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Via online submission

1 Introduction

Qualcomm International Incorporated (Qualcomm) welcomes the opportunity to provide input to the Australian Communications and Media Authority (ACMA) regarding the *Proposed update to the Australian Radiofrequency Spectrum Plan* consultation paper (the consultation paper). We support ACMA's actions to quickly incorporate outcomes of the 2023 World Radiocommunication Conference (WRC-23) into Australia's spectrum plans.

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 foundational technologies enable the mobile ecosystem and are found in every 3G, 4G, and 5G smartphone. We bring the benefits of mobile to new industries, including automotive, the internet of things (IoT), and computing, and are leading the way to a world where everything and everyone can communicate and interact seamlessly.

Qualcomm supports the incorporation of stakeholder feedback into key spectrum planning instruments such the Australian Radiofrequency Spectrum Plan. Such consultations allow industry and other stakeholders to provide input on the use of spectrum resources in Australia and harmonization with global and regional spectrum use.

In this response, Qualcomm provides input regarding potential future spectrum use considerations, particularly related to the use of the 7125-8400 MHz range and the upper 6 GHz band.

2 6G spectrum

2.1 Context

As wireless technology continues to advance and enable new and expanded use cases, additional spectrum resources are required to ensure the reliable provision of high-quality services. Often, the technological advances that accompany a new wireless generation are made possible due to the

availability of wider, contiguous spectrum bandwidths. Qualcomm anticipates that 6G will need wider channel bandwidths than 5G (i.e., 400 MHz wide) per operator to meet future use cases. Access to such contiguous spectrum will allow each operator to offer ultra-low latency and highly reliable services, while also expanding broadband capacity and speed, resulting in improved communications and enhanced applications.

This will allow flexibility for operators and their customers to more rapidly develop a variety of applications that will combine the physical, digital, and virtual worlds. 6G can encompass a broad range of technologies and combine the potential of communications, AI, integrated sensing, resilience of systems, and sustainability of networks. Further 6G will enable continued development and improved availability of immersive extended reality (XR) – including augmented reality (AR), virtual reality (VR), and mixed reality (MR) – in a wider range of locations.

2.2 Use of IMT in 7125-8400 MHz

As noted in ACMA's recently published Five-year Spectrum Outlook 2024-2029 (FYSO), WRC-27 agenda item 1.7 will consider studies on sharing and compatibility and develop technical conditions for the possible use of IMT in certain bands, including 7125-8400 MHz. Upper mid-band spectrum such as 7125-8400 MHz has been widely recognized as an important frequency range for 6G consideration since it can support wide-area coverage as well as high capacity.

As published by the ITU in Recommendation ITU-R M.2160 on the framework for IMT-2030 (or 6G), the next generation of IMT is expected to support enriched and potential immersive experience, enhanced ubiquitous coverage, and enable new forms of collaboration. Potential use cases will be an expansion of the 5G use cases including substantially more capacity for wide-area broadband, expanded use of extended reality (XR), and support for high-resolution radio frequency (RF) sensing. These use cases will provide additional benefits to smartphone users in the mass market, smart city and automotive connectivity, and industry verticals.

Qualcomm encourages ACMA to continue to monitor international developments regarding the 7125-8400 MHz range, including activities in ITU-R Working Party 5D, APG and AWG. Qualcomm urges ACMA to consider investigating potential spectrum for 6G in accordance with WRC-27 agenda item 1.7, focusing on making spectrum above 7125 MHz available in Australia.

As Australia considers its plans for enabling the successful deployment of 6G services, consideration of international and regional developments and domestic use will be important inputs into the planning process. Qualcomm would be pleased to continue engaging with ACMA to provide compatibility study updates as appropriate, as well as relevant technical information that could assist with the Australian WRC-27 preparation process and efforts to prepare for the introduction of 6G services.

3 6 GHz

Qualcomm applauds ACMA's efforts to remain engaged with stakeholders in developing an appropriate position for the upper 6 GHz band. We urge ACMA to consider models for enabling access to the upper 6 GHz band by both wide-area wireless broadband (WA WBB) and radio local area network (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.

European regulators, including Ofcom and the Department for Science, Innovation, and Technology (DSIT) in the United Kingdom, are undertaking work to assess the costs and benefits of upper 6 GHz 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. The information gleaned from European studies of spectrum sharing between WA WBB and RLAN uses 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.

ACMA should consider limiting unlicensed RLAN use to indoor environments 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 occur 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.

There are benefits to both the band segmentation and co-channel sharing approaches to providing 6 GHz spectrum access to WA WBB and RLAN users. Segmentation could provide additional spectrum for both uses on a faster timeline, but with more limited spectrum for both technologies. By comparison, 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 performance cost to both technologies.

Conclusion

To realize the full benefits of 6G wireless technologies, Qualcomm encourages ACMA to continue monitoring developments related to key spectrum bands, particularly the 7125-8400 MHz range. This upper mid-band spectrum will be a key enabler of 6G use cases, providing both coverage and capacity. In addition, Qualcomm supports ACMA's ongoing work to identify an appropriate mechanism for enabling use of the upper 6 GHz band to provide additional capacity for wireless technologies.

We appreciate the opportunity to provide feedback to ACMA on future spectrum plans and would be happy to provide further information that could assist in the spectrum planning process, particularly with respect to spectrum for 6G services.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Nies Purwati' with a stylized flourish at the end.

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