



Australian Government

Department of Defence

Chief Information Officer Group

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The Manager

Spectrum Management Outlook and Strategy Section

Australian Communications and Media Authority

PO Box Q500, Queen Victoria Building, NSW 1230

FIVE-YEAR SPECTRUM OUTLOOK 2021-26

References

- A. Five-year spectrum outlook 2021-26 work program - Consultation Draft
Australian Government Held Spectrum Report, 5th April 2019

1. Defence appreciates the opportunity to comment on the draft work program 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.

Concerns

2. Key Defence concerns on spectrum re-allocation plans are summarised below. Please note that Defence will provide separate non-public correspondences on particular issues being summarised below, as required.

a. 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 A) which have not been addressed to date.

b. The Australian Government will invest approximately \$270 billion in Defence capability over the decade to 2029-30¹. This includes considerable investment into information and communication technologies requiring long term certainty to the spectrum access.

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

d. We would like to emphasise the need for Defence specific emerging technologies that are intended to serve and protect public interests which require access to spectrum. Refer to Annex B for further details.

¹ [2020 Defence Strategic Update & 2020 Force Structure Plan](#)

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Proposal for new work items

3. 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. 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 more spectrum for this purpose. It is of vital interest to undertake this study as there is some evidence suggesting that Australia has significantly more spectrum allocated per person for mobile telecommunication services than other similar countries. This has been supported by GSMA's The State of Mobile Internet Connectivity 2020 report² where Australia is ranked in the top five of 170 countries (representing 99 percentage of global population) in all four indicators used in the report, and number one overall. Note that one of the indicator is infrastructure³ which further includes bandwidth per user, spectrum (MHz per operator), network coverage and etc. It is evident that the performance of Australian mobile communication networks is far ahead of the rest of the world.
4. 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 to include this work item under the FYSO.
5. Annex A provides feedback and Defence position on selecting various frequency bands for future mobile telecommunications systems. Annex B describes Defence priorities and emerging technologies within Defence that needs to be re-iterated to the ACMA.
6. My point of contact is Dr Snezana Krusevac on (02) 5130 1169 or via email snezana.krusevac@defence.gov.au.

Yours sincerely

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² <https://www.gsma.com/r/wp-content/uploads/2020/10/Mobile-Internet-Connectivity-Global-Fact-Sheet.pdf>

³ <https://www.gsma.com/r/wp-content/uploads/2020/09/GSMA-Mobile-Connectivity-Index-Methodology-2020.pdf>

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ANNEXES:

- A. Feedback on band-planning and forward spectrum allocations
- B. Defence priorities and emerging technologies

FEEDBACK ON BAND-PLANNING AND FORWARD SPECTRUM ALLOCATIONS

1. Defence understands that Australia is heavily influenced by the international markets and is seeking benefits of spectrum harmonisation. However, before doing this, Australia must also take into account the spectrum required to defend its national interests in order to advance its security and prosperity. This is not to be limited to domestic spectrum allocations. Defence currently conducts operations in all ITU-R regions, meaning that Australian interests and influence should be adequately taken into account across all these regions.

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 has submitted a contribution to WP5D study group clearly showing that potentially allocated IMT systems are not compatible with current radar systems operated by Defence. This study has further supported the results of Study F of ITU-R Report M.2481. Further, possible implementation of mitigation measures, applicable to Australian scenarios and adequate to protect radars, will 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) Newsletter from December 2020⁴, ECC reported that the 3.6 GHz (3400-3800 MHz) band would be the primary band for 5G. The 3300-3400 MHz band has not even been identified under the new future-looking roadmap – 5G and beyond. It is evident that no CEPT administration is planning to allocate spectrum below 3 400 MHz⁵.

4. Whilst the United States Federal Communications Commission⁶ has focused for some time on the entire 3100-3550 MHz band, the 3450-3550 MHz is the only frequency band currently released for 5G as an additional analysis is necessary to assess possible sharing mechanisms and incumbent relocation options.

5. It is also of vital interest to take into account Australian 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 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 FYSO. 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 Australian territory today through either legacy systems or newly acquired systems across

⁴ [ECC Newsletter December 2020](#)

⁵ https://www.cept.org/Documents/ecc/61628/ecc-20-124-annex-18_follow-up-5g_roadmap

⁶ <https://www.fcc.gov/document/facilitating-shared-use-3100-3550-mhz-band>

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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. Finally, these bands are the few remaining frequency segments below 6 GHz available to Defence.

7. **10.0-10.5 GHz: Defence is concerned about listing this band for monitoring.** Defence does not think that listing this band for potential allocation for IMT is justifiable at this point of time. Defence points out also that in the FYSO it should be acknowledged that the fixed and mobile allocations in this band are designated for the purposes of defence and national security. Defence would also like to bring to your attention 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 consequent 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. Note that Defence is concerned about possible consideration for LTE and MSS systems and potential implications for AMT systems operated by Defence.

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. These are long-term trends in Defence spectrum usage. Refer to the 2020 Defence Strategic Update & 2020 Force Structure Plan¹, 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. Consequently the appearance of a growing inventory of modernised spectrum dependent equipment within Defence.
2. **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.
3. **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.
4. **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.
5. **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, including class licensed frequencies.
6. **Space systems:** Space-based systems are critical for long range communications, surveillance and navigation and the future upgrade of satellite capabilities will be significant. Spectrum access assurance through international regulatory procedures in a timely manner is critical. As correctly reference in the draft FYSO, the Australian Government has increased investment to seven billion dollars over the next decade to improve Australian Defence Force's capability in space. This include 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 non-geostationary constellations and short duration satellite systems (CubeSats). This introduces challenges when ensuring adequate spectrum for Defence capabilities.
7. **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.