore be presumed to know that if it transmits over the Australian landmass using IMT spectrum frequency ranges which have been allocated for terrestrial spectrum licensing in Australia, it would be likely to substantially interfere with an existing terrestrial mobile network.

By entering into a private inter-operator agreement with a MNO the satellite operator can solve for the interference risk in practise (both from the satellite network to the terrestrial network and vice versa), but this does not change the initial objective likelihood of substantial interference which triggers the need for the ACMA written permission under s.195. Our view is that the proper reading of s.195 is that the satellite operator must demonstrate to the ACMA how it intends to address the substantial interference likelihood, i.e., by sharing the inter-operator agreement (or those provisions of the agreement pertaining specifically to interference management) with the ACMA, and the ACMA is thereby placed in a position to exercise its discretion to issue the written permission. To take any other view, i.e., that operators of foreign space objects outside of our domestic regulatory scheme can rely on their own private information to assess the likelihood of causing substantial interference to Australian radiocommunications, would be to neuter the protection of domestic sovereignty intended by s.195.

We observe that the satellite operators currently seeking to launch Satellite DTM services in Australia have had their filings issued by the United States’ Federal Communications Commission in well-documented and rigorous public processes that are easily accessible by Australian regulators and the general public.<sup>8</sup> These operators are considered to be responsible actors subject to stringent corporate and technical regulation in their home jurisdiction. This may not be the case for all future satellite operators. In fact, under RR4.4 the first time the ACMA becomes aware of a foreign operator transmitting into Australia may be when it causes

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<sup>5</sup> In the second reading speech for the Wireless Telegraphy Bill 1967, the Postmaster-General and Vice-President of the Executive Council stated: “*the purpose of this Bill is to deal with the so-called pirate stations that may be established beyond territorial waters but close enough to our coastline to direct their programmes to Australia.*” The provision was introduced due to concern that the approach taken by Radio Caroline to broadcast into the UK, would be duplicated in international waters around Australia.

<sup>6</sup> In the Minister for Communications’ second reading speech for the *Radiocommunications Bill* 1983, he stated:

*Moving to part XI of the Bill, honourable members will note the severe penalty provisions in clauses 65(2) and 65(10). These penalties are to deal with threats to the safety of marine and aeronautical services, to provide protection to Australian radio and television broadcasting services from the transmission of pirate broadcast programs from outside the territorial sea, and to **provide protection against substantial interference to internal and external Australian radiocommunications** caused by sources outside the territorial sea.*

(our emphasis)

<sup>7</sup> *Radiocommunications Legislation Amendment Act 2000 (Cth).*

<sup>8</sup> See the explanation of the process for NGSO satellite constellation licensing by the FCC in Mirmina, S. and Schenewerk, C., *International Space Law and Space Laws of the United States*, 2022 (Elgar), at p.198.



interference. We submit the ACMA should not (and cannot) forbear from exercising the jurisdiction inherent in s.195 by relying on whatever a satellite operator considers in its own private knowledge to be sufficient such that it believes there is no likelihood of causing substantial interference. The protections in s.195 are not vacated by the wholly subjective views of a person operating a transmitter on a foreign space object or by its private knowledge of commercial arrangements (but for which substantial interference with radiocommunications would be highly likely to occur). Australia's domestic regulatory scheme places significant reliance on independent accredited persons verifying by way of issue of Interference Impact Certificates that a licensee is complying with its obligations, prior to allowing registration of a transmitter.<sup>9</sup> It is logical that there be a similar objective assessment of a satellite operator's claim that it has in place arrangements to prevent harmful interference, in this case by way of the ACMA considering the information provided by the satellite operator and exercising its discretion to provide written permission under s.195.

Written permission from the ACMA under s.195 is not expected to be an onerous requirement for satellite operators; one satellite operator in its presentation at the ACMA Spectrum Tune Up noted that in several jurisdictions it has obtained "no-objection" letters from national regulators to commence services, so this appears to be a common and workable regulatory approach.

Further, the requirement for Satellite DTM operators to obtain a s.195 authorisation is consistent with the practice in other countries. We are currently not aware of any other administration that does not require a Satellite DTM operator to be authorised by the administration before they commence DTM transmissions in IMT bands.

We note that the s.195 written permission requirement does not apply to use of a transmitter if it is "*in accordance with an agreement, treaty or convention that*", "*... is entered into between Australia and any other country or countries*" or "*is specified in the regulations*".<sup>10</sup> However, RR4.4 presupposes acting in derogation of the Table of Frequency Allocations, in other words contrary to the ordinary requirements under the relevant ITU-R treaty instruments. Reliance on a provision in the Radio Regulations that permits derogation on an exceptional basis from those regulations, cannot be said to be "acting in accordance" with the relevant instrument. Therefore, until such time as arrangements are reached at an ITU-R level (potentially in WRC-27) for Satellite DTM operation and are given effect in a domestic Australian licensing scheme, our view is that the s.195 written permission requirement will continue to apply.

## 2.2. The requirement for an inter-operator agreement

We observe that, amongst stakeholders for Satellite DTM services and the ACMA, there appears to be general agreement that an inter-operator agreement must be established between the satellite operator and the terrestrial MNO. We envisage that an inter-operator agreement would address matters such as interference management by the satellite operator and the terrestrial spectrum licensee to:

- confirm that the spectrum licensee agrees to emissions in its spectrum space from the satellite transmitters that would otherwise be considered as harmful interference;
- provide a guarantee from the spectrum licensee to the satellite operator that the spectrum licensee will dedicate sufficient paired IMT spectrum to enable the Satellite DTM service to be

<sup>9</sup> s.145(3) and see the ACMA webpage: [What an accredited person does | Radiocommunications | ACMA](#)

<sup>10</sup> s.195(2)(a).





provided, by the spectrum licensee not otherwise using the relevant spectrum (save for instances where terrestrial use would not cause any interference to the Satellite DTM service e.g. in-building use); and

- ensure no adjacent licensees (at the frequency and geographic boundaries) are subject to harmful interference by supply of the Satellite DTM service.

We do not think it is possible for a spectrum licensee to issue a third party authorisation to a satellite operator to achieve these outcomes, because the satellite is transmitting from outside the spectrum licensee's spectrum-licensed space and hence to the best of our understanding is not capable of being registered under the relevant spectrum licence, as required by the Act<sup>11</sup> and the conditions of the spectrum licence.<sup>12</sup> The inter-operator agreement provides an alternative mechanism to demonstrate that the satellite operator is operating to transmit into the terrestrial IMT frequency range with the spectrum licensee's consent, and to set out the agreed technical arrangements for such transmission. Ordinarily, potential issues of harmful interference from adjacent apparatus-licensed transmitters into spectrum licensed space can be managed by agreement between the licensees. The inter-operator agreement is a bilateral arrangement that is similar to the existing approach used in Australia between adjacent licensees with the only distinctions being: (i) the transmissions from the transmitter outside the spectrum licence space are **intended** to be received in the spectrum licence space; and (ii) the space object is operating under RR4.4 rather than an apparatus licence.

Thus, we see a need for a regulatory mechanism which ensures that an inter-operator agreement is in place.

We propose the following process be adopted:

1. The satellite operator applies for a s.195 written permission, which includes providing a copy of the signed inter-operator agreement (for those provisions of the agreement pertaining specifically to interference management); and
2. upon receipt of a satisfactory application and signed agreement, the ACMA would issue a written permission under s.195 to the satellite operator, and also copy this to the MNO.

For the reasons explained in section 2.3, we also recommend that a summary of s.195 written permission letters be recorded publicly on the ACMA's website. Details such as names of the entities entering into the inter-operator agreement, the frequency or frequencies on which the service will operate, and high-level details of the geographic region(s) where the service will operate, should be published.

### **2.3. Publishing details of s.195 written permissions will be beneficial to stakeholders**

In the event of unexplained interference in IMT bands, the availability of the summary details (frequency and location) of a s.195 written permission and the inter-operator agreement will be of significant public benefit to either identify or rule out the Satellite DTM service as the possible cause of interference. We consider it will be beneficial to a wide array of stakeholders, both domestically and internationally, to have access to a list of s.195 written permissions, including the frequencies and geographic regions of operation, published on the ACMA's website.

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<sup>11</sup> s145.

<sup>12</sup> s.69.





In the future, if Australia transitions to a more fit-for-purpose licensing regime, as we propose in section 3, s.195 written permission will not be required. We suggest, however, there would still be significant public benefit in maintaining a public record of historic s.195 written permissions, to facilitate interference investigation and resolution. In the event the future licensing regime does not require the satellite operator to hold specific Space and Space Receive apparatus licenses, then there may still be benefit in maintaining a public record of future interoperation agreements, to facilitate interference investigation and resolution.

### 3 The case for transitioning to a more fit-for-purpose licensing regime for the long term

Note: In this section, our comments apply to Satellite DTM in IMT bands only and do not apply to Satellite DTM in MSS bands.

As noted elsewhere in this submission, Telstra's priority is to bring Satellite DTM technology to Australians as early as possible. It is for this reason that we support the ACMA's regulatory approach (with some enhancements) as explained in section 2. However, we have concerns the framework is unlikely to be sufficiently robust in the long term, particularly as satellite DTM technology matures and evolves, and the field of industry players and interested parties expands.

#### 3.1. Limitations in relying on Radio Regulations Article 4.4

Allowing satellites to operate in IMT bands under RR4.4<sup>13</sup> is the most expeditious way to introduce Satellite DTM in Australia, and we support this interim approach, coupled with the ACMA issuing a s.195 written permission to the satellite operator. However, we consider there are several limitations with using the RR4.4 approach that need to be addressed, and hence, there is a need for an alternative licensing framework in the longer term. The limitations we see are as follows:

- 1) We are concerned it may be difficult to resolve interference claims between different satellite constellations authorised simultaneously under RR4.4. RR4.4 requires that "*... such a station, when using such a frequency assignment, shall not cause harmful interference to, and shall not claim protection from harmful interference caused by, a station operating in accordance with the provisions of the Constitution, the Convention and these Regulations.*" Of course, neither station (on the respective satellites) is operating "*... in accordance with the provisions of the Constitution, the Convention and these Regulations*", because both stations are acting in derogation of the Table of Frequency Allocations. We are concerned neither station can claim protection from the other station, given neither is complying with the rules, and as such, an unresolvable situation exists.
- 2) If a satellite operating under RR4.4 causes interference to terrestrial or satellite services that are not operating in derogation of the Radio Regulations, the resolution process through the ITU-R is lengthy, and during this time, interference is likely to continue.
- 3) Notwithstanding the previous point about the time required to resolve interference claims, if a neighbouring jurisdiction to Australia is successful in lodging a claim for protection from

<sup>13</sup> ITU-R Radio Regulations Article 4, clause 4.4. <https://life.itu.int/radioclub/rr/art4.pdf>



interference from a satellite providing Satellite DTM services into Australia, the satellite operator must alter the system to mitigate the interference. This could result in parts of the service being shut down (i.e., restricted from operating in some geographic locations in Australia), presenting risk to the continuity of Satellite DTM services to Australians (who may already be using them).

- 4) Operation under RR4.4 can only offer protection to radio astronomy facilities in the designated radio astronomy bands, as the only time a terrestrial service can claim protection from a station on a space object operating under RR4.4 is if the terrestrial service is operating in accordance with the Regulations, and there is no allocation for radio astronomy (primary or secondary) on the IMT bands where Satellite DTM is planning to operate.

We are of the view that these limitations related to authorising satellite operation in IMT bands could, in the longer term, pose a risk to the continuity and sustainability of satellite DTM services supplied to Australia, especially as: 1) more satellite systems emerge; and 2) those systems are used in more complex and novel ways.

In addition to the limitations of operating satellites under RR4.4, we also consider mobile devices are not licensed to communicate with space objects, in breach of s.46 of the Act, which we discuss further in section 3.2 below.

### **3.2. Mobile devices are not licensed to communicate with space objects, only terrestrial base stations**

We also consider mobile handsets are not licensed to communicate with space objects, either in spectrum-licensed space or in apparatus-licensed (PMTS Class B) space. Under the Act, all transmitters operated in Australia must be licensed.<sup>14</sup> For most widely used devices, this is achieved under a class licence.

Mobile devices operating in apparatus-licensed space are licensed under the Cellular Mobile Telecommunications Devices (CMTD) class licence 2014,<sup>15</sup> and are only licensed to communicate with another station that is authorised under a PTS (PMTS Class B) licence.<sup>16</sup>

Mobile devices operating in spectrum licensed space do not have a separate class licence for the user terminal, but rather, are licensed (authorised) under the spectrum licence. Here again, the mobile device is only intended to communicate with other stations (base stations) authorised under the same spectrum licence; i.e., Telstra mobile devices are licensed to communicate with Telstra base stations on the frequencies and locations specified in the spectrum licence, Optus mobile devices with Optus base stations, etc.

As such, we consider mobile handsets are not licensed to communicate with space objects, regardless of whether the mobile handset is in a geography within spectrum-licensed space or is reliant on the CMTD class licence to communicate with an apparatus-licensed (PMTS Class B) mobile base station. Allowing mass-market devices to communicate with space objects without a licence risks setting an inconsistent precedent, even if the precedent is limited to IMT bands. There is a risk that this 'opens the door' to

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<sup>14</sup> s46.

<sup>15</sup> Available at <https://www.legislation.gov.au/F2014L01794/latest/text>

<sup>16</sup> Ibid, clause 5(1)(b).



importation and/or operation of devices communicating with space objects in IMT bands outside the control of the spectrum licensee.

Mobile network licensees that hold spectrum licences can, as part of an inter-operator agreement with a Satellite DTM operator, undertake to authorise their customers to operate mobile handsets within their spectrum space to communicate with space objects, by using a spectrum licensee's authorisation rights under s.68 of the Act. This provides a solution enabling initial deployment of Satellite DTM services under the RR4.4 approach. However, it does not provide a handset licensing solution for apparatus-licensed geographies in IMT bands in Australia.

### 3.3. Licensing is required to meet the Objects of the Act

We also consider that licensing, both of the space objects and of the mobile terminals when communicating with space objects, is required in accordance with the Object of the Radiocommunications Act.<sup>17</sup> The Object of the Act states that the purpose of the Act, and hence the radiocommunications licensing regime, is to: “... *promote the long-term public interest derived from the use of the spectrum by providing for the management of the spectrum in a manner that facilitates the efficient planning, allocation and use of the spectrum ...*”. We consider that licensing each constellation of satellites operating in an IMT band is required to meet the objectives of the Act (doing so facilitates good *management of the spectrum*) and provides a means to control use of the spectrum as the number of satellite constellations increases and new and more complex uses emerge. Choosing not to license satellite constellations sends a signal that authorisation is not required (for either the space object or the mobile terminal), thereby potentially undermining the ability to effectively control and manage the spectrum, eroding the long-term public interest.

## 4 The ACMA and Dept Comms have a pivotal role to play at WRC-27

The coexistence of satellites in IMT band and other existing services is being studied in the WRC-27 cycle under Agenda Item 1.13 (AI1.13). We consider the ACMA and the Department of Infrastructure, Transport, Regional Development, Communications and Arts (DITRDCA) has a pivotal role to play in AI1.13 to promote a robust framework for the operation of satellites in IMT bands. In Australia and elsewhere around the world, MNOs make substantial payments to acquire spectrum. Similarly, satellite operators spend substantial amounts to launch and maintain satellite constellations. These significant investments require a robust licensing framework to ensure the continuity of Satellite DTM services, and to ensure mechanisms exist that prevent satellite operation without commensurate agreement from a terrestrial mobile operator. Advocacy at the working parties from the Australian Delegation is essential to ensure appropriate arrangements are developed to support a domestic licensing regime for Satellite DTM in IMT bands.

We consider the regulatory arrangements (both ITU-R and domestic licensing), regardless of their final form, must ultimately satisfy these objectives:

- the spectrum licensees of terrestrial mobile networks must have robust legal protection from the unwanted (i.e., without a formal agreement) operation of satellite transmissions into their licensed terrestrial IMT bands;

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<sup>17</sup> Radiocommunications Act, Part 1.2, s.3. <https://www.legislation.gov.au/C2004A04465/latest/text>



- terrestrial mobile network operators must have a legal mechanism for licensing mobile devices to communicate with space objects;
- satellite operators must have a robust legal framework within a jurisdiction for resolving claims for protection from interference arising within that jurisdiction (notionally, the satellite should be licensed to operate in that jurisdiction, thereby affording the satellite a higher level of status than the current proposal of operating under RR4.4 where there is no protection from claims of interference); and
- to the greatest extent possible, satellite operators should have a level of recourse to resolve claims from protection from harmful interference raised by neighbouring jurisdictions, i.e., such that once Satellite DTM services are operational in Australia, there is a mechanism to resolve interference claims arising from neighbouring jurisdictions and to protect the services from other services operating under RR4.4, to minimise any disruption to Satellite DTM operating in Australia.

Thus, we consider the ACMA and the Department of Communications have a pivotal role to play in AI1.13 to promote the development of a robust licensing framework for the operation of satellites in IMT bands that satisfies these objectives. We look forward to working closely with the ACMA, Department and industry on this issue in the work leading up to WRC-27.

## 5 Protecting the ARQZWA and east-coast radio astronomy facilities

Note: in this section, our commentary is applicable to both Satellite DTM in IMT bands and Satellite DTM in MSS bands.

In any conversation about radio astronomy coexisting with IMT, it is important at the outset to acknowledge that both mobile services and radio astronomy have great potential to benefit Australians in different ways, and both need to coexist. It will be necessary for operators of radio astronomy services at the ARQZWA and operators of both satellite and terrestrial mobile services to co-ordinate closely so that these benefits can be realised.

It is also necessary to acknowledge that spectrum licensees have paid for, and have the right to use, spectrum in IMT bands right across Australia, outside the protection areas (normally specified by a radius), around radio astronomy facilities. Satellite DTM will bring substantial benefits directly to Australians living and working outside these radio astronomy protection areas, and it is important that these services can be provided at any location outside the protection zones.

At the Spectrum Tune Up session facilitated by the ACMA on 31 October 2023, CSIRO presented information about the scientific exploration conducted at Australia's radio astronomy facilities. CSIRO highlighted the importance of this work for understanding the origins of the universe, and why radio astronomy is susceptible to radio interference from transmissions from satellites orbiting the earth. CSIRO have also highlighted the importance of frequencies outside of those designated for Radio Astronomy in the ARSP because of the 'red shift' effect due to the rapidly expanding universe.

Because LEO satellites orbit at around 500 km above the earth, they are "visible" (above the horizon) at distances of around 2,000 km. CSIRO suggested that to fully protect facilities such as the Murchison Radio



Observatory (MRO) in the Australian Radio Quiet Zone in Western Australia (ARQZWA), a satellite could only service the eastern states if no other interference mitigations were in place.

However, our initial engineering studies have shown that it is likely that the satellite operators will be able to implement 'null steering' on each satellite antenna system in order to minimise any impact on such radio astronomy facilities while operating in close proximity to the protection boundary surrounding various observatories. This technique puts very deep nulls in the direction of the radio astronomy facility and is much more effective at mitigating any interference than only steering the main beam from the satellite away from the facility. More collaborative work between stakeholders is needed to consider techniques like this to address the radio astronomy community's concerns while still allowing Satellite DTM coverage aspirations to be met.

Thus, we consider the best way to ensure the opportunity for the introduction of Satellite DTM is maximised, while providing reasonable protection to radio astronomy facilities around Australia, is for satellite operators and MNOs to collaborate with the radio astronomy community to determine what can be realistically achieved while minimising interference to radio astronomy observatories.

We also suggest that once collaboration has occurred, and agreements on proposed coexistence mechanisms have been reached, the arrangements can be codified in appropriate ACMA instruments. This could take the form of updates to some of the Radiocommunications Assignment and Licensing Instruction (RALI) documents such as RALIs MS-31 and MS-32 to introduce mutually beneficial changes, or perhaps the creation of new RALIs for the coexistence of radio astronomy facilities and satellite operation.

## 6 Other matters raised during the Tune Up

This final section of our submission contains questions and thoughts we have about one other matter raised during the Tune Up session on 31 Oct 2023.

### 6.1. Clarification is required for IoT devices communicating directly with satellites under LIPD

At the ACMA's Tune Up session, there was a presentation related to Satellite-direct-to-IoT services. The presentation stated the LIPD framework is fit-for-purpose for Satellite-direct-to-IoT communication. We are not convinced this is accurate.

Specifically, the ACMA consultation 35/2022<sup>18</sup> notes that the ACMA elected not to proceed with including the authorisation of earth station receivers in the 900 MHz and 2.4 GHz bands. As the ACMA's outcomes paper notes,<sup>19</sup> "> earth stations cannot be fully authorised under the LIPD Class Licence, as it currently covers the transmitters only, not receivers;". The outcomes paper also notes these receivers are not licensed under the Communications with Space Object (CSO) Class Licence, as the relevant bands are not included in that licence.

With respect to transmitters on space objects, we are unclear as to whether the LIPD class licence applies. If it does apply, then the *transmitter output* is limited to a maximum of 1W EIRP (items 54 and 58 in the LIPD class licence). This is not the power spectral density as measured on the surface of the earth, but rather the

<sup>18</sup> See <https://www.acma.gov.au/consultations/2022-10/new-arrangements-low-interference-potential-devices-consultation-352022>

<sup>19</sup> Consultation 35/2022 outcomes paper, middle of p.3.  
[https://www.acma.gov.au/sites/default/files/2023-05/lipd\\_class\\_licence\\_update\\_-\\_outcomes\\_paper.pdf](https://www.acma.gov.au/sites/default/files/2023-05/lipd_class_licence_update_-_outcomes_paper.pdf)



output of the transmitter as measured at the antenna on the space object. Of course, the satellite operator could apply for a Space (and complementary Space Receive) apparatus licence should it desire to operate at power levels above 1W EIRP. However, as the ACMA observes in the outcomes paper, the ISM bands (915-928 MHz and 2400-2483.5 MHz) are not listed in the CSO class licence,<sup>20</sup> so communication with the terrestrial IoT devices is technically not authorised in the event the satellite operator obtains a Space apparatus licence required to operate at a power output above 1W EIRP.

We request the ACMA to clarify its view on the appropriateness of the LIPD class licence to enable Satellite-direct-to-IoT communication, especially where the power output of the satellite transmitter is above 1W EIRP.

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<sup>20</sup> Ibid, middle of p.3.



## Appendix 1: Response to consultation questions

This appendix contains our response to the consultation questions.

**1. Is the current spectrum management framework fit-for-purpose to manage these new satellite services? This includes spectrum-licensed bands and other bands covered by the LIPD class licence.**

While not optimal, we consider the spectrum licensing framework, and reliance on RR4.4, with a s.195 written permission from the ACMA, is sufficient for the early introduction of Satellite DTM into Australia. We refer the reader to sections 2, 3, 4 and 6.1 of our submission for full details.

**2. If not considered fit-for-purpose: What are your concerns? What is your proposed solution? What next steps should be taken?**

See sections 2, 3, 4 and 6.1 of our submission.

**3. Are there any other commercial, regulatory or public-benefit implications we should take into account?**

We consider there are considerable public benefits that could arise from the advent of Satellite DTM in Australia. Already, LEO Satellites providing fixed broadband services have revolutionised broadband connectivity in remote areas of Australia. We anticipate a similar revolution with Satellite DTM services so that Australians can easily remain easily connected and make emergency calls wherever they go in remote areas. This would be of immense benefit to people living and working in remote areas and communities, or for people travelling through such areas, allowing them to remain in contact with family and friends, or for business purposes, or in the case of an emergency.

We commend the ACMA on the work it is doing to expedite the introduction of Satellite DTM services in Australia, and we look forward to continuing to work with the ACMA, the CSIRO and satellite operators.