



**Australian Government**

**Department of Defence**

Chief Information Officer Group

ACMA IFC 12/2022

The Manager  
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## **FIVE-YEAR SPECTRUM OUTLOOK 2022-27 AND 2022-23 WORK PROGRAM**

### **References**

- A. Five-year spectrum outlook 2022-27 and 2022-23 work program – Draft for consultation
- B. Australian Government Held Spectrum Report, 5<sup>th</sup> April 2019

1. Defence appreciates the opportunity to comment on the Five-year spectrum outlook 2022-27 and 2022-23 work program – draft for consultation provided in Reference 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. Defence fully supports the ACMA's effort to promote the long-term public interest derived from the use of the spectrum by providing the management of spectrum in a manner that facilitate the use of spectrum for defence purposes, national security purposes and other non-commercial purposes (including public safety and community purposes) as determined by the object of *the Radiocommunications Act 1992*.

3. Defence supports the first ministerial policy statement specifying communication policy objectives to which the ACMA must consider in performing the spectrum management functions in relation to the 3.4-4.2 GHz band. Defence would also support the ACMA's efforts in identifying objectives for specific planning and allocations process in this band. It is worth emphasising that Defence has specific yet increasing demand for operating spectrum dependent capabilities which can be accommodated in the 3.4-4.2 GHz frequency band.

4. Defence fully understands market and technology drivers of change in spectrum demand. However, it is evidently from the provided references (ref to pages 10 and 11 of Ref A) that the listed drivers are sourced from commercial entities only. As we are now learning from overseas experiences, especially from the US<sup>1</sup>, this might be an opportunity to build a whole-of-the government spectrum vision on the future spectrum demands rather than looking from the perspective of commercial entities only. Defence acknowledges that such an approach would be able to serve government and industry users and serve the Australian people.

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<sup>1</sup> <https://www.aip.org/fyi/2022/fcc-ntia-vow-fix-spectrum-allocation-turmoil>

## Concerns

5. Key Defence concerns on spectrum re-allocation plans are summarised below. Please note that Defence is prepared to provide separate non-public correspondence on particular issues being summarised below, as required.

a. On the ACMA's priorities on particular spectrum uses, Defence's main concern is on the adequate protection for Australian licensed networks from the mega non-geostationary satellite orbit (NGSO) constellations operating across the frequency bands which are not regulated by the Article 22 of the ITU Radio Regulations. More details are provided in Annex A.

b. Defence has concerns on work items that might result in spectrum re-allocation of frequency segments critical to national security and defence. The ACMA continues to monitor several frequency bands designated as Defence bands for possible introduction of International Mobile Telecommunications (IMT) services. Defence continues to point out that such arrangements would be infeasible and will have significant technological incompatibilities with Defence systems (ref to Annex B) which have not been addressed to date.

c. Defence has obligations via international military arrangements to coordinate and harmonise spectrum access with the Five Eyes countries and other Allies, and would appreciate the ACMA take these arrangements into account when considering any potential re-planning and re-allocation of Defence bands.

d. Defence's spectrum requirements coincide with the general public user requirements to some extent but there are specific emerging technologies that are intended to serve defence purposes, national security and other non-commercial purpose as refer to Annex C.

6. The Australian Government will invest approximately \$270 billion in Defence capability over the decade up to FY20-30<sup>2</sup>. This includes considerable investment into information and communication technologies requiring long term certainty of spectrum access.

7. With respect to the Government Spectrum Holdings report in Reference B, Defence suggests enhancing this body of work to include accurately forecasting future growth of spectrum dependencies. Defence proposes that the ACMA includes this work item under the FYSO.

8. Annex A provides feedback on priorities for particular spectrums uses. Annex B provides feedback on the 2022-23 annual work program plan and in particular on Defence's position on selecting various frequency bands for future mobile telecommunications systems. Annex C describes Defence priorities and emerging technologies within Defence that needs to be re-iterated to the ACMA.

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<sup>2</sup> [2020 Defence Strategic Update & 2020 Force Structure Plan](#)

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9. My point of contact is Dr Snezana Krusevac on (02) 5130 1169 or via email [snezana.krusevac@defence.gov.au](mailto:snezana.krusevac@defence.gov.au).

Yours sincerely

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**ANNEXES:**

- A. Feedback on priorities of particular spectrum uses
- B. Feedback on 2022-23 annual work plan
- C. Defence priorities and emerging technologies

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**FEEDBACK ON PRIORITIES FOR PARTICULAR SPECTRUM USES**

1. Defence understands the ever-increasing demand for wireless connectivity by the wide range of consumers including general public, businesses and government. In the last two years, Defence faced many challenges in keeping up with Defence's own growing demand for connectivity across premises all around Australia. The demand for higher speed, greater bandwidth, shorter latency, more connected devices and users will only continue in the following years.
2. Defence has military specific spectrum requirements that serve all Australians in defending its national interests in order to advance its security and prosperity. The spectrum demand for these military specific applications is increasing significantly and will require both greater efficiency of use and where necessary access to additional spectrum for Defence purposes.
3. Defence would appreciate the ACMA's full cooperation and assistance to meet these diverse spectrum demands.

**WIRELESS BROADBAND**

4. The Defence Spectrum Office (DSO) has encountered the growing demands for spectrum to support mobile and fixed wireless broadband (WBB) applications from the overall Defence enterprise and defence industry.
5. In regards to potential re-farming of the other bands previously unused for WBB applications, Defence suggests that the ACMA undertake a comprehensive study with the aim of investigating spectral efficiency and actual spectrum usage across all bands currently allocated for the mobile telecommunication services, supported by the evidence of future spectrum demands before initiating any new spectrum allocation to these services. The methodology should identify bands and applications feasible to operate across the same frequency bands and measures required to be taken to protect sensitive applications. Such an initiative might need to be undertaken at the whole of the government level. Defence would like to suggest such a study to be undertaken in line with the Government Held Spectrum Report (reference B).
6. Defence is of the view that additional spectrum to the mobile telecommunication services should only be supported where there is strong evidence that there is an actual need for additional spectrum to be repurposed for these applications<sup>3</sup>. International reports suggest that Australia has significantly more spectrum allocated per person for mobile telecommunication services than other similar countries<sup>4</sup>.
7. In terms of the medium term planning, Defence would like to reiterate support for the ACMA's efforts to revise 1.9 GHz bands enabling operation of various WBB applications. Defence also provides support for revising 1.5 GHz band which will provide some certainty to Aeronautical Mobile Telemetry (AMT) service with more details provided in Annex B.

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<sup>3</sup> [GSMA | 5G Speeds in Australia are Almost Twice the Global Average - Membership](#)

<sup>4</sup> <https://www.gsma.com/newsroom/press-release/gsma-sets-out-5g-roadmap-for-asia-pacific/>

## TERAHERTZ BANDS

8. Defence recognizes that the ACMA is looking for regulatory arrangements similar to the US FCC<sup>5</sup> and the UK Ofcom's<sup>6</sup> arrangements in the 100 GHz to 3 THz frequency band. 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 particular interest for currently utilising THz technologies but this situation may change in the future.

9. Defence would, however, like to point out 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 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 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 recognises the rapid development in satellite technologies including the deployment of mega NGSO constellations, which are significantly larger than previous constellations, containing thousands of satellites. Defence notes that the current regulatory framework needs to change significantly to accommodate these NGSO constellations and protect incumbent GSO networks.

12. Considering the global nature of NGSO systems, Defence understands the ACMA's cautious position in introducing any additional regulatory overlays on the global systems that are already subject to the ITU processes, however, this needs to take into account the required protection of incumbent licences.

13. It is worth noting that the Australian government is making considerable investments into future sovereign satellite capabilities to defend Australia and its national interests.

14. Defence has been approached by a number of NGSO operators seeking comments on their earth station licences in Australia. Defence trusts that the one of ACMA's fundamental responsibilities under the objects of the Act is to ensure that Australian Defence licences and corresponding networks are not disadvantaged by these mega-NGSO constellations.

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<sup>5</sup> <https://docs.fcc.gov/public/attachments/DOC-356643A1.pdf>

<sup>6</sup> [https://www.ofcom.org.uk/\\_data/assets/pdf\\_file/0032/228929/terahertz-spectrum-paper.pdf](https://www.ofcom.org.uk/_data/assets/pdf_file/0032/228929/terahertz-spectrum-paper.pdf)

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15. Defence is committed to fully oblige with the ITU processes. In these circumstances, Defence's approach is to invite those NGSO operators to complete coordination with respect to Defence networks. It should be noted that coordination in the frequency segments where Article 22.2 of the ITU Radio Regulations does not apply requires a considerable amount of time and effort.

16. Defence suggests that this may be improved by providing sufficient guidance to all stakeholders with respect to navigating this complex license application process.

**FEEDBACK ON 2022-23 ANNUAL WORK PLAN**

1. Defence understands that the Australian market is heavily influenced by the international trends seeking the fast adoption of new emerging technologies predominantly led by mobile wireless telecommunication entities. Defence acknowledges the ACMA's aim to facilitate efficient spectrum planning, allocation and licensing arrangements in each band for the use or uses that best promote the long-term public interests derived from the use of that spectrum. Yet, in such a complex environment, Defence would always support the ACMA to pursue its obligations toward the object of the *Radiocommunications Act 1992* in facilitating the use of spectrum for defence purposes, national security purposes and other non-commercial purposes. Defence would like to raise concern on the following topics listed in 2022-23 annual work plan:

**MONITORING STAGE**

2. **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 that 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.

3. In the latest Electronic Communications Committee (ECC) overview on the spectrum for wireless broadband from March 2022<sup>7</sup>, the ECC reported that the 3.4-3.8 GHz has been already harmonised within Europe. It is clearly evident that 3.3-3.4 GHz band has not been identified under roadmaps for 5G and beyond in Europe.

4. Whilst the United States Federal Communications Commission Rule from Jun 2021<sup>8</sup> has predominantly focused on the 3450-3550 MHz frequency band, the 3.3-3.45 GHz band is still pending the outcome of future planning involving identification of complex sharing opportunities.

5. 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.

6. **4 400–4 500 MHz and 4 800–4 990 MHz: Defence is concerned about monitoring these frequency bands for possible allocation for IMT.** These frequency bands support multiple Defence applications across the land, sea and air domains, not simply aeronautical mobile telemetry (AMT) as indicated in the FYSO. Defence responded to the same point in the previous FYSOs. Both frequency bands are 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

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<sup>7</sup> [CEPT.ORG - ECC - Topics - Major topics - Spectrum for wireless broadband – 5G](https://www.cept.org/Topics/Major-topics/Spectrum-for-wireless-broadband-5G)

<sup>8</sup> <https://www.federalregister.gov/documents/2021/04/07/2021-06546/facilitating-shared-use-in-the-3100-3550-mhz-band>

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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 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.

**7. 10.0-10.5 GHz: Defence is concerned about listing this band for monitoring as a band identified under the WRC-23 agenda item 1.2.** Defence does not think that listing this band for potential allocation for IMT is justifiable at this point of time. Defence would also like to point out that the FYSO has to acknowledge that the fixed and mobile allocations in this band are designated for the purposes of defence and national security. Defence would also like to point out that WRC-23 agenda item 1.2 is focussed on Region 2. As there will be no new ITU studies and reports addressing any sharing scenarios between IMT and radars for Region 3, listing this band for potential allocation in Australia is not appropriate.

## INITIAL INVESTIGATION

**8. 1.5 GHz (1427-1518 MHz):** We would like to reiterate again that the 1 435–1 535 MHz frequency band is standard Aeronautical Mobile Telemetry (AMT) band and is used for such purposes Australia wide as well as in the US and NATO countries. This has been also reported via our submission to IFC 25-2016 as well as all subsequent responses to FYSOs. Since 2016, there is a growing demand for AMT access in this band directly by Defence as well as defence industry for testing systems with larger spectrum bandwidth requirements. Therefore, Defence welcomes the initiative to release a discussion paper which could provide some certainty for spectrum access. However, Defence is concerned about potential implications on the AMT systems from the future LTE and MSS systems if these services are going to be considered under the future scope.

## IMPLEMENTATION

**9. 2 GHz (1980-2010 MHz and 2170-2200 MHz):** Even though Defence is not directly affected by replanning options in 1 980–2 010 MHz and 2 170–2 200 MHz, as a heavy user of the adjacent band 2 200–2 290 MHz (current and emerging) is concerned of any collateral effects of spectrum replanning. In addition, Defence participates in discussions with the ACMA on accommodating relocated small wireless camera operators in 7.2 GHz with minimal impact to Defence Earth stations.



**DEFENCE PRIORITIES AND EMERGING TECHNOLOGIES**

1. Defence has invested in capabilities that have growing spectrum demand over the long term. Refer to the 2020 Defence Strategic Update & 2020 Force Structure Plan<sup>1</sup>, whereby information and cyber, maritime, air, space and land are capability priorities. Defence's approach to integrated investment requires that every capability is supported by enablers such as spectrum. The consequence is an appearance of a growing inventory of modernised spectrum dependent equipment within Defence.
2. **Space systems:** Space-based systems are critical for long range communications, surveillance and navigation and the future upgrade of satellite capabilities. Spectrum access assurance through international regulatory procedures in a timely manner is critical. The Australian Government has increased its investment over the next decade to improve Australian Defence Force's capability in space. This includes plans for a number of space networks to provide sovereign and resilient satellite communication capability across the Indian and Pacific Ocean Regions and an enhanced space control capability. Furthermore Defence notes that there is a rapidly changing space-spectrum environment due to the introduction of very large NGSO constellations and short duration satellite systems (CubeSats). This introduces challenges when ensuring adequate spectrum for Defence capabilities.
3. **Unmanned systems:** Growth in unmanned systems within Defence surpasses that in commercial sectors. Military use of unmanned aero, land and maritime systems is growing and spectrum needs in support of command and control and payload communications spans across multiple frequency bands.
4. **Electronic warfare (EW):** the Australian Government will invest in EW systems enhancing Defence's capability to protect access to spectrum in the presence of adversarial actions. The ability to train with recently acquired EW capabilities with minimal restrictions is essential and Defence requires flexibility in regulatory measures to achieve this aim.
5. **Multi-band systems:** Military communications promote multiband systems that can operate on multiple frequencies simultaneously or shift from one band to the other to combat jamming effects. Software Defined Radio based systems have greater flexibility outside traditional Defence bands. However, regulatory restrictions are not allowing Defence to train as you fight ability.
6. **Shared frequency segments:** Defence does not have the luxury of deploying homogenous systems on a given segment of frequency as in the case of commercial systems. Some scenarios, for example, consists of a mix of fixed point-to-point networks, beyond line of sight point-to-point links, aeronautical mobile uplink and downlink and radionavigation systems accessing the same frequency segment within the same geographic area. Spectrum sharing between these systems requires careful spectrum management.
7. **Electronically steerable arrays (ESA):** ESAs are widely used in Defence and other government radar systems. This has allowed implementation of highly complex processing algorithms within sensor systems. However, the treatment of these systems in technical and regulatory studies, which supports spectrum planning, must change to address engineering and technical nuances.