Boeing Australia Holdings

RESPONSE TO THE ACMA DRAFT FIVE-YEAR SPECTRUM OUTLOOK 2026-2031

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Response to the Australian Communications and Media Authority's draft Five-Year Spectrum Outlook 2026-2031

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Boeing Australia Holdings appreciates the opportunity to respond to the Australian Communication and Media Authority's (ACMA) draft Five Year Spectrum Outlook 2026-2031 consultation paper (draft FYSO).

Our response focuses on key radio frequency bands of interest to the Boeing Company's Australian, Asia-Pacific and global operations.

About Boeing Australia Holdings

Boeing has a broad portfolio in Australian aerospace industry and one of the company's largest operational footprints outside the United States.

With approximately 5000 employees and a heritage stretching back more than 99 years, Boeing plays an integral role in the region's aerospace and defence industry as a leader in advanced manufacturing for commercial airplane components, defence systems design, development and sustainment, training and services, research and development, and uncrewed systems.

Boeing Australia subsidiaries include:

- Boeing Defence Australia is Australia's leading defence aerospace enterprise, supporting some of the largest and most complex programs for the Commonwealth of Australia, the Australian Defence Force, including the Royal Australian Air Force, Australian Army and Royal Australian Navy and commercial customers.
  Directly relevant to this submission is, the radio frequency requirements of the MQ-28 Ghost Bat developed by Boeing Australia and supported by the Royal Australian Air Force. MQ-28 brings a disruptive advantage to allied forces' crewed and uncrewed missions by delivering affordable mass and rapid capability insertion.

- Boeing Aerostructures is Australia's only manufacturer of high-end aero-structure components, providing customers with a complete solution to aircraft component manufacture – from developing the most aerodynamic and efficient design, to rigorous testing processes.

- Boeing Distribution Australia is a leading solutions provider of aftermarket supply-chain management services for the aerospace, defence and marine industries, serving more than 500 customers in Australia.

- Insitu Pacific – relevant to this submission Insitu Pacific specialises in the design, development, and manufacture of high-performance and low-cost uncrewed aerial systems for commercial and military applications to Australia and the Asia-Pacific region.

- Wisk Aero – relevant to this submission Wisk Aero is a leading advanced air mobility company and developer of the first all-electric, self-flying air taxi bringing the future of flight to Australia.

Our spectrum interests are many including aeronautical, uncrewed systems, defence, space, fixed and mobile satellite services, radiolocation, maritime, 5G, IoT and machine-to-machine applications.

We offer the comments and views in this submission on radio frequency bands and issues discussed in the draft FYSO that are of direct interest to Boeing Australia's operations.

1.5 GHz (1 427- 1 535 MHz) – preliminary replanning

Aeronautical use of the frequency band

The frequency band is increasingly used nationally and in other countries for flight testing and aircraft control and non-payload communications (CNPC). The Australian Radiofrequency Spectrum Plan (2025 update) 2021 (ARSP) footnote AUS3 identifies 1 435-1 535 MHz for AMT 'priority over other uses by the mobile service.' [1]

Boeing Australia develops and maintains aircraft communications in the frequency band. Any future determinations in this frequency band should, as a priority, retain and protect the identification for flight testing as indicated in the ARSP footnote AUS3.

ACMA is planning the introduction of IMT/5G/WBB communications in the frequency band. It is widely understood and noted by Defence in their submission to the 2024-2025 FYSO, that ITU-R studies have shown coexistence between AMS and IMT is not practical in this frequency.[2]

ACMA states that there is 'support domestically from WBB interests to progress the re-farming of this band'. This is not evident in submissions to the last FYSO where the frequency band was not mentioned by AMTA, Optus only noted ACMA's planning intentions and Telstra saw it as a 'moderate' IMT priority.

Given the increasing national and global usage of the frequency band for essential aeronautical and defence requirements, ACMA will need to carefully weigh up any real benefit for IMT over commercial purposes, against the expanding interest of aviation and national defence.

For 1.5 GHz (1 427-1 518 MHz) preliminary replanning Boeing Australia recommends:

- Under any future planning decisions, the need to retain the priority status of aeronautical mobile service for telemetry over other uses by the mobile service in accordance with ARSP footnote AUS3.
- Final FYSO should specifically include reference to AUS3 footnote of the ARSP.
- Explore the options to accommodate UAS CNPC and general payload communications in the frequency band consistent with other aeronautical use.
- Support a discussion paper to further this issue while recognising the points noted above including the outcome of ITU-R studies that show coexistence between AMS and IMT is not feasible.

1 ARSP footnote AUS3 – 'The use of the band 1 435–1 535 MHz by the aeronautical mobile service for telemetry has priority over other uses by the mobile service'.

2 Draft New Report ITU-R M. [AMT-IMT.SHARING.L-BAND] *Sharing studies between potential International Mobile Telecommunication systems and aeronautical mobile telemetry systems in the frequency band 1 429-1 535 MHz.*

3.3 GHz (3 300-3 400 MHz) - monitoring

The 3.3 GHz frequency band is globally allocated to radiolocation services (RLS) on a primary basis. The mobile service is co-primary with RLS in Region 2 but not assigned in Region 1 or 3 as either a primary or secondary service, excluding any Radio Regulations (RR) country footnote identifications for IMT/5G/WBB.

The 2023 ITU World Radiocommunication Conference identified the frequency band for IMT in Region 2 as a footnote to the RR.[3] The global identifications for IMT (apart from the Region 2 identification) are complicated and fundamentally assigned via footnotes to the RR Table of Frequency Allocations. The IMT identification RR footnotes includes the condition that IMT cannot claim protection from, or cause interference to, RLS allocated in the frequency band.

As noted in the ACMA draft FYSO - in Australia ARSP footnote AUS101A applies and stipulates the primary RLS is 'designated to be used principally for the purposes of defence and national security and the Department of Defence is normally consulted in considering non-defence use of this service'. The other allocated services, amateur, fixed and mobile are all secondary to RLS.

Any expansion of IMT/5G/WBB into in this frequency band poses significant potential for radio frequency interference to Defence global radar operations. In the Defence Department's submission to the 2024 FYSO it noted

> 'This reallocation will impact a growing number of Defence radar capabilities including non-itinerant systems … It is also of vital interest to take into account Australia's long term investment into developing globally unique Defence assets before repurposing the 3 300-3 400 MHz frequency band.'

Boeing Defence Australia is committed to supply of equipment and services to the Department of Defence for radiolocation operations in this frequency band.

Boeing Australia is of the view there is no solid case for Australia to identify IMT in this frequency range in the foreseeable future. Especially while 3.4-4.0 GHz was recently repurposed in Australia for 5G/WBB including the auctioning to mobile network operators of the frequency bands 3.575-3.7 GHz in 2018 and 3.7-3.8 GHz in 2023.

Boeing Australia recommends:

- Retain the current ACMA position 'monitor' for this frequency band.
- As this is a priority Defence frequency band ensure DoD is consulted on all future planning considerations.

3 RR footnote No. **5.429D**

4.0 GHz (4 400–4 990 MHz) - monitoring[4]

Current usage

- The entire frequency band is allocated globally on a co-primary basis to the fixed and mobile services.
- 4 500-4 800 MHz is a primary global allocation to fixed-satellite services.
- 4 400-4 800 MHz in Australia is 'principally for the purposes of defence and national security'.[5]
- the entire frequency band in Region 2 and Australia provides aeronautical mobile telemetry for flight testing - see RR footnote No. **5.440A**.[6]
- in Australia, the frequency band 4 825–4 835 MHz is also allocated to the aeronautical mobile service, limited to aeronautical mobile telemetry for flight testing - see RR footnote No. **5.443**.[7]

Aeronautical mobile telemetry access for flight testing in Australia as identified in two RR footnotes is essential to commercial and defence aviation and future planning must preserve the integrity and intent of the footnotes.

ACMA has noted in the draft FYSO 'there is some interest domestically from mobile network operators as well as from wireless internet service providers and other fixed wireless access operators in pursuing this band for WBB in Australia.' Boeing Australia agrees with ACMA's further observation that there is no widespread support for use of the frequency band for 5G/WBB applications from regional communication bodies CEPT, CITEL, ASMG and APT.

Aviation safety considerations

Boeing Australia opposes 5G/WBB in this frequency band given its proximity to the aviation radio altimeter safety of life allocation immediately adjacent at 4 200-4 400 MHz.

Radio altimeters are an essential component of commercial and military aircraft enabling precision approach, instrument landing, ground proximity and collision avoidance functions to work reliably. Studies have identified potentially serious interference to radio altimeter systems from 5G macro base stations operating near the frequency band. Until such time that aviation standards are in place to protect

4 Noting part of the frequency range is also a consideration of WRC-27 Agenda item 1.7 discussed below.

5 ARSP footnote AUS101 'This band is designated to be used principally for the purposes of defence and national security. The Department of Defence is normally consulted in considering non-defence use of this band.'

6 RR footnote No. **5.440A** 'In Region 2 (except Brazil, Cuba, French overseas departments and communities, Guatemala, Paraguay, Uruguay and Venezuela), and in Australia, the band 4 400-4 940 MHz may be used for aeronautical mobile telemetry for flight testing by aircraft stations (see No. **1.83**). Such use shall be in accordance with Resolution **416 (WRC-07)** and shall not cause harmful interference to, nor claim protection from, the fixed-satellite and fixed services. Any such use does not preclude the use of this band by other mobile service applications or by other services to which this band is allocated on a co-primary basis and does not establish priority in the Radio Regulations'. (WRC-07)

7 RR No. **5.442** In the frequency bands 4 825-4 835 MHz and 4 950-4 990 MHz, the allocation to the mobile service is restricted to the mobile, except aeronautical mobile, service. In Region 2 (except Brazil, Cuba, Guatemala, Mexico, Paraguay, Uruguay and Venezuela), and in Australia, the frequency band 4 825-4 835 MHz is also allocated to the aeronautical mobile service, limited to aeronautical mobile telemetry for flight testing by aircraft stations. Such use shall be in accordance with Resolution **416 (WRC-07)** and shall not cause harmful interference to the fixed service'. (WRC-15)

radio altimeters, it is critical for air travel safety that this frequency band is not considered for identification of IMT/5G/WBB.

Defence operational considerations

In previous FYSO's the Department of Defence noted in relation to frequency bands 4 400-4 500 MHz and 4 800-4 990 MHz Defence platforms could be directly affected due to possible radio frequency interference by IMT in these frequency bands. The frequency bands are part of the harmonised Five Eyes and NATO spectrum used extensively by Defence and its current use is incompatible with IMT/5G in the same frequency range. Boeing Australia and subsidiaries supply equipment and services to Defence and are reliant on this frequency band continue to be assigned 'principally for the purpose of Defence.'

Boeing Australia is opposed to identification of 5G/WBB in Australia in this frequency range and recommends:

- The 4 400-4 500 MHz and 4 800-4 990 MHz frequency bands should be removed from monitoring as they are part of the harmonised Five Eyes and NATO spectrum used by Defence for aeronautical mobile services, data transfer, command, control and telemetry as well as for Navy fleet wide communications in Australian territory.

- Communication operational infrastructure to support these services is provided by Boeing Australia and many other Australian defence industry contractors.

- Sharing of the applications and services in this frequency band is not feasible.

- Exceptionally noting the public importance of protection of safety of life aeronautical radio altimeter operations in the adjacent 4 200-4 400 MHz frequency band from 5G/WBB base stations transmissions. Introduction of high-power 5G/WBB base station operations is incompatible with the adjacent ARNS allocations and identifications should be opposed.

- ACMA ensure the spectrum regulatory protection of the current arrangements in the frequency band in the interest of defence and national security use.

- Ensuring the retention of Australia's name in RR footnotes No. **5.440A** and **5.442**, and

- the need to retain access to part of the frequency range allocated via footnotes to the RR Table of Frequency Allocations to aeronautical mobile service for flight testing by aircraft stations and telemetry.

5 030–5 091 MHz RPAS - monitoring

At WRC-12, the 5 030–5 091 MHz frequency band was identified in the Radio Regulations for use by line-of-sight (LoS) and beyond line-of-sight (BLoS) remotely piloted aircraft systems (RPAS) control and non-payload communication (CNPC) links. It is only recently that spectrum regulators, notably ACMA, FCC, MIC (Vietnam) and KMCC have moved to free up access to this frequency band to accommodate RPAS communications.

RPAS operating in non-controlled airspace predominately use the class licenced low interference potential device (LIPD) or Industrial, Scientific, and Medical (ISM) frequency bands for both CNPC and payload communications.

While LIPD/ISM access is useful for smaller RPAS and hobbyists' drones, the inherent low power constraints and congestion of the LIPD/ISM radio frequencies are not suitable for medium to large RPAS business and security operations. These aircraft operate in environments that require reliable safety-critical control links.

The existing spectrum constraints were acknowledged by ACMA in 2022 and resulted in arrangements being put in place to facilitate temporary access to part of the frequency band (i.e. 5 055–5 065 MHz) for LoS RPAS CNPC links. ACMA states these interim arrangements will be in place 'while we await finalisation of relevant work within the ITU-R on band planning.' A component of the ITU-R work is a draft new Recommendation that specifies terrestrial air-ground link characteristics operating in the aeronautical mobile radiocommunication service in the band.[8] Subsequent to and seemingly relying on ITU-R outcomes ACMA proposes to release an 'options paper outlining proposals for more permanent arrangements.' This assumes widening access to the entire frequency range and possibly options for BLoS.

The frequency band needs to be protected for future requirements for UAS and if demand exceeds the current 10 MHz interim access ACMA should free up more of the frequency band.

Boeing Australia acknowledges that ACMA is only responsible for the spectrum aspects of RPAS regulation in Australia whereas air safety and operational regulatory provisions are the mandate of the Civil Aviation and Safety Authority and Airservices Australia, and any arrangements in the frequency band are to be developed in consultation with those agencies and ICAO standards and practices.

Recognising the frequency band 5 030-5 091 MHz only provides a small amount of internationally harmonised spectrum for RPAS CNPC, there is a pressing need for more spectrum to be available, for both CNPC and payload applications for medium to large RPAS, this is discussed below under 'Emerging aviation technologies and spectrum regulation'.

Presently there is no commercially available satellite access for UAS payload operations in 5 030-5 091 MHz to support the aeronautical mobile-satellite (R) service. Given the rapid developments across the satellite industry especially non-GSO constellations it is possible a viable service could become available especially if supported by open access to the frequency band for RPAS. For Australia's vast airspace this is perhaps a significant option for countrywide and intercontinental UAS operations.

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8 https://www.itu.int/dms_ties/itu-r/md/23/wp5b/c/R23-WP5B-C-0216!N21!MSW-E.docx- *Characteristics and protection criteria of terrestrial and satellite unmanned aircraft system control and non-payload communications links operating in the aeronautical mobile (route) service and aeronautical mobile satellite (R) service in the band 5 030-5 091 MHz and aeronautical mobile satellite (R) service in the band 5 000-5 150 MHz*

Rather than seeing regulation follow technological developments, Boeing Australia encourages ACMA to take a lead in developing spectrum regulations that can support future BLoS radiocommunications for UAS.

Boeing Australia commends ACMA for introducing arrangements for interim access to the frequency band for RPAS CNPC. However, there has been no apparent regulatory progress for some years with ACMA or government to further this access.

Boeing Australia recommends the ACMA:

- explore independent initiatives to free up wider access to the frequency band domestically for both terrestrial and satellite RPAS communications, while taking into consideration, where relevant, ITU-R studies to develop international radiocommunication regulations, and
- consider and facilitate access to the entire 5 030-5 091 MHz frequency range dependent on developing user demand.

40 GHz (37–43.5 GHz) 46 GHz (45.5–47 GHz) 47 GHz (47.2–50.2 GHz) and 50 GHz (50.4-51.4 GHz) - monitoring

Across these frequency ranges the Radio Regulations have primary allocations for a range of services including space research, fixed, mobile, mobile satellite and fixed satellite services in Australia.

The frequency bands are subject of WRC-27 agenda item 1.6 for equitable access of the frequency band for FSS.[9]

ARSP footnote AUS101, determines the 37-37.5 GHz band is designated to be used principally for defence and national security.[10]

ACMA notes 'the 40 GHz and 47 GHz bands are of significant interest for both terrestrial 5G and satellite broadband services.' It is not clear what the 5G interest currently is given mobile network operators remain heavily focused on lower radiofrequencies to provide widespread coverage, which is not an attribute of mmWave frequencies.

WRC-27 Agenda item 1.1 is considering technical and operational conditions for the use of the frequency bands 47.2-50.2 GHz and 50.4-51.4 GHz (Earth-to-space), or parts thereof, by A-ESIM and M-ESIM communicating with GSO and non-GSO space stations in the fixed-satellite service.

9 WRC-27 Agenda item 1.6 'to consider technical and regulatory measures for fixed-satellite service satellite networks/systems in the frequency bands 37.5-42.5 GHz (space-to-Earth), 42.5-43.5 GHz (Earth-to-space), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) for equitable access to these frequency bands, in accordance with Resolution 131 (WRC-23).'

10 AUS101 'This band is designated to be used principally for the purposes of defence and national security. The Department of Defence is normally consulted in considering non-defence use of this band.'

IMT interest in the frequency bands

The frequency band 37-43.5 GHz is identified globally for IMT/5G via RR footnote No. **5.550B**.
The footnote indicates various FSS allocations that need to be protected from IMT transmissions.

While there have been 5G assignments to mmWave spectrum in a number of countries the expected technological and practical expansion of IMT into mmWave frequency bands has been limited and under whelming.

A report by Plum Consulting in 2023 showed 'only 35 countries in our analysis have assigned spectrum above 7 GHz [for IMT], and there is a wide variety of types of assignment. There are several assignments in the 26 GHz band, particularly in Regions 1 and 3, and a few assignments in the 28 GHz band, such as in Japan, Singapore, Taiwan, and the US.'[11]
The Republic of Korea Ministry of Science and IT revoked mmWave licences in their country as operators did not utilise their access to the frequency bands.[12]
New Zealand have delayed mmWave allocations for at least two to four years citing 'a lack of maturity in potential cases.'[13]

As Australia has mmWave spectrum for 5G/WBB allocated in the frequency ranges 25.1-27.5 GHz and 27-29.5 GHz, there is no pressing need to consider the 40 GHz spectrum for more 5G/WBB mmWave spectrum. The Australian Mobile Telecommunications Association in their 2024 and 2025 FYSO submission noted, 'the 40 GHz band is not a short-term priority for industry, and agree that no further work needs to be carried out in the 2024-25 work program.' Telstra in their 2025 submission to FYSO states for the 40 GHz range 'additional mmWave spectrum should be the lowest priority on the spectrum workplan for 5G and wide-area MBB.'

Fixed-satellite service interest in the frequency bands

The traditional satellite frequency bands such as C, Ku and Ka are not only congested but have been partially reallocated, often to IMT/5G. Satellite data traffic would benefit from using mmWave frequency bands that have not yet been widely exploited.

The mmWave frequency bands gives satellite operators access to high-quality, ultra-fast, reliable communications channels. mmWave frequencies are ideally suited for feeder links, enabling high-speed data exchange between satellites and ground stations, as well as for relaying data between satellites within constellations.

Intelsat in their 2025 submission to FYSO noted …

> 'With the aim of providing high capacity means of communication, even to the most isolated regions, these Q/V bands are vital for the future development of satellite services. A large numbers of satellite network filings has been submitted to the ITU containing these Q/V bands. At present, tens of Q/V band satellites have been manufactured, and plans are underway for future satellites intending to use these bands for gateway links and possibly for user terminals.'

11 *Examining the current assignment and usage of mobile spectrum* - July 2023 Plum Consulting

12 Korean govt falls for 5G fallacy over 28GHz | Light Reading

13 Radio Spectrum Management NZ April 2026 *Future use of the 24–30 GHz spectrum*

FSS operators in the past have recommended ACMA progress 40 GHz to 'initial planning' given the roll out of new satellite applications and green field opportunities of Q and V band radio frequencies.

Current assignments in Australia for the spectrum range are largely for Defence usage.

Embargo 80

ACMA's Embargo 80 provides for new FSS earth station assignments at four earth station protected zones in Australia to support new FSS applications. However, given the discussion above there is good reason ACMA should progress planning of these radio frequency bands beyond the temporary embargo to establish long term regulatory surety for FSS and where feasible coexistence with IMT, dependent on MNO industry needs.

Boeing Australia recommends the ACMA:

- Consider progressing the planning stage to 'initial investigation' in light of developing satellite applications and ACMA's intention to undertake 'a comprehensive review' thereby providing additional planning certainty for future services. Considering there are currently no compatibility issues with other services there is significant potential to maximise the utility of this spectrum for fixed satellite services.

- Support the ITU-R studies for WRC-27 agenda item 1.1 to harmonise parts of the frequency band for ESIM on aircraft and vessels with GSO and non-GSO space stations of the FSS, and

- support the existing allocation of primary services specifically retaining and protecting the utility of the FSS primary allocation in the frequency band.

Bands being studied under WRC-27 Agenda item 1.7

WRC-27 Agenda item 1.7 is undertaking sharing and compatibility studies and technical conditions for the possible use of IMT in the frequency bands 4 400-4 800 MHz, 7 125–8 400 MHz (or parts thereof), and 14.8–15.35 GHz.[14]
These frequency bands, either in part or in full, are used for defence purposes in Australia.

The 4 400-4 800 MHz frequency band

This frequency band is immediately adjacent to the primary safety of life aeronautical radionavigation service (ARNS) frequency band of 4 200-4 400 MHz reserved exclusively for radio altimeters installed onboard aircraft. The radio altimeter is a mandatory safety-critical aircraft system.

This frequency range was studied for IMT compatibility at WRC-15 under Agenda item 1.1. The outcome of those studies was overwhelming consensus that services allocated in the frequency band were not compatible with ubiquitous IMT deployment. This is particularly relevant to IMT/ FSS and AMS compatibility. However, the studies did not include compatibility of IMT with radio altimeters in the adjacent frequency range 4 200-4 400 MHz. The issue of radio altimeter incompatibility came about after WRC-15 when in 2018 3GPP specifications of the n78 frequency range (3 300-4 200 MHz) were approved and released. After the standards were released aviation industry undertook studies showing serious incompatibility of 5G base stations transmissions with radio altimeters in the adjacent frequency range.[15]

In domestic preparatory work for WRC-23 the Australian Mobile Telecommunications Association stated regarding this frequency band and IMT identification … ‘we’re not suggesting that Australia should support this band.’

Defence interest in this frequency range

Defence in their 2024 FYSO submission noted ‘this frequency band will not be identified in Region 2 (North and South America) and majority of European nations (i.e. NATO member countries) and United Kingdom expressed strong opposition to the inclusion of this band in Region 1 at WRC-23.’
Thereby denying any valuable global economies of scale and geographical ubiquity for IMT applications.

This frequency band is a harmonised NATO band type 1 specifically designated for use by NATO forces and its Member States in a coordinated manner. This harmonisation ensures efficient frequency utilisation and provides military users with greater access to the radio spectrum. While Australia is not a member of NATO we do ‘share a deep relationship based on addressing shared security challenges that affect both the Euro-Atlantic and Indo-Pacific regions’ according to DFAT.[16] The scope of cooperation between Australia and NATO includes ‘upholding the rules-based international order, promoting mutual understanding of global security issues, enhancing interoperability between NATO and Australia, and engaging on issues of common interest, including cyber defence; countering hybrid threats; resilience;

14 Most of the agenda item bands are Region specific - 4 400-4 800 MH, in Region 1 and Region 3; 7 125-8 400 MHz in Region 2 and Region 3; 7 125-7 250 MHz and 7 750-8 400 MHz in Region 1; and 14.8-15.35 GHz globally.

15 See RTCA paper *Assessment of C-Band Mobile Telecommunications Interference Impact on Low Range Radar Altimeter Operations*, and Airline Pilots Association, Int’l *Aircraft Operations and Radar Altimeter Interference from 5G*

16 Australian Embassy - Belgium, Luxembourg and Mission to the European Union and NATO – Relations with NATO https://belgium.embassy.gov.au/bsls/relnato.html

Women, Peace and Security; and new technologies', much of which is underpinned by secure radiocommunication facilities.[17]

The 7 125-8 400 MHz frequency band

The X and Ku bands are major defence and NATO frequency bands. Specifically, 7 250-8 400 MHz is a core Defence satellite communications band with worldwide operational footprint and significant harmonisation interests making it entirely unsuitable for IMT identification that would technically and operationally compromise defence operations.

Other services allocated to the frequency band have been shown to be incompatible to IMT, e.g. Earth exploration satellite service, fixed satellite service, metrological-satellite service (MetSat) and space research service.

The 14.8-15.35 GHz frequency band

Adjacent to 14.8-15.35 GHz is the frequency band 15.4–15.7 GHz allocated to the primary aeronautical radionavigation service and used for ground-based primary surveillance radar systems including precision approach radar (PAR) and airport surface detection equipment (ASDE). These functions are critical to maintaining public and aircraft safety and are potentially susceptible to IMT operations in the adjacent frequency band.

The 15.4-15.7 GHz frequency band is also identified by ICAO for use by the following systems, that may be impacted by IMT out-of-band emissions:

- On-board weather radar - a safety-critical instrument assisting pilots in deviating from potentially hazardous weather conditions and detecting wind shear and microbursts. It supports the safe passage of an aircraft in the vicinity of turbulent weather conditions and provides timely warnings of rapidly changing weather conditions as an aid to in-flight route planning.
- Ground mapping radar – that support maintaining contact with geographic features, such as shorelines, as a supplement to navigational orientation.
- Detect and Avoid (DAA) systems - a critical component of remotely piloted aircraft system (RPAS). It contributes to mitigate the risk of separation loss and prevent collision with the ground and other aircraft. DAA equipment can either be located on-board aircraft or on the ground.

Background to the WRC-27 Agenda item

This agenda item was arrived at in closed discussions at the final days of WRC-23. Australia and the Asia-Pacific Region (Region 3) were not involved in these discussions. The potential negative consequence for aviation, defence and other radiocommunication services from outcomes that may identify IMT/5G/6G in these frequency ranges is considerable.

In the past, Australia has often been a significant influencer in international radiocommunication fora and needs to ensure we are in an effective regional and global position to influence WRC-27 outcomes.

17 NATO – Relations with Australia October 2024 https://www.nato.int/cps/en/natohq/topics_48899.htm

Regional representation is paramount to deciding high risk intractable matters at WRCs, Australia needs to invest considerable effort and expertise into managing the APT preparatory group (APG) for the 2027 World Radiocommunication Conference to benefit outcomes at the coming WRC and influence agenda items for future conferences to Australia's best advantage. It is encouraging that Australia has recently secured a Vice Chair position on the APG management group.

An Australian position on WRC-27 agenda item 1.7

While ACMA proposes in the draft FYSO to 'continue to engage with stakeholders via the DITRDCSA and ACMA's preparatory processes for international meetings to develop Australian positions on WRC-27 agenda item 1.7 and contribute to studies. Developments in other regions and countries will also be monitored.' Boeing Australia cautions that this is not sufficient.

The frequency bands the focus of this agenda item are mostly unsuited for IMT in Australia and this should be established as an Australian position. Regional APT discussions will be lengthy and fractured. It is likely, as has happened in the past, that there will not be a consolidated Asia-Pacific (APT) view on this agenda item. Therefore, Australia will need a Member State position to prosecute at the WRC Preparatory Conference meeting and WRC-27 or to cosign with like-minded Administrations.

It would be beneficial to Australian radiocommunication stakeholders to identify the position that IMT is not compatible with most existing services in these frequency ranges and accordingly participate in ITU-R studies to this effect. It is often cited that the identification of IMT/WBB in specific frequency ranges is ultimately the remit of individual Administrations. An Australian WRC-27 Agenda item view/position should clearly state the intention not to identify IMT in the frequency ranges the subject of the agenda item. This will provide planning certainty for stakeholders and redirect efforts to explore spectrum planning options in other radio frequency bands more suited to viable outcomes for 5G/6G/WBB.

Boeing Australia recommends:

- Through the Australian Preparatory process for WRC-27 urgently position this issue as 'no IMT identifications' in the frequency bands identified for WRC-27 agenda item 1.7 excepting possibly part of the lower 7 GHz frequency range in Australia, and

- engage in ITU studies to protect the use of the frequency bands used for Defence purposes and aeronautical safety of operation in Australia.

Emerging aviation technologies spectrum regulation

For consistency in this section reference to uncrewed aircraft systems (UAS) generally includes RPAS and drones of medium to larger size aircraft for commercial, government and defence use.

The UAS industry continues to grow exponentially, with Australia a significant contributor.
While aviation standards and technology developments that accompany UAS operations are the responsibility of other regulators, intergovernmental agencies and industry bodies, access to, and regulation of, spectrum in Australia is the responsibility of the ACMA.

As noted by the ACMA,

> 'most current drone use-cases can be supported by the LIPD class licence, and users can access the spectrum the class licence makes available at no cost … While we expect drones to increasingly transfer more and more to mobile (including 5G) networks over time, larger drones used for commercial or military purposes are increasingly requiring access to dedicated aeronautical spectrum such as the 5030–5091 MHz band.'

Boeing Australia welcomes creative and world leading initiatives by the ACMA in spectrum access for the medium/large commercial and defence UAS industries. Notably arrangements for temporary access to a portion of the 5 030-5 091 MHz frequency band is a significant step forward.
Nonetheless, and consistent with the ACMA comments above, aviation requires more dedicated aeronautical spectrum for medium to large UAS operations than currently available across LIPD/ISM class licences and the small amount of spectrum provided in the 5 030-5 091 MHz ARNS allocation.

Boeing Australia agrees and welcomes access to 5G infrastructure that can facilitate multiple payload communications. However, the safety of life CNPC communications will not be adequately supported by access to the public mobile telecommunications system. Constraints include the more demanding medium/larger UAS requirements for flight coverage that travels beyond mobile network range and issues of high reliability QoS for CNPC requirements.

Under 'Activities planned for 2026-27' in the draft FYSO, ACMA references a number of monitoring tasks, yet no actual programs or initiatives to drive spectrum identification and regulation for UAS.
'Monitoring' sentiment does not align with a more proactive Australian Government drone spectrum policy and does not build on the positive approach to drone spectrum management from four years ago.[18]
Advanced Air Mobility (AAM) and RPAS innovation is strongly supported by industry and government in Australia and ACMA is encouraged to look for opportunities to free up spectrum access for medium to large UAS CNPC communications noting recent developments in CASA and industry group AAUS.[19]

It is noted in the CASA RPAS and AAM Strategic Regulatory Roadmap 2024 that CASA 'needs to understand spectrum usage requirements for RPAS and AAM and works with the Australian Communications and Media Authority (ACMA) and across government to support meeting spectrum needs.' This appears to place some onus on ACMA to assist CASA in its understanding of the spectrum requirements for UAS.

18 https://www.drones.gov.au/policies-and-programs/policies/spectrum-policy

19 For examples see a) CASA *The RPAS and AAM Strategic Regulatory Roadmap* and b) AAUS Release Vision Roadmap for AAM

Boeing Australia supports ACMA collaboration with CASA, the Department of Infrastructure, Transport Regional Development, Communications, Sport and the Arts, and the Emerging Aviation Technologies sector to further refine future Australian UAS spectrum requirements, avenues for government support and necessary spectrum regulations.

Going forward

Existing aeronautical allocations in the Radio Regulations (notably 960-1 164 MHz) have been ruled out as an option for UAS spectrum as the frequency bands are already heavily encumbered for critical aeronautical navigation purposes. The quantum of spectrum required for future UAS operations is undefined and growing, industry and government are encouraged to continue to work together to determine near and long-term requirements.

The ITU-R have been developing regulatory conditions for use of fixed-satellite service networks for CNPC and payload communications of UAS over a long period of time.
Global CNPC use in FSS allocations most recently was a consideration at the ITU's 2023 World Radiocommunication Conference (WRC-23) in Dubai.[20] Unfortunately, this valuable work did not progress at the conference.

Boeing Australia is of the view that in this instance formally mandated ITU-R regulatory conditions are not essential for the use of FSS allocations for RPAS communications in Australia. Domestic regulatory provisions can, and should, be developed to support innovative programs such as uncrewed air transport for major sporting events including the 2032 Olympic Games in Queensland.

Nonetheless, the fundamental ITU-R technical work has largely been settled. Useful and relevant provisions of the studies are mature and can be the basis to expand spectrum access for UAS in non-segregated airspace. In Australia (under Region 3 identification) this includes 12.2-12.5 GHz, 12.5-12.75 GHz, 14-14.7 GHz and 29.5-30 GHz frequency bands. Supplementing this work with coordination between likeminded countries supported by ICAO standards and practices is a viable way forward. Additionally, L-band satellite operators are actively positioning to support UAS C2 links as part of multi-link architectures that provide a potential global coverage.[21]

Boeing Australia encourages the ACMA to use elements of the ITU-R technical work to support developing appropriate regulatory conditions to facilitate FSS spectrum for this use. This is conditional on no constraints to the FSS and procedures in place for safe operation of UAS, the latter being remit of other regulatory agencies and ICAO standards and practices.

The ACMA through technical and regulatory spectrum regulation can support flexibility, capacity and reliability considering the wide range of opportunities and uses that are emerging in this dynamic market. Continued and deeper engagement on these issues is encouraged.

20 WRC-23 agenda item 1.8 'to consider, on the basis of ITU R studies in accordance with Resolution **171 (WRC-19)**, appropriate regulatory actions, with a view to reviewing and, if necessary, revising Resolution **155 (Rev.WRC-19)** and No. **5.484B** to accommodate the use of fixed-satellite service (FSS) networks by control and non-payload communications of uncrewed aircraft systems'.

21 https://www.autonomyglobal.co/always-on-when-seconds-matter-viasats-l-band-connectivity-elevates-public-safety-uav-operations/

Boeing Australia recommends the ACMA:

- Explore with a view to support the use of FSS allocations (in part based on work in ITU-R) for CNPC and payload access to spectrum for medium to large RPAS in conjunction with ICAO standards and practices.

- Continue to support trials for UAS access to viable frequencies outside of the LIPD/ISM bands through Scientific licensing.[22]

- Continue to support government and industry consultation and cooperation on frequency bands that may accommodate medium/large UAS communications for both CNPC and general payload and other options suited to explore alternative radio frequency access, including working with CASA to inform their understanding of radio frequency spectrum regulation for UAS.

General comments on the FYSO

FYSO format and relevance

The ACMA FYSO has been published each year since 2009 with minimal change. The format has a broad commentary i.e. in Part 1: Five-year spectrum outlook 20XX–XX and the detailed Part 2: ACMA annual work program. The latter attracts the bulk of attention from industry submissions, whereas the former does not go into detail of evolving technologies and subsequent regulatory challenges.

In the current FYSO the content on evolving spectrum licenses (ESL) is referenced and rightly indicates that this work is a major longer-term focus for ACMA. However, ESLs is regulatory maintenance work and not necessarily forward looking. This is so with the outcome of the ESL process likely to see little change beyond renewing the existing licences and debate on pricing. Otherwise, apart from ESLs, there is little that goes into specifics beyond 12 months ahead.

As an example, the following are out-years references in the current FYSO:

- 2031 – nothing
- 2030 – three references – two for 6G, one reference to the Aviation White Paper Towards 2050 and the government introducing legalisation before **2030**.
- 2029 – two references 'the expiring spectrum licences' in 2.5 GHz.
- 2028 – three references all relevant to expiring spectrum licences.

ACMA is encouraged to undertake a timely review of the objective and effectiveness of providing a five-year-outlook in its present format.

22 See Scientific licence | ACMA

Future spectrum regulation

Boeing Australia and other radiocommunication industry stakeholders are directly involved in manufacture and service of equipment reliant on radio frequency spectrum. As an industry, design and development of new equipment is a long-term commitment.

Telstra has previously promoted the need for a National Spectrum Strategy taking ACMA's planning beyond the FYSO.[23] Boeing Australia supports the Telstra proposal.

When spectrum, and radio frequency access is a part of production, how the spectrum regulator views development of technology and the regulatory challenges and impact, even while still formative, can inform industry planning of radio frequency reliant devices.
Noting, forward-looking views of the regulator would not reflect or usurp policy decisions of the Department or other Government agencies.

Future regulatory challenges include:

- the introduction of AI and its part in future radiocommunications
- The evolution of dynamic spectrum sharing
- Dynamic Frequency Management Systems for assigning temporary and localised spectrum, notably for increasing numbers of UAS.

These issues have significant potential impact on spectrum management, radio frequency equipment and associated software applications. A vision of how this may be managed on a regulatory basis and the future challenges is a discussion worth considering.

Boeing Australia encourages the ACMA

- to review the structure of the FYSO to consider if it remains relevant as a five-year spectrum outlook.
- To consider developing a National Spectrum Strategy providing a comprehensive blueprint of Australia's vast spectrum requirements.
- To engage industry on the potential impact of AI and evolving technologies on radiofrequency spectrum management and regulation.

23 Why we need a National Spectrum Strategy Telstra November 2025 *https://www.telstra.com.au/exchange/why-we-need-a-national-spectrum-strategy-*

Boeing Australia appreciates the opportunity to respond to the ACMA's spectrum planning in this submission.

Respectfully submitted

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List of abbreviations/glossary

Abbreviation	Definition
5G	Fifth generation mobile phone service
6G	Sixth generation mobile phone service (still in development)
AAM	Advanced Air Mobility
ACMA	Australian Communications and Media Authority (spectrum regulator)
APT	Asia-Pacific Telecommunity
ARNS	Aeronautical radionavigation service
ARSP	Australian Radiofrequency Spectrum Plan
ASMG	Arab Spectrum Management Group
AAUS	Australian Association of Uncrewed Systems
BLoS	beyond line-of-sight
CASA	Civil Aviaition Safety Authority (Australia)
CEPT	Conference of Postal and Telecommunications Administrations (Europe)
CITEL	Inter-American Telecommunication Commission
CNPC	control and non-payload communication
DAA	detect and avoid
DITRDCSA	Department of Infrastructure, Transport, Regional Development, Communications, Sports and the Arts (Australia)
DoD	Department of Defens(c)e (USA or Australia)
ESIM	earth stations in motion A-ESIM = Aeronautical ESIM, M-ESIM=Maritime ESIM
FCC	Federal Communications Commission (USA)
FSS	fixed-satellite service
GHz	Gigahertz
GSO	geosynchronous orbit (of a satellite postioned above Earth)
ICAO	International Civil Aviation Organization
IMT	International mobile telecommunications
IoT	Internet of Things
ISM	Industrial scientific and medical
ITU	International Telecommunication Union
ITU-R	International Telecommunicatiuon Union - Radiocommunication Sector
KMCC	Korea Media and Communications Commission (Republic of South Korea)
LIPD	Low interfernce potential devices
LoS	line-of-sight
MHz	Megahertz
MIC	Ministry of Communications (Vietnam)
mmWave	Millimetre wave (spectrum roughly from 20-300 GHz)
NATO	North Atlantic Treaty Organization
NGSO	Non-geostationary satellite orbit (does not maintain a stationary position)
QoS	Quality of service
RLS	Radiolocation service
RPAS	remotely piloted aircaft systems
RR	Radio Regulations
UAS	uncrewed aircraft systems
WBB	wireless broadband
WRC	World Radiocommunication Conference


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