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May 12, 2023

The Manager
Spectrum Licensing Policy Section
Australian Communications and Media Authority
PO Box 13112
Law Courts
Melbourne VIC 8010

Re: Five-year spectrum outlook 2023–28

Dear Manager, Spectrum Licensing Policy Section -

The Dynamic Spectrum Alliance (DSA)[1] respectfully submits these comments to the Australian Communications and Media Authority (ACMA) "Five-year spectrum outlook 2023–28 and 2023–24 work program" (Spectrum Outlook).[2] We appreciate the opportunity to offer our perspectives on how ACMA can increase connectivity, close the digital inclusion gap, and promote "investment, innovation and the adoption of new and emerging technologies."[3]

The DSA and our members work with regulatory authorities around the world to promote new and innovative approaches to spectrum management to increase spectrum access options and extend connectivity. Such innovative approaches include the adoption of new licensing frameworks that incorporate licensed, unlicensed, and license-by-rule access options. In addition, the DSA promotes the use of automated dynamic spectrum management systems (DSMS) to make more efficient use of spectrum and support a wide range of commercial services, including wide-area mobile and fixed broadband networks, as well as local and private networks, use cases and applications. We believe

[1] The DSA is a global, cross-industry, not for profit organization advocating for laws, regulations, and economic best practices that will lead to more efficient utilization of spectrum, fostering innovation and affordable connectivity for all. Our membership spans multinationals, small-and medium-sized enterprises, as well as academic, research and other organizations from around the world all working to create innovative solutions that will benefit consumers and businesses alike by making spectrum abundant through dynamic spectrum sharing. A full list of DSA members is available on the DSA's website at dynamicspetrumalliance.org/members.
[2] Available at https://www.acma.gov.au/sites/default/files/2023-04/Draft%20FYSO%202023-28_for%20consultation.pdf.
[3] Spectrum Outlook at 1.

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that these concepts and tools should be key components of ACMA's Five Year Spectrum Outlook planning and implementation.

The DSA applauds ACMA for its recognition of the importance of innovative licensing frameworks and the benefits of dynamic spectrum sharing. Our comments herein will provide an update on recent spectrum sharing developments in the CBRS and 6 GHz bands in the United States and elsewhere and recommendations on ACMA's planning and implementation activities.

The DSA and our members are available to discuss these comments and provide any additional information and insights on dynamic spectrum management and innovative licensing frameworks.

Respectfully submitted,
Martha SUAREZ
President
Dynamic Spectrum Alliance

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DSA COMMENTS

A) Update on Automated Spectrum Sharing in the U.S. 3.5 GHz CBRS Band

To maximize the efficient use of spectrum and provide a variety of access options, the DSA recommends that regulators worldwide implement automated Dynamic Spectrum Management System (DSMS) solutions and innovative licensing frameworks. The DSA anticipates that regulatory authorities worldwide will need to rely increasingly on automated DSMS tools to handle surging demand for wireless connectivity by sharing underutilized frequency bands. Significant improvements in computation power are enabling more efficient and rapid advanced propagation analysis capability, which in turn enables coordination of devices and users in what is close to real-time. Application of artificial intelligence techniques, such as machine learning for spectrum sensing and for signal classification, also can support improved spectrum management.[4] In addition, more agile wireless equipment is being developed that can interact directly with DSMS tools, increasing opportunities for even greater efficiency and scale.

One of the best examples of a successful implementation of an automated DSMS and novel licensing framework is the U.S. 3.5 GHz CBRS band (3550-3700 MHz). Authorized by the Federal Communications Commission (FCC) in January 2020, CBRS has been a shining example of the myriad benefits of automated spectrum sharing.

Through this automation of shared spectrum, a whole host of new services has emerged. In addition to densification of the nationwide public mobile networks, and use of these frequencies by rural wireless Internet service providers (WISPs), a wide variety of private networks are also using the CBRS band. Today there are over 330,000 CBRS cell sites deployed across the United States, with the vast majority using the GAA tier. Examples of such private wireless network deployments using the CBRS GAA tier include:

Military logistics:
https://www.fiercewireless.com/private-wireless/federated-demo-dod-highlights-benefits-shared-spectrum

[4] Body of European Regulators for Electronic Communications (BEREC), "Draft - BEREC Report on the impact of Artificial Intelligence (AI) solutions in the telecommunications sector on regulation," BoR (22) 191, Dec. 2022, pages 24-26. Microsoft Word - BoR (22) 191 Draft Report on challenges and benefits of Artificial Intelligence (AI) solutions in the telecomm (europa.eu).

Energy management:
https://www.fiercewireless.com/private-wireless/schneider-electric-adds-private-wireless-smart-factories

Retail:
https://www.druidsoftware.com/2019/11/15/cbrs-ongo-at-american-dream-entertainment-retail-complex-nj-usa/

Municipal government:
https://www.fiercewireless.com/private-wireless/motorola-and-harris-county-build-private-lte-network

https://www.fiercewireless.com/private-wireless/cox-launches-cbrs-pilot-city-las-vegas

Transportation:
https://www.fiercewireless.com/wireless/boingo-deploys-trial-cbrs-network-at-dallas-love-field-airport

Education:
https://www.csrwire.com/press_releases/747561-private-wireless-helps-schools-close-digital-divide

https://www.fiercewireless.com/private-wireless/fort-worth-isd-builds-sustainable-cbrs-network

https://www.fiercewireless.com/private-wireless/samsung-amdocs-deploy-private-cbrs-network-howard-university

Entertainment:
https://inbuildingtech.com/venues/connectivity-wireless-jma-stadium-cbrs/

Hospitality:
https://www.thefastmode.com/technology-solutions/24585-airspan-networks-deploys-5g-cbrs-private-network-for-hospitality-industry

Manufacturing warehouse/supply chain:
https://www.fiercewireless.com/private-wireless/calchip-connect-emerges-key-player-private-wireless

https://www.fiercewireless.com/private-wireless/mxd-adds-second-private-wireless-network

https://www.fiercewireless.com/private-wireless/cbrs-replaces-wi-fi-tennessee-factory#:~:text=When%20Italy's%20Del%20Conca%20Group,at%20alternatives%20to%20Wi%2DFi

Agriculture:
https://www.fiercewireless.com/private-wireless/three-day-deployment-makes-tractors-autonomous

https://enterpriseiotinsights.com/20220607/smart-farm/how-robot-tractors-and-a-private-network-came-together-at-a-smart-vineyard

Given this explosive growth and the wide range of use cases being supported by streamlined, automated spectrum access, the DSA encourages ACMA to include in its work program the implementation of commercially available DSMS tools to complement its current WBB licensing approaches. The introduction of DSMS will increase spectrum access options for new private wireless network users in addition to wide area subscriber networks.

B) 6 GHz (5925 – 7125 MHz) Next Steps

The DSA commends ACMA on its decision to make the lower 500 MHz of the 6 GHz band available for RLAN operations on a shared basis. However, we reiterate our strong recommendation that ACMA make the full 6 GHz band (5925-7125 MHz) available under the same framework and review how power levels and other operating conditions can be amended. There remain very strong arguments for the release of the upper 6 GHz band to RLAN and other class-licensed devices. We believe that these arguments lead to the conclusion that this should occur as soon as possible.

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DSA contends that there remain very strong arguments for the release of the upper 6 GHz band to RLAN technologies and believes that those arguments lead to a conclusion that this should occur as soon as possible.

Deliberations at the recent CPM-23-2 were inconclusive in relation to the 6 GHz band, with a wide range of options still on the table and concerns about sharing remaining. Other 'mid-bands' were also under consideration for IMT which reinforces DSA's view that IMT has sufficient spectrum in the mid-bands for current and future needs.

Of concern from the CPM is China's attempt to replicate a Region 1 consideration in Region 3. DSA appreciates Australia's comments from the floor on this issue, but we also note that the push for that allocation is coming from Huawei and that devices from this manufacturer are not permitted in the networks of many Administrations including Australia. Rejecting these moves is therefore in Australia's interests.

There is a strong demand for more class-licenced spectrum to support new and emerging technologies being deployed in Australia, and to also support very high-capacity broadband reticulation in offices, factories, homes and remote settlements.

In particular, there is a demand for 'digital inclusion' from many Australians living in remote areas and this demand has been recognised by the Government. By far, the most effective ways to 'connect' remote towns and settlements is via high throughout satellite connected to a Wi-Fi reticulation system. Thus, the allocation of the upper 600 MHz for class-licensed use helps meet an important Government requirement.

Australia-wide, the demand for more class licenced spectrum has not been met and cannot be met unless the upper 6 GHz band is allocated to RLANs. A high-capacity data link can be established to a central point through a fibre point of presence, a satellite link (GSO or NGSO) or a microwave point-to-point system. This data link could then be reticulated throughout the township via Wi-Fi, delivering the same quality of service experienced in the cities and, in some cases, with similar latency (depending on the method of delivery to the Wi-Fi connection). This method of broadband access is particularly helpful in remote settlements and low-income communities with the greatest need for broadband access. Without access to the high throughput reticulation that can be made possible with the full 1.2 GHz of 6 GHz Wi-Fi spectrum, however, full digital inclusion in Australia is unlikely.

In addition, unless the full 1.2 GHz is allocated for RLAN, Wi-Fi deployments leveraging the 6 GHz band will largely still be limited to the use of 40 MHz channel sizes typically seen in 2.4 GHz

and 5 GHz deployments, particularly for dense deployments in high user scenarios such as in stadiums, schools and hospitals. Such deployments will not be able to fully utilize the 80 MHz, 160 MHz and even 320 MHz channel sizes that the latest Wi-Fi technology offers, limiting performance and the number of Wi-Fi users, even where the underlying broadband connection may be at gigabit speeds.

Sharing with other services

Sharing remains a concern both at the ITU and in domestic consultation. The DSA and other Wi-Fi proponents have demonstrated that a secondary service utilising Automatic Frequency Coordination (AFC) can co-exist with incumbent services like MSS Feeder Links, Fixed Links and FSS Uplinks, by way of the secondary status of RLAN. Even with standard power Wi-Fi operations, the sharing scenario between terrestrial uses and FSS space station receivers remains relatively unchanged.

More specifically, according to the studies conducted for US 6 GHz band (Reference: RKF, Frequency Sharing for Radio Local Area Networks in the 6 GHz Band, January 2018), maximum interference to noise ratio (I/N) into FSS receivers was -21.9 dB, well below the -6dB applicable interference protection criteria (IPC) and significantly less than the interference FSS presently receives from existing FS microwave transmissions.

However, the FCC has adopted an effective EIRP mask (47 CFR 15.407(a)(4)) which, if adopted in Australia, would give the FSS community additional comfort that standard power RLAN will not adversely affect their space receivers.

Most satellite operators believe that RLANs with AFC will enable them (and other services) to continue to operate and indeed deploy new terminals. This is particularly important for new MSS feeders which will support services that help to close the 'digital divide' and meet the aforementioned Government policy initiative. Only one operator, Globalstar, does not support this position and their submissions have been analysed by the FCC and dismissed.

In short, Wi-Fi throughout the 6 GHz band can share the spectrum without disrupting other services, and still provide full connectivity regardless of where people live or work.

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Maximising Socio-Economic Benefit

While releasing the lower 6 GHz will undoubtedly provide significant economic benefit to Australia, DSA is concerned that a split allocation may hamper the development of RLAN systems and other innovation that will need access to spectrum throughout the 6 GHz band.

With that in mind, DSA believes the ACMA should move the full 6 GHz band for class-licensed use into the allocation stage and make an announcement as soon as possible.

DSA Comment on Five-year spectrum outlook 2023–28 (Part 1)

Deployment of new applications targeted by Wi-Fi 6E and Wi-Fi 7 (based on IEEE 802.11ax-2021 standard and the upcoming IEEE 802.11be standard) can be effectively scaled when multiple of 160 MHz and 320 MHz channels are enabled. Although the current 6 GHz band for Wi-Fi 6E ends at 7125 MHz, IEEE 802.11be scope has already expanded the 6 GHz band from 7125 MHz to 7250 MHz for license-exempt shared use (indoor and outdoor). With this extension, Wi-Fi will have access to one additional 320MHz channel, effectively making possible 4-cell frequency reuse (N=4) deployment to improve scalability in the service offering in enterprise and dense scenarios.

The DSA recommends that ACMA consider extension of the 6 GHz band to 7250 MHz for class-licenced spectrum usage in its Five-year spectrum outlook 2023–28.

The IMT community in Australia benefits from the forward planning the ACMA started nearly 20 years ago in the 3.4 – 4.2 GHz bands. Indeed, IMT in Australia has more access to mid-band spectrum than almost any other comparable country.

DSA believes that to maximise early service delivery, the upper 700 MHz of the 6 GHz band (i.e., 6425-7125 MHz) should be allocated this calendar year, complementing the lower 500 MHz already announced by the ACMA.

DSA also encourages ACMA to consider extension of the 6 GHz band to 7250 MHz for class-licenced spectrum usage in FYSO 2023-2028.

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C) Conclusion

The DSA appreciates the opportunity to provide input on ACMA's Five Year Spectrum Outlook. We believe that innovative licensing frameworks, spectrum sharing, and automated DSMS solutions can help ACMA meet its goals of increasing connectivity, closing the digital inclusion gap, and promoting investment, innovation and the adoption of new and emerging technologies.

We encourage ACMA to implement DSMS solutions as soon as possible and to move forward with making the entire 6 GHz band available for class licenced RLAN operations as soon as possible. The DSA and our members stand ready to work with ACMA to build on the success of existing spectrum sharing frameworks and bring the resulting benefits to Australia in the near future.