



Australian Government

Defence

The Manager  
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## **FIVE-YEAR SPECTRUM OUTLOOK 2024-29 AND 2024-25 WORK PROGRAM**

### **References**

- A. Five-year spectrum outlook 2024-29 and 2024-25 work program – Draft for consultation
- B. 2024 National Defence Strategy
- C. 2024 Integrated Investment Program
- D. 2023 Defence Strategic Review
- E. 2020 Defence Strategic Update
- F. 2022 Defence Information Communication and Technology Strategy

1. Defence appreciates the opportunity to comment on the Five-year spectrum outlook 2024-29 and 2024-25 work program – draft for consultation provided in Ref. A. Defence also notes that there will be opportunities to engage with the ACMA on an issue-by-issue basis as the work program takes its course.

2. As described in the 2024 National Defence Strategy (Ref. B) “*Australia’s strategic environment demands a fundamentally new approach to the defence of Australia and its interests. Accordingly, the Government has urgently assessed the most consequential security risks we face and developed a comprehensive strategy to address them. This new approach is the foundational principle that underpins the National Defence Strategy and is based on the concept of National Defence – a coordinated, whole-of-government and whole-of-nation approach that harnesses all arms of national power to defend Australia and advance our interests.*”

3. On 17 April 2024, the Australian Government released the 2024 National Defence Strategy (NDS) and the 2024 Integrated Investment Program (IIP). The NDS outlines the Government’s direction to shift the Australian Defence Force (ADF) to an integrated, focused force designed to address Australia’s most significant strategic risks based on the concept of national defence. The IIP sets out the specific defence capabilities the Government will invest in to give effect to the NDS. Together, the NDS and IIP provide a blueprint to deliver an ambitious transformation of the ADF to ensure it is positioned to safeguard Australia’s security and contribute to regional peace and prosperity for decades to come.

4. Defence would like to highlight the requirement for a Whole of Government approach to National Defence outlined in Ref. B and the Defence Strategic Review (Ref. D). Critically this will require the ACMA to adequately provision and prioritise where necessary Defence requirements ahead of other potential users of spectrum in any forward planning to ensure the whole-of-government initiative for National Defence is achieved.

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5. The NDS points out the central role that our Alliance with the United States plays to Australia's security and strategy. It also emphasizes the importance of building the strong relationship with other key partners – notably New Zealand and Japan, but also other partners in Southeast Asia and the Pacific family, the Republic of Korea, India as well as the UK and other European nations. As such Defence is of the view that harmonisation of Defence spectrum needs with these countries should be prioritised ahead of any potential re-allocation of spectrum in other countries.

6. In response to Australia's strategic environment deterioration, the Government has planned in total up to 420 billion from 2024-25 to 2033-34 through the IIP. All capability investment priorities for the integrated, focused force have significant dependencies and reliance on secure, unencumbered, access to the electromagnetic spectrum. It is therefore imperative for Defence to guide its portfolio level investment with a clear and consolidated understanding of its current and future requirements to ensure access to the electromagnetic spectrum. Loss of access to the electromagnetic spectrum will fundamentally impede Defence operations, activities and actions.

7. The 2020 Defence Strategic Update (Ref. E) first judged that Australia no longer has a ten-year window of strategic warning time for conflict. This was reconfirmed in both the 2023 Defence Strategic Review (Ref. D) and the 2024 National Defence Strategy (Ref. B). It is therefore critical to recognise that the time has passed when Defence could be viewed as being in a position to relinquish or "share" spectrum traditionally designated to Defence in either a national or deployed context. On the contrary, Defence spectrum needs are only increasing, particularly for unmanned platforms. Whilst Defence will make every effort to ensure greater efficiency it should be noted that Defence spectrum needs are expanding.

8. Defence would like to acknowledge the important role which the mobile and satellite communication industry plays for the national prosperity of any developed country, but would like to emphasise that national prosperity cannot be achieved at the cost of national security. As noted in the National Defence Strategy:

*"This National Defence Strategy acknowledges that Australia's security and prosperity are inextricably linked. Australia's future depends in large part upon protecting our economic connection to the world, upholding the global rules-based order, maintaining a favourable regional strategic balance and contributing to the collective security of the Indo-Pacific."*

9. Defence would hence like to invite the ACMA to use the FYSO to acknowledge the above objective.

10. Annex A provides feedback on market and technologies drivers of change in spectrum use. Annex B provides feedback on the 2024-25 annual work program plan and in particular on Defence's position on selecting various frequency bands under monitoring and replanning stages. Annex C lists Defence critical spectrum dependant capabilities as described in the IIP.

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11. My point of contact is Dr Snezana Krusevac on [REDACTED] or via email [REDACTED].

Yours sincerely

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**ANNEXES:**

- A. Feedback on priorities of particular spectrum uses
- B. Feedback on 2024-25 annual work plan
- C. Defence critical spectrum dependant capabilities

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## **FEEDBACK ON MARKET AND TECHNOLOGY DRIVERS OF CHANGE IN SPECTRUM DEMAND**

1. Defence understands the ever-increasing demand for ubiquitous connectivity. Following that the Government plans to invest in next generation wireless networks and sovereign satellite capabilities ensuring that Defence remains connected to securely communicate, collaborate and co-ordinate where and when it is required, including in the deployed, degraded and disconnected environment.
2. Defence understands that the spectrum has become increasingly contested, congested, and constrained. The only way for the Government to respond to exponentially increasing demands for the spectrum is to encourage deployment of new technologies which will ensure that the spectrum is used efficiently and effectively.
3. Defence would like to take this opportunity and invite the ACMA to conduct studies on the spectrum efficiency of mobile network operators in Australia. Numerous studies investigate the efficiency of mobile network operators (MNO) across the world, but Australian MNOs do not seem to be included in these studies. It is well known that Australian MNOs are at the very top in the worldwide ranking in terms of data download performance, but Defence is not aware of any studies outlining their performance in terms of spectrum efficiency. Of particular concern, based on the known studies, is that the majority of developed countries have not reached expectations in terms of spectrum efficiency. Given the continued lobbying for more spectrum from MNOs in Australia this aspect of spectrum efficiency should be investigated as a means of gaining greater utility of spectrum for mobile broadband applications.
4. In this regard, the ACMA might have a critical role to play as the studies<sup>1</sup> clearly indicate that regulatory policies play one of the key factor in delivering spectrum efficiently. Across the world, the Finnish regulator has been taken as good example for allocating spectrum by motivating development of new technologies and being a forerunner in technological evolution. Whereas other regulators have adopted market driven mechanisms with a prime objective to increase the revenue from the telecom sectors. According to the study, an overburden of high investment on spectrum and low revenue generation deters operators from investing in spectrum holdings which further delays the deployment of new technologies.
5. Defence has military specific spectrum requirements that will serve all Australians for decades to come. Through the NSD and IIP Defence investment in spectrum dependent technologies and the consequent increase in spectrum demand will not only require Defence to increase efficiency in spectrum usage of Defence's current spectrum holdings but will also require access to additional spectrum for various broadband applications.

## **WIRELESS BROADBAND**

6. In 2022 Defence Information Communication and Technology Strategy (Ref F)),

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<sup>1</sup> Efficiency of Mobile Network Operators from a Data Service Perspective – [www.econstor.eu](http://www.econstor.eu)

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Defence sets a strong commitment for a connected and digital Defence capable of communicating and collaborating through mission capable information and communications technology, when and where it is needed. Defence is investing in next generation wireless networks and sovereign satellite capabilities ensuring that Defence remains connected to securely communicate, collaborate and co-ordinate where and when it is required, including in the deployed, degraded and disconnected environment.

7. Defence supports ACMA's efforts for preliminary replanning the 1.9 GHz bands enabling operation of various WBB applications. Defence also provides support for replanning the 1.5 GHz band including consideration of Defence's responses to previous consultations in 2016 and 2022.

### TERAHERTZ BANDS

8. Defence welcomes the ACMA's interests in the terahertz frequency range (100 GHz to 420 THz). It is worth investigating regulatory arrangements similar to the US FCC and the UK Ofcom's arrangements in the band above 100 GHz. As pointed out in the overseas regulatory arrangements, the intention is to support future developments of these technologies mostly used for short range devices, land mobile and fixed point-to-point links. DSO is not aware of any firm plans for currently utilising THz technologies but this situation may change in the future.

9. Defence notes the rapid developments of the optical communication technologies in recent years. In order to support 5G and beyond features such as high bandwidth, low delays and high precision synchronisation, many optical communication network architectures are being developed. Defence runs several projects experimenting with free space point-to-point optical links as part of terrestrial networks. There are also some hybrid Earth-to-space links consisting of RF and free space optical links. The links operate in accordance with the Australian/New Zealand Standard for Safety of Laser Products AS/NZS IEC 60825. 1:2014 and the Defence Radiation Safety Manual. Defence can provide greater detail as required.

10. Defence understands that frequency bands up to 420 THz are considered to be radio waves as per the definition provided in the *Australian Radiofrequency Spectrum Plan 2021*. Defence also acknowledges that the frequency bands above 275 GHz are currently not allocated. Defence recommends further examination of the arrangements to access this spectrum in order to protect the currently operating free space optical links.

### SATELLITE COMMUNICATIONS

11. Defence would firstly like to thank the ACMA for the efforts devoted to review the satellite filing procedures.

12. In terms of the future work for satellite operators, Defence would like to acknowledge that Australia is home to small-medium industry that operates small constellations. This includes several DSTG programs funded by the Government and industry partnerships. The Australian spectrum management framework should accommodate these smaller players. It is also worth noting that the protection of the geostationary satellite orbit (GSO) from mega non-GSO constellations, in particular in frequency ranges that Art 22.2 does not apply, now becomes a challenge. It is expected that Australia's spectrum management framework is ready to manage the expectations of both GSO and non-GSO operators.

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13. It is worth noting that on 14 March 2024, the United States adopted the Supplemental Coverage from Space (SCS) regulatory framework which combines satellite and wireless services. The list of frequency bands that are available for the provision of SCS are:

600 MHz (614–652 MHz and 663–698 MHz)  
700 MHz (698–769 MHz, 775–799 MHz, and 805–806 MHz)  
800 MHz (824–849 MHz and 869–894 MHz)  
1850–1915 MHz and 1930–1995 MHz and  
1915–1920 MHz and 1995–2000 MHz

14. Defence support the ACMA efforts to harmonise the SCS bands with the United States.

**FEEDBACK ON 2024-25 ANNUAL WORK PLAN**

1. Defence understands that the Australian market is heavily influenced by international trends seeking the fast adoption of enhanced mobile wireless technologies. Defence however trusts that the ACMA will work with Defence to deliver the challenging goals set by the Government under the NDS as a part of whole-of-government commitments and efforts.
2. Defence continues to raise concern on the following topics listed in the 2023-24 annual work plan:

**MONITORING STAGE**

3. **3 300–3 400 MHz: Defence is concerned about monitoring this frequency band for possible allocation for IMT.** This reallocation will impact a growing number of Defence radar capabilities including non-itinerant systems. Defence would like to point out the results of Study F of ITU-R Report M.2481 clearly indicating that possible implementation of mitigation measures, applicable to Australian scenarios, could only make IMT deployment overly restrictive without further denying spectrum to key Defence radar capabilities that will be in service for several decades.
4. The 3.4-3.8 GHz has been harmonised within Europe for mobile/fixed communications network through ECC Decision 11(06). It is clearly evident that the 3.3-3.4 GHz band has not been identified under roadmaps for 5G and beyond in Europe.
5. In the United States, the 3.45-3.55 GHz band has been allocated to US Defense and commercial wireless access, and the FCC instituted a three-tiered sharing model in this band with the primal goal to protect military radars in this band. The 3.1-3.45 GHz band is allocated to the federal agency only with primary use for US Defence. Any future sharing studies for the 3.1-3.45 GHz band are still pending the complex administrative procedures which are to be developed.
6. It is also of vital interest to take into account Australia's long term investment into developing globally unique Defence assets before repurposing the 3300-3400 MHz frequency band. Defence can provide further information regarding these aspects.
7. **4 400–4 990 MHz: Defence is concerned about monitoring this frequency band for possible allocation for IMT.** This frequency band supports multiple Defence applications across the land, sea and air domains. Over several years, Defence has continuously objected to monitoring the 4.4-4.5 GHz and 4.8-4.99 GHz frequency bands in all responses to previous FYSOs that focus on these bands. On these continuous objections, in 2022 the ACMA responded by including an additional 300 MHz (4.5-4.8 GHz) of Defence bands under the monitoring stage without acknowledging Defence's objections or consulting Defence.
8. This frequency band is part of the harmonised Five Eyes and NATO spectrum used by aeronautical mobile services (AMS), fixed line-of-sight and non-line-of-sight for data, command, control and telemetry as well as for Navy fleet wide communications including mesh networks all of which are currently used by Defence in Australian territory today through either legacy systems or newly acquired systems across major Defence capability projects. AMS use also extends to command and control of weaponised systems. Due to the

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very complex spectrum environment including weaponised systems, either sharing or replacement of equipment will simply not be possible. It is worth noting that these bands are the few remaining frequency segments below 6 GHz available to Defence and it is vital to preserve these bands for defence purposes. Furthermore it should be noted that whilst the 4400-4800 MHz band will be studied for potential identification for IMT under the International Telecommunication Union World Radiocommunication Conference 2027, Agenda Item 1.7, 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.

### PRELIMINARY REPLANNING

9. **1.5 GHz (1427-1518 MHz):** Defence would like to raise a concern on the information provided under the replanning stage of the 1.5 GHz band which could be misinterpreted to some degree by a wider spectrum audience. As an example, the FYSO states that at WRC-15 the entire 1.5 GHz band was harmonized for IMT in Regions 2 and 3. The band was actually identified for IMT within Regions 2 and 3, not harmonized. Also, within Region 1, the emphasis was on countries outside Europe. Suggestions that the band is harmonized in each Region necessitates that the ACMA should provide information and further context on which countries bordering each other have agreed to utilize the band for IMT.

Defence appreciates the ACMA's clarification within Region 1 support to IMT between European, Arab, and African nations. It is well known under the NDS that the Australia Government recommended further strengthening the relationship with AUKUS, FVEYs and NATO countries and alignment on spectrum interests is one aspect which should be taken into account.

10. Defence would also like to note that none of previous consultations; one from 2016 and another from 2022, to the 1.5 GHz band review process have been mentioned. As such Defence does not support inclusion of un-referenced material to the effect made by mobile network operators to utilize the band for WBB without proper referenced consultation responses including those made by Defence. Defence will take this opportunity to reiterate the main points from our responses:

- a. Defence utilises this band for aeronautical mobile telemetry (AMT) with more critical capabilities yet to come as set in the NDS and IIP.
- b. Defence required access to 20 MHz of spectrum in selected Defence Test Ranges for manned and unmanned flight testing purposes, but this might need to be revised to address the requirements under the NDS and IIP.
- c. Defence needs Australia wide access in the 1.5 GHz band.
- d. Multiband systems are a key priority for Defence to ensure combat jamming effect with the 1.5 GHz band playing the key role.
- e. Growing requirements for access for unmanned aerial vehicle and unmanned aerial system in the 1.5 GHz band as other parts of the L-bands have become heavily congested.

11. By not acknowledging incumbent users and a growing demand for AMS access in this

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band by Defence and defence industry for testing systems with larger spectrum bandwidth requirements, the spectrum community will be misled in terms of spectrum availability in the 1.5 GHz band.

12. FYSO also states that the impact on AMT and fixed services are to be investigated, while Defence has repeatedly pointed out that the studies show that co-existence between AMT and ITM is not practical.

13. Finally, Defence would like to invite the ACMA to acknowledge the footnote AUS3 for 1429-1555 MHz frequency band which states that the AMS has priority over other users by mobile services.

14. Defence requests that these points be included in the final FYSO version.

## IMPLEMENTATION

15. **2 GHz (1980-2010 MHz and 2170-2200 MHz):** Defence is not directly affected by replanning options in the 1 980–2 010 MHz and 2 170–2 200 MHz frequency bands. However, Defence heavily uses the adjacent band 2 200–2 290 MHz for AMS and uses this band for satellite operations. Defence is concerned about any collateral effects of spectrum replanning. It should be noted that Defence has previously participated in discussions with the ACMA with respect to accommodating relocated small wireless camera operators in 7.2 GHz in order to protect Defence satellite Earth stations.

## **ANNEX C**

### **DEFENCE CRITICAL SPECTRUM DEPENDANT CAPABILITIES**

16. As already pointed out, the Government has planned to invest in a total up to 420 billion from 2024-25 to 2033-34 through the IIP to give effect to the National Defence Strategy of which the majority of that investment will deliver capabilities that are in some way reliant on the electromagnetic spectrum. Some of the critical spectrum dependant capabilities are listed below.

#### **ELECTRONIC WAREFARE**

17. The Government is investing \$2.7-\$3.7 billion in the development and integration of electronic warfare capabilities that can protect the ADF's electronic capabilities from being interfered with, for instance through jamming and can enable the ADF to locate and disrupt a potential adversary's electronic signals.

#### **UNCREWED AIR SYSTEMS**

18. The Government will invest \$4.3-\$5.3 billion in the development and acquisition of uncrewed aerial systems for Air Force to augment its crewed capabilities on a range of missions. Initial areas of focus include autonomous collaborative capabilities able to perform intelligence, surveillance and reconnaissance and combat roles including the MQ-28 Ghost Bat and other developmental uncrewed aerial systems.

19. The Government is continuing to invest in the MQ-28 Ghost Bat and has approved its next stage of development, which will see the delivery of three Block 2 aircraft with enhanced design and improved capabilities. This investment will progress the development of the unique Australian technology that allows MQ-28A aircraft to work with each other and with crewed aircraft as one team to achieve their mission. It will also enable further development of the MQ-28A's mission payloads, integrated combat system and autonomous systems.

20. In line with the Defence Industry Development Strategy, the Government is exploring opportunities to further enhance the integration of uncrewed aerial systems into the ADF's force structure. Co-development of uncrewed aerial systems with Australian industry will provide Defence with a range of effective, expendable and economical capability options into the future.

#### **MISSILE DEFENCE**

21. The Integrated Investment Program includes an extensive investment currently planned from 14 to 18 billion from 2023-25 to 2033-34 in integrated air and missile defence (IAMD), spread across the capability priorities. This includes investment in advanced active IAMD defence capabilities that can defeat key air and missile threats in flight, including missile launchers and munitions. It also includes investment in sensors, command and control systems and communications capabilities and critical IAMD supporting systems. The Government is also investing in passive IAMD capabilities that can degrade the effectiveness of an air and missile attack, which are an essential part of any IAMD framework.

## **INFORMATION AND COMMUNICATION TECHNOLOGY**

22. The Government will invest \$5.8-\$7.8 billion in ICT at the enterprise level through the delivery of modern, secure and survivable networks and applications capable of fulfilling current and future corporate, intelligence and warfighting needs. This includes an uplift of Defence's single information environment to strengthen network security and agility and deliver next-generation Defence networks. This also includes enhancing interoperability and connectivity with allies and partners to support communications, situational awareness and targeting.