

Boeing Australia Holdings

Response to the ACMA's Proposed spectrum re-allocation declaration for the 3.4 GHz and 3.7 GHz bands - consultation paper

Boeing Australia Holdings (Boeing Australia) appreciates the opportunity to respond to the ACMA's 'Proposed spectrum re-allocation declaration for the 3.4 GHz and 3.7 GHz bands' consultation paper.

Boeing Australia understands, and in general supports, the introduction of new radio 5G and wireless broadband (WBB) across Australia and supports the recommendations of the "Australian Government response to the House of Representatives Standing Committee on Communications and the Arts: [The Next Gen Future](#)" in response to the 'Inquiry into the deployment, adoption and application of 5G in Australia.'

Boeing Australia's submission to this consultation on the proposed reallocation of 3.4 GHz and 3.7 GHz focusses on two issues relevant to Boeing's Australian, regional and global operations that are important for ACMA to take into active consideration in this replanning.

1. Potential interference from 5G wireless broadband transmissions in C-Band or mid-band spectrum (1-6 GHz) with the operation of radio altimeters in the nearby frequency range of 4 200-4 400 MHz

Radio altimeters are essential components of an aircraft for safe operation.

The radio altimeter is the only sensor onboard an aircraft providing a direct measurement of aircraft clearance over the terrain and other obstacles.

A radio altimeter is used during all phases of a flight, but significantly during precision approaches to landing, determining aircraft proximity to the ground, and collision avoidance systems. A failure in this sensor can lead to catastrophic results for the crew on board, passengers, and people on the ground.

Studies conducted internationally have analysed the impact of 5G/wireless broadband (WBB) systems in the frequency range 3 400-4 200 MHz. In the United States the Radio Technical Commission for Aeronautics (RTCA) and the FAA, the European Union Safety Agency (EASA), Czech Republic, French and Canadian spectrum regulators have provided guidance on radio altimeter interference from 5G/WBB in mid-band spectrum. The studies have led to the USA, France, Canada and Japan introducing various mitigation measures to protect radio altimeters from interference from 5G/WBB transmissions. Each country has different 5G/WBB technical rollouts and consequently different mitigation measures to protect radio altimeters, i.e. one size does not fit all.

Aviation regulators of many countries, including CASA in Australia, have issued airworthiness directions or advisory bulletins referencing the potential interference from 5G/WBB and thereby raising awareness with pilots and airline operators.¹

The international mitigation measures mentioned above apply to varying frequency ranges that correlate to the ACMA's reallocation of 3.4 GHz and 3.7 GHz. The frequency ranges and countries where mitigations have been introduced are France, Czech Republic and Canada

¹ The latest CASA [Airworthiness Bulletin No 34-020. 7](#) 'Potential 5G Interference of Radio Altimeter Systems' was released 4 March 2022.

3 450-3 650 MHz, the United States 3 700-3 980 MHz, while Japan has introduced 5G in 3 600-4 100 MHz and above the radio altimeter frequency range at 4 500-4 600 MHz.

The mitigation measures vary from country to country, examples include:

- reduced base station power levels
- exclusions and protection zones around airports and runways
- prescribing a downward-looking radiation pattern for 5G transmitting station antennas
- guard or separation frequency bands
- indoor operation only
- measures to avoid configurations in which 'network lobes' appear in active antennas, which have the particularity of 'scaring' up a significant portion of the antenna's power.

Meanwhile, the aviation industry is focused on developing new technical standards for radio altimeter equipment designed to reject spurious emissions from 5G transmissions. This is a process that will take time as technical standards are still under development and equipment is then to be manufactured and eventually installed on aircraft. The best case time-line to achieve this outcome is estimated to be five years, however, to refit all affected aircraft could take much longer.

In the near term to ensure the safe operation of radio altimeters coexisting with new radio 5G and its variants; aviation, mobile phone companies and regulators need to work together to introduce interim regulatory arrangements.

Boeing Australia proposes the ACMA take this issue into consideration as an essential aspect of the reallocation of 3.4 GHz and 3.7 GHz for 5G/WBB.

The Australian aviation industry has engaged directly with ACMA on this matter through the 'Technical Liaison Group' established for the ACMA's consultation on the 'Review of 3700-4200 MHz, 3.4 GHz bands spectrum and apparatus licensing technical frameworks' (the TLG). It is surprising that the current 3.4/3.6 GHz reallocation consultation makes no mention of the radio altimeter interference issue, nor recommendations made by the aviation industry into the work of the TLG.

The Australian aviation industry group, known as the 'Radio Altimeter Co-ordination Group' (RA-CG), submitted comprehensive information and views to the ACMA TLG. The summary view of the RA-CG states:

the protection of RA's from interference caused by WBB services should be of paramount importance. Members of the RA-CG believe there is sufficient evidence to indicate that WBB interference may adversely impact RA's. We therefore strongly support the case for technical restrictions on WBB deployments near airports, other landing locations (such as heliports), and areas where risk to aviation activity is identified.

Boeing Australia supports the view of the RA-CG.

While we appreciate the ACMA's compliance with the Minister for Communications, Urban Infrastructure, Cities and the Arts [Ministerial Policy Statement](#) (MPS) identifying communications policy objectives the ACMA must consider in exercising spectrum management powers in the 3.4-4.0 GHz frequency band, separately, there are the legislative obligations under the *Radiocommunications Act (1992)* (the Act) relevant to safe operation of radiocommunications specifically for aircraft i.e. section 192.

Furthermore, it is generally accepted that an incumbent radiocommunication services allocated and operational in a specific frequency band should not be disadvantaged by, or worse subject to, harmful interference as a result of the introduction of new services or applications in, or adjacent to, the incumbent's frequency band. Radio altimeters for many decades have been operational in the Radio Regulations globally allocated aeronautical radionavigation service frequency band 4 200-4 400 MHz.

Australia as a member of the International Telecommunications Union has treaty obligations in respect to protection from harmful interference from other services as detailed in Article **0.4** of the Radio Regulations so that stations must be established and operated in such a manner as not to cause harmful interference to other radio services.

The ACMA has conducted its own studies on compatibility of radio altimeters and wireless broadband, however, no conclusions are reached in the studies and it is not clear exactly what view the ACMA has on potential interference into radio altimeters from 5G/WBB operations.² In the ACMA TLG papers 'draft approaches to manage coexistence' between 5G/WBB and radio altimeters were proposed. The Approach B was in principle supported by the aviation RA-CG although the methods proposed are not agreed.

ACMA has further developed the mitigation scenario/approach in a draft new RALI MS 47, discussed in the ACMA's 'Apparatus licences in the 3.4–4.0 GHz band in remote Australia - Licensing, allocation process, technical framework and pricing arrangements' – consultation paper. It is somewhat encouraging to see this inclusion but it is noted that it is the only text in the draft RALI that is in square brackets, taken to mean it can be entirely deleted, and ACMA notes that the text does 'not yet represent a formed ACMA view.' Our detailed response to this aspect of the draft new RALI is included in Boeing Australia's separate submission to the apparatus licencing consultation.

Boeing Australia encourages the ACMA to work towards forming a view on the extent of possible interference into radio altimeters from 5G/WBB in Australia to provide valuable direction to industry.

The reallocation proposal for one or more reallocation declaration(s) to be made for 5G/WBB spectrum licences in the 3.4 GHz and 3.7 GHz frequency bands is a major expansion of the current 5G spectrum licence across 3 575-3 700 MHz. While variations of WBB are proposed for different areas of Australia fundamentally the ACMA should take into urgent consideration the effect of potential interference into radio altimeters from 5G/WBB expansion in the following:

- 3 400-3 575 MHz in regional and major regional centres
- 3 400-3 475 in urban excise areas, formerly NBN licenced but underutilised
- 3 700-3 750 MHz in regional areas
- 3 700-3 800 in all metropolitan areas.

The reallocation of 3.4 GHz and 3.7 GHz above represents more than a 100% increase of 5G/WBB access compared to the current 5G allocations in 3 575-3 700 MHz (100 MHz), effectively an increase of 125 MHz taking the quantum of spectrum to a proposed additional 275 MHz. This expansion fundamentally raises the radio altimeter interference stakes to a concerning level considering that the allocation is proposed for higher power WBB and

² ACMA Review of 3700-4200 MHz, 3.4 GHz bands spectrum and apparatus licensing technical frameworks 3400-4000 MHz Technical Liaison Group paper March 2022 Appendix D: Updated wireless broadband and radio altimeter study

spectrum licenced services as opposed to the current allocations that pose no threat to radio altimeter operation.

Summary

The interference risk from new 5G radio applications near the allocated aeronautical radionavigation service safety of life frequency range 4 200-4 400 MHz is well documented. The potential safety of life impacts on aviation operations including the possibility of catastrophic failures in the absence of appropriate mitigations must be fully addressed.

The risk of harmful interference from new 5G/WBB to radio altimeters in the near term cannot be mitigated only by the aviation industry. Longer term, it is expected new radio altimeters will be built to reject 5G interference and older units may have newly designed filtering applied. Unfortunately, this will take many years. In order to avoid unacceptable outcome from an incident where radio altimeters are negatively affected by 5G transmissions, the mobile service industry and spectrum regulators need to cooperate with the aviation industry to put in place appropriate interim mitigation measures to prevent interference to aircraft radio altimeters in the frequency band 4 200-4 400 MHz.

In reallocating a substantial portion of the 3.4 GHz and 3.7 GHz frequency bands for WBB/5G Boeing Australia is of the view that:

- the ACMA needs to come to an early determination of the extent of the potential radio altimeter interference based on Australia's current and proposed to be expanded 5G/WBB spectrum infrastructure.
- Subject to the ACMA arriving at a determination it is proposed temporary mitigation measures are included in the spectrum licence conditions (under either section 72 or 73 of the Act) or a new RALI to address the potential interference to aircraft radio altimeters.
- Boeing Australia has no firm view on how mitigation conditions are applied but expects it should be administratively easy to rescind mitigation measures once the interference to radio altimeters is resolved for the long term.

2. Reallocation considerations for the fixed-satellite service

Response to the consultation paper question:

The ACMA's preferred planning approach: 3400–3575 MHz and 3700–3800 MHz

Do you have comments on our preferred planning option (Option 3), which updates the previous preliminary planning decisions (Option 1)?

Please provide evidence in support of your comments. See also the 'Specified parts of the spectrum' section of this paper.

While the reallocation is at a mature level in respect of potential spectrum for new radio 5G/WBB applications and the retuning or clearing of incumbent services, the fixed-satellite service (FSS), which has only recently been moved out of the lower 3.6 GHz frequency range, is now facing additional hurt with more valuable C-Band access denied under the 3.7 GHz reallocation.

To this extent Boeing Australia supports ACMA's Option 1 'current planning decision' of the 'Planning arrangements in 3 400-3 575 MHz and 3 700-3 800 MHz.'

As the Option title suggests, this is the current planning approach that was adopted for the previous 3.4 GHz replanning and it provides the best possible outcome for FSS while supporting an adequate spectrum allocation to 5G/ WBB applications. The methodology is tried and tested and seemingly accepted by incumbent and relocated operators.

As noted in the consultation paper:

3400–4000 MHz TLG has identified a preference by most members to use restricted-use bands (RBs) to manage interference at shared frequency boundaries between area-wide apparatus licences (AWLs) and spectrum licences. Up to 15 MHz is required for an RB at each shared frequency boundary.

The preference of the TLG industry participants should be respected. If the ACMA has ongoing concern about the 15 MHz RB at shared boundaries, it could look to innovation from industry to seek to adapt/develop new filtering mechanisms in time for the introduction of reallocated services (likely to be 5-7 years away).

Option 2 ‘incremental modification to planning decision’ (i.e. Option 1) sees a further diminution of FSS spectrum without a proven benefit to 5G spectrum licensing.

Option 3 ‘consolidated planning arrangements’ provides for a different configuration and is ACMA’s preliminary preferred Option. The upfront 5G/WBB benefit sees consolidated spectrum licence arrangements between 3 400–3 800 MHz in metropolitan areas and between 3 400–3 750 MHz in all regional areas. It also consolidates AWL arrangements in regional areas into a contiguous 250 MHz bandwidth in the 3 750–4 000 MHz band. However, the ACMA speculates such large holdings may not be to all industry preferences or affordable for smaller operators. It is even suggested that licenses might ultimately be traded, which appears to be to the financial benefit of a licence holder and perhaps a long way from overall ‘long-term public interest derived from use of the spectrum.’

For FSS, Option 3 sees a reduction of spectrum access in 3 475-3 542.5 MHz in regional areas but an additional 50 MHz at 3 750-3 800 MHz in regional areas. In all, a minor gain for FSS given most FSS access in the lower frequency range 3 400-3 700 MHz has already been cleared and what remains is of secondary status and subservient in effect to primary spectrum and wide area licenced 5G/WBB.

Boeing Australia supports:

- the safer and proven planning approach Option 1.

Reallocation period and deadline

The consultation paper references what appears to be different reallocation periods for different parts of the 3.4 GHz and 3.7 GHz frequency ranges.

Noting that the frequency range 3 400–3 442.5 MHz is unencumbered and the former NBN spectrum licence 3 400–3 475 MHz (urban excise) is also unencumbered, and therefore, ACMA is of the view that while forming part of the reallocation period, this spectrum nonetheless could be made available immediately.

Meanwhile, other parts of the 3.4 GHz frequency range are occupied by secondary FSS, amateur and primary PMP services.

The 3 700-3 800 MHz frequency range has a mix of primary FSS and PTP services.

The ACMA's proposal: re-allocation period and deadline

If the ACMA makes a re-allocation declaration, do you have comments on our proposal for a re-allocation period of 5 years from the commencement of the re-allocation declaration, and a re-allocation deadline of 12 months before the end of the re-allocation period?

Please provide evidence in support of your comments.

Boeing Australia appreciates that while 3 400-3 475 MHz is practically unencumbered, caution should be exercised in regard to the possibility of introduced 5G/WBB causing interference to radio altimeter operations in 4 200-4 400 MHz, as discussed above. In France and Canada mitigation measures apply from 3 450 MHz. The ACMA needs to assess the Australian situation and decide on mitigation measures taking into consideration that 5G is already spectrum licenced and operational from 3 575 MHz in Australia. Any further extension and roll out of 5G can increase the potential for interference to aircraft radio altimeters.

For other frequency ranges where FSS is allocated, both secondary and primary, a reallocation period of a minimum of five years should be applied to provide sufficient time for operators to retune or vacate the frequency range entirely. This is an expensive exercise for FSS involving planning, re-equipping, reprogramming possible relocation of earth stations and in some cases contract renegotiation with clients.

Allocation methodology

While Boeing Australia has no view on the method to auction the spectrum we do propose ACMA take into consideration the need for compensation to the FSS in clearing services from the frequency range. This is a proposition raised on a number of occasions by the Communications Alliance (CA) Satellite Sub Working Group (SSWG), more recently in their submission to the ACMA in September 2020 on replanning 3 700-4 200 MHz. This CA SSWG view is supported by Boeing Australia.

The ACMA has previously responded to requests for compensation for the relocation of FSS operations saying it 'has no ability to provide financial compensation when regulatory arrangements change, licences are not renewed or are cancelled by operation of section 153H of the Act.'

However, compensation has been made in the past for reallocated services, notably with the process of the digital TV restack. Therefore, the absence of reference to compensation in section 153H of the Act does not preclude compensation being made through legislative processes included in the chosen auction process.

This compensation is to take into account the significant costs and potential business losses brought about by the reallocation of the frequency band to accommodate new radio applications.

FSS in Australia has seen considerable denial of access to the valuable C-Band radio frequencies and this reallocation is further harmful to the industry. Given the auction process is generally expected to be a high-value exercise, the addition of a financial component to offset FSS losses can readily be factored into the auction process. Thereby the services that benefit from access to the spectrum have a responsibility to support the victim FSS through a compensation component included in the auction that would not place any financial burden directly on government revenue. This approach reflects the FCC replanning of 3.7-3.98 MHz in



the United States. Noting that many FSS operators have already cleared the 3.6 GHz part of C-Band there would likely be a small number of calls for compensation.

Summary

Boeing Australia supports:

- a reallocation period of a minimum of 5 years for RSS to vacate spectrum as proposed in the reallocation process.
- Delaying access to unencumbered spectrum until such time that mitigation measures to protect aircraft radio altimeters from potential 5G/WBB emissions have been agreed and put in place.
- Compensation to dislocated FSS operators through an appropriate levy on the spectrum auction.

Boeing Australia once again thanks the ACMA for making available this valuable public consultation and we look forward to working with the regulator on the important matter of protecting the operation of aircraft radio altimeters as a consequence of further provisioning 5G/WBB in 3.4 GHz and 3.7 GHz in Australia.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Brendan Nelson'.

Dr Brendan Nelson
President
Boeing Australia, New Zealand and South
Pacific

A handwritten signature in black ink, appearing to read 'Neil Meaney'.

Neil Meaney
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