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1 Introduction

Qualcomm International Incorporated (Qualcomm) welcomes the opportunity to provide input to the Australian Communications and Media Authority's (ACMA) June 2024 "Future use of the upper 6 GHz band" options paper.

Qualcomm is the world's leading wireless technology innovator and the driving force behind the development, launch, and expansion of 5G. When we connected the phone to the internet, the mobile revolution was born. Today, our technologies serve as the foundation of the mobile ecosystem and are found in every 3G, 4G, and 5G smartphone. We are bringing the benefits of mobile to new industries, including automotive, the internet of things (IoT), and compute, and are creating a world where everything and everyone communicates and interacts seamlessly. Qualcomm's Wi-Fi solutions build on our world-class engineering capabilities to provide highly reliable multi-gigabit connectivity to users and devices in homes, businesses, libraries, and on school campuses. Today, we are laser-focused on advancing 5G, developing 6G, and continuing to improve Wi-Fi connectivity.

In this response, Qualcomm provides comments for ACMA's consideration regarding efforts to enable radio local area network (RLAN) and wide-area wireless broadband (WA WBB) operations in the upper 6 GHz (6425-7125 MHz) band in Australia.

2 Assessment of planning options for the upper 6 GHz band

Qualcomm appreciates ACMA's efforts to enable RLAN and WA WBB operations in the upper 6 GHz band in Australia, as there is a demonstrated need for additional mid-band spectrum for unlicensed RLAN use and for WA WBB operations. As such, it is important to closely consider the available options to achieve these goals using the upper 6 GHz band and to assess the unique implications of all options for end users, services, and existing technologies that leverage the upper 6 GHz band.

Option 2, as described in the options paper, would introduce arrangements to enable RLAN use in the upper 6 GHz band through a variation to the LIPD Class License. The recent proliferation of wireless technologies operating in unlicensed frequencies has significantly increased demand for this spectrum, and allocating the full band for RLAN use could support the expansion of novel technologies, services,

and applications. This option would also enable ACMA to consider the long-term trajectory of Wi-Fi 6 and 6E adoption and use. By allowing RLAN use in the upper 6 GHz band, ACMA could encourage the adoption of devices that can leverage wider channel bandwidths and lower reuse factors, as well as enable Australians to benefit from the advanced capabilities in Wi-Fi 6E and Wi-Fi 7.

Further, many countries, including Argentina, Canada, Costa Rica, the Dominican Republic, El Salvador, Guatemala, Honduras, Peru, South Korea, Saudi Arabia, and the United States, have opened the entire 5925-7125 MHz range for unlicensed use, and others are considering means of opening additional upper midband spectrum for unlicensed.

At the same time, WA WBB spectrum is needed today for 5G and will be needed for 6G later this decade. Option 3 in the ACMA options paper would introduce arrangements to enable WA WBB use in the upper 6 GHz band through apparatus and/or spectrum licensing. According to a July 2022 [GSMA report](#), 5G networks require an average of 2 GHz of mid-band spectrum per market and without access to capacity in the 6 GHz band, mobile networks could become slower, more expensive, and cause higher carbon emissions. There are active global efforts considering the use of the upper 6 GHz band for WA WBB use, including in countries in the EU and Latin America, and in China and Hong Kong. Qualcomm is participating in Anatel's efforts in Brazil to optimize the band's utilization through authorizing WA WBB use.

In its February 2024 spectrum tune-up, ACMA indicated that it was monitoring international developments—including those included in the outcomes of ITU WRC-23—to decide on the future of the upper 6 GHz band. It should be highlighted that the WRC-23 decisions sought to provide flexibility to different administrations on their best approach to use this band, ensuring that both Wi-Fi and IMT technologies can develop and have economies of scale.

Given the ongoing technical and policy debates over the best uses of the upper 6 GHz band—in addition to the series of ongoing spectrum sharing studies between RLANs and WA WBB in the European Union and elsewhere—Qualcomm supports ACMA's efforts to monitor the active discussions and studies internationally relating to the upper 6 GHz band to inform ACMA's own plan for the upper 6 GHz band.

3 Segmentation of the upper 6 GHz band and potential sharing options

Qualcomm is actively supporting ongoing global efforts to explore sharing opportunities between licensed WA WBB and unlicensed RLANs in the upper 6 GHz band. We urge ACMA to continue to monitor the development of studies and models for enabling access to the upper 6 GHz band by both WA WBB and RLAN services. For example, band sharing could allow licensed WA WBB operations outside of buildings and unlicensed RLAN operations inside buildings where licensed and unlicensed users each can access the spectrum where it is needed most.

Qualcomm is involved in efforts in the European Union with the United Kingdom's (UK) Ofcom and other regulatory authorities to study unlicensed/licensed sharing in the upper 6 GHz band. In April 2023, the UK Department for Science, Innovation and Technology (DSIT) released its [Wireless Infrastructure Strategy](#) and related [Spectrum Statement](#) that highlighted the importance of spectrum sharing. DSIT expects sharing will be a key feature of future wireless networks, including 6G networks, and that sharing will help realize many of the benefits of advanced wireless, including novel use cases.

As part of this work, DSIT is funding several spectrum sharing studies between RLAN and WA WBB operations to assess sharing approaches not possible under current licensing conditions. Qualcomm and its partners in the UK were awarded funding to study RLAN/WBB co-existence in the upper 6 GHz band via test beds. Qualcomm is working with Ofcom, DSIT, and industrial partners on use cases to be field tested over the next 9 to 12 months. The objective of this technically challenging work effort is to provide UK regulators with an assessment of the costs and benefits of the sharing solutions, i.e., implementation cost and performance impact from an interference perspective versus performance improvements through sharing, and the regulatory mechanisms that may help achieve the country's desired goals. Such information may be valuable to ACMA as it weighs options for the upper 6 GHz band.

At the same time, Qualcomm recognizes the benefits of band segmentation. Allocating the lower 160 MHz portion of the Upper 6 GHz band to unlicensed use would enable two 320 MHz-wide unlicensed channels (when combined with the 500 MHz-wide Lower 6 GHz band) while allocating the remaining 540 MHz portion of the upper 6 GHz band to WA WBB relieves the need to implement potentially complex spectrum sharing technologies and opens access to the band more quickly than co-channel sharing options. Scheme 1—as described in ACMA's preliminary view on frequency segmentation—would support two 320 MHz unlicensed channels and 540 MHz for WA WBB, which could support five 100 MHz channels and one 40 MHz channel for WA WBB.

ACMA also should consider limiting unlicensed RLAN use indoors as a means of enabling the full upper 6 GHz band for WA WBB operations. The overwhelming majority of unlicensed device operations in terms of data delivery occurs indoors, due in large part to the fact that video and audio streaming services are replacing traditional cable service over wireline connections. To the extent wireless internet service providers that use unlicensed spectrum to serve customers are seeking higher transmit power to increase their service range, ACMA can allow higher power outdoors in the lower 6 GHz band.

To be clear, segmentation of the upper 6 GHz band would provide less than 700 MHz to licensed WA WBB (of the total amount of megahertz in the upper 6 GHz band) and less than 1200 MHz (when the lower 6 GHz and upper 6 GHz are combined) to RLAN. As it has been extensively noted, both uses seek more spectrum for the development of their technologies. WA WBB requires additional spectrum for 5G Advanced and for 6G, and RLAN operations require more than the 500 MHz in the lower 6 GHz band. On the other hand, enabling co-channel sharing in the full 700 MHz of the upper 6 GHz band would provide an option where more spectrum becomes available to both licensed WA WBB and unlicensed RLANs, albeit with a cost to both technologies as noted above.

4 Opening WA WBB spectrum in the 7125-8400 MHz range is key for 6G

While the 7 GHz band is not the subject of ACMA's options paper, Qualcomm recommends that ACMA begin to take steps to make spectrum above 7125 MHz in Australia available for licensed mobile operations. This band is under study for WA WBB worldwide. With the next generation of wireless technology being developed in the coming years, 6G requires more spectrum than what is available in the upper 6 GHz band to achieve present performance targets. 6G needs wider channel bandwidths than 5G (i.e., 400 MHz wide). Thus, it is essential that ACMA begin work now to open the 7125-8400 MHz band for WA WBB.

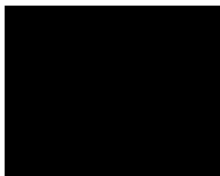
5 Conclusion

ACMA's option paper is an acknowledgement of the pressing need for additional spectrum for two different but critically important technologies: 5G Advanced / 6G WA WBB and Wi-Fi RLAN. While the Upper 6 GHz band can provide WA WBB spectrum for 5G and eventually 6G, ACMA should begin work to open the 7125 - 8400 MHz band for WA WBB operations, for it will allow ACMA to support RLAN's needs for multiple 320 MHz channels in 6 GHz and WA WBB needs by combining upper 6 GHz spectrum assets and adjacent portions of the 7.1-8.4 GHz bands.

ACMA also should monitor the ongoing licensed / unlicensed sharing studies and associated regulatory efforts in the EU and elsewhere. These studies can inform ACMA on the appropriate strategy for the upper 6 GHz band in Australia. Enablement of successful spectrum sharing regimes will play an increasingly important role in spectrum policy decisions moving forward, and it is important that ACMA monitor those efforts and consider them in the development and evolution of its own spectrum policy.

We appreciate the opportunity to provide feedback on ACMA's options paper and look forward to assisting ACMA in the development and implementation of the upper 6 GHz band ecosystem.

Sincerely,



Nies Purwati
Senior Director, Government Affairs
Qualcomm International Inc.

