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Response to ACMA's consultation on 'Technical design features  
and allocation considerations for the 2 GHz MSS band (1980–2005  
and 2170–2195 MHz)'

**19<sup>th</sup> Feb 2024**

**PIVOTEL.COM.AU**

Pivotel welcomes the opportunity to comment on ACMA's consultation on 'Technical design features and allocation considerations for the 2 GHz MSS band (1980–2005 and 2170–2195 MHz)'.

## CONTEXTUAL STATEMENT

- Pivotel supports more than 100,000 Australian and New Zealand satellite services operating outside of mobile phone coverage. Our suite of satellite and mobile technologies enables connectivity via satellite phones, high-speed satellite internet terminals, wireless networks, personnel and asset monitoring solutions, machine-to-machine (IoT) data terminals, and specialist maritime communication systems. As a mobile operator, Pivotel is keen to see appropriate spectrum allocation for terrestrial networks, Direct Air to Ground (DA2G), and Non-Terrestrial Network (NTN) services such as satellite Direct-To-Mobile (DTM) become available to serve the markets in new and innovative ways, now and into the future. There is an evident gap in providing digital connectivity to the aviation layer which must be addressed.
- Pivotel has provided responses to ACMA on previous consultations for the 2 GHz MSS band. Subsequently, Pivotel carried out a joint field trial with SkyFive in 2023 by deploying LTE DA2G base stations in Australia under a scientific license. Considerable insight has been gained from the trial, which forms the basis of providing a response to this consultation. When planning for Australia, it's essential to consider the global utilisation of the 2 GHz band. The European Aviation Network (EAN) is a consortium of Viasat and Deutsche Telekom, successfully making use of SkyFive LTE DA2G technology. More than 300 aircraft are currently equipped to utilise the EAN and a further 150 aircraft will be added after the recent agreement with Lufthansa to join the network.
- The European Aviation Network (EAN) is deployed across the entire European continent, spanning over 40 countries. Operating on the frequency band of 1980-1995 MHz in the uplink and 2170-2185 MHz in the downlink, EAN facilitates DA2G communication, functioning as a hybrid system integrating both DA2G and Mobile Satellite Service (MSS) technologies. In this setup, the A2G component, referred to as CGC in EAN, manages the majority of traffic, utilising the full 2x15 MHz spectrum. The MSS component is predominantly utilised for routes to remote destinations like Iceland and the Canary Islands, where DA2G coverage from the European continent is not feasible. This operational model applies uniformly across all participating countries. Currently, approximately 330 aircraft are equipped with the EAN system, facilitating about 100 million Internet sessions since its inception. With the inclusion of the Lufthansa Group, the fleet equipped with EAN is set to expand to 480 aircraft.
- As mentioned in previous consultations, Pivotel holds the view that MSS solutions are largely inadequate in meeting the needs of significant portions of the aviation market, which could be served more effectively by a DA2G-only solution. Requiring DA2G operators to integrate an MSS component into their service, where no standard or global scale can be leveraged, is likely to escalate equipment and service costs, negatively impacting end users and potentially undermining the investment viability for operators. Therefore, it is recommended that a mixed co-use approach be adopted in Australia, wherein ACMA allocates spectrum in the band based on the High Value Use (HVV) principle. For instance, the DA2G network serves not only airlines but also benefits society at large through various applications such as fire prevention and Beyond Visual Line of Sight (BVLOS) drone flights, which are utilised for transporting medical supplies, among others.

## **Pivotel Response**

We strongly advise against implementing restricted access solely for MSS or MSS/CGC licensees across the entire band. For further information, please refer to Pivotel's previous submission to ACMA in February 2022.

While new LEO-based aviation mobility solutions are effective for providing off-grid connectivity to large commercial aircraft outside landmasses with low capacity demand on the serving satellite, they are not practical for lightweight aircraft such as emergency first responder aircraft, helicopters, and drones. In densely populated areas, where numerous aircraft are spread over a small geographic area, and heavily trafficked routes the demand on capacity is best met by DA2G technology.

DA2G technology is currently the only solution capable of meeting the size, price, and performance requirements across a wide range of aviation markets. DA2GC technology operating in Band-65 is the sole solution available for deployment, leveraging the scale of the European market, to deliver a commercially viable solution for Australia.

## **2 GHz MSS parameters**

- 1. What are your views on the proposal to develop technical requirements for mobile earth stations and CGC systems based on the 2 GHz spectrum licensing technical framework. Are there alternative approaches that could be used and different resulting values for key parameters such as power and unwanted emissions that we should consider?**

Generally, compliance with technical parameters within the 2GHz spectrum licensing framework is considered acceptable. Specific aeronautical transmitter parameters need special attention and comments are provided for those under the relevant question from ACMA.

- 2. Having arrangements based on the 2 GHz spectrum licensing technical framework means including support for active antenna systems. We seek views about the inclusion of active antenna systems in the technical framework for 2 GHz MSS.**

Pivotel is open to the use of AAS, however, Pivotel has not found any examples where AAS has been deployed for DA2G.

- 3. What are your views on developing technical parameters for aeronautical transmitters in CGC/DA2GC systems based on ECC report 233?<sup>1</sup> Are there alternative parameters that should be used?**

Pivotel had deployed three D2AG base stations from Dubbo to Mt Piper, NSW under a scientific license. Charter flight tests were subsequently conducted to assess performance metrics such as throughput at various altitudes. The extrapolation of these results led to the conclusion that 40dBm EIRP (as recommended by ACMA) in occupied bandwidth for aeronautical transmitters is essential for On Board Equipment (OBE) modem on a commercial flight operating at 33,000 feet to deliver a satisfactory in-flight connectivity experience from a capacity perspective when connected to a DA2G base station.

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<sup>1</sup> ECC Report 233: Adjacent band compatibility studies for aeronautical CGC systems operating in the bands 1980–2010 MHz and 2170–2200 MHz (May 2015).

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The ECC Report 233's recommended Out of Band (OOB) emission mask to manage adjacent channel interference can be achieved through operational controls put in place by the licensee, for example, limiting UE power based on aircraft's altitude.

4. **What are your views on the proposal to reduce the current emission limit at the 2010 MHz boundary from of -66 to -60 dBW/MHz EIRP intended to provide protection for TOB receivers operating above 2010 MHz?**

Pivotal has no comment.

5. **For 2 GHz MSS emission limits above 2010 MHz and 2200 MHz, which are intended to protect TOB receivers, do the limits achieve that objective? If not, please explain why and outline what the limits should be.**

Pivotal has no comment.

6. **For 2 GHz MSS emission limits above 2010 MHz and 2200 MHz, we seek views on the merits of applying more relaxed limits in areas of lower TOB usage and views on relevant emissions limits to apply in areas on low TOB usage.**

Pivotal has no comment.

**Coordination requirements: 2 GHz MSS with other services**

7. **Views are sought on the coordination requirements outlined in section 3.**

Pivotal has no objection on the coordination rules outlined in ACMA's proposal.

8. **Views are sought on the approach of coordinating CGC transmitters operating in the band 2170–2195 MHz with earth station receivers using the level of CGC unwanted emissions at the earth station receiver. What are appropriate earth station protection levels under such a methodology? Are there alternative approaches that we should consider?**

Pivotal has no comment.

9. **Views are sought on the suitability of the arrangement for coordination with the radio quiet zone, and what requirements should apply for aeronautical transmitters in 1980–2005 MHz with respect to the radio quiet zone.**

If required, geo-fencing can be applied to protect RQZ by either reducing or disabling transmit power when an aircraft flies over the zone.

### Coordination requirements: 2 GHz MSS with 2 GHz MSS

10. No coordination requirements are considered necessary between co-channel and adjacent channel MSS services. We are interested in views on this proposal, including views on any alternative coordination requirements considered necessary.

Pivotal has no plans to use MSS at this stage, therefore, no comment.

### Reconsideration of 2 GHz narrowband requirements

11. We propose that the current the emission limit at the 2010 MHz boundary could reduce from -66 to -60 dBW/MHz EIRP. Are there other elements of arrangements for narrowband MSS that would be beneficial to review?

Pivotal has no plans to use NB-MSS or TOB, therefore, no comment.

12. We are considering whether ITU-R Recommendation P.1812<sup>2</sup> configured to 10% time (percentage of average year for which the calculated signal level is exceeded) and 10% location (percentage of locations for which the calculated signal level is exceeded) is an appropriate propagation model to use if arrangements are reviewed. What are your views on this proposal?

Pivotal has no plans to use NB-MSS or TOB, therefore, no comment.

### Licence allocation design

13. We are interested in views about the intended uses of the 2 GHz MSS spectrum, as well as the availability of suitable equipment.

Pivotal has successfully conducted a joint trial with SkyFive, deploying DA2G LTE base station equipment supplied by Nokia, and On-Board Equipment (OBE), provided by Flightcell. The EAN utilises established base station and UE equipment suppliers, indicating a proven and reliable ecosystem, particularly for DA2G technology.

14. What is the minimum viable amount of spectrum for 2 GHz MSS services? Is a 2x5 MHz allocation useable or is a minimum of 2x10 MHz required?

It is recommended that the spectrum be partitioned according to Table-A to offer maximum flexibility and encouragement to applicants, thereby fostering efficiency and innovation. In particular, DA2G should not be predicated upon on having an MSS component.

**Table-A: Example of Pivotal Proposed Spectrum Allocation**

Upper MHz	2170-2185	2185-2195
Lower MHz	1980-1995	1995-2005
Allowed Use Cases	MSS or DA2G or D2M	MSS or DA2G or D2M

ACMA could set a timeframe, maybe by the end of 2024, where all applicants must submit their applications detailing their use cases, base station locations, evidence of a business plan and capital, as well as the amount of spectrum needed. ACMA can use the High-Value Use principle to decide the outcome of the band allocation. Additionally, ACMA could specify a "Use it or Lose it" timeframe to ensure efficient spectrum usage.

**15. Which of the following options is the most appropriate frequency lot configuration for the 2 GHz MSS spectrum?**

**Configuration 1**

- > **2 x 15 MHz paired (1980-1995 MHz with 2170–2185 MHz)**
- > **2 x10 MHz paired (1995–2005 MHz with 2185–2195 MHz).**

**Configuration 2**

- > **5 generic 2 x 5 MHz paired lots which would provide participants in the allocation the opportunity to bid for as many blocks as suits their use case.**

We recommend Configuration 1, as it closely aligns with the EAN deployment and provides the 2x 15 MHz needed to deliver capacity for good in-flight experience.

For any questions in relation to this response please contact:

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**Pivotel Group Pty Limited**