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For online submission via [ACMA website](#)

1 Introduction

Qualcomm International Incorporated (Qualcomm) welcomes the opportunity to provide input to the Australian Communications and Media Authority (ACMA) regarding the discussion paper titled *Automatic Frequency Coordination-assisted spectrum sharing in the 6 GHz band*.

Qualcomm is the world's leading wireless technology innovator and the driving force behind the development, launch, and expansion of licensed and unlicensed spectrum wireless technologies. 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 are bringing the benefits of mobile to new industries, including automotive, the internet of things (IoT), and computing, and we are leading the way to a world where everything and everyone can communicate and interact 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.

Qualcomm commends ACMA for initiating this work and supports the use of Automatic Frequency Coordination (AFC) systems to enable efficient, predictable and scalable spectrum use in the 6 GHz band. Detailed responses to the discussion questions are provided in the sections below.

2 Issues for comment set out in the discussion paper

1. Do you support the adoption of an AFC framework in Australia to enable outdoor standard-power operation in the 6 GHz band? What are the key benefits and concerns? In particular, who would the main beneficiaries be, and what would be the implications for consumers in the telecommunications market?

Qualcomm supports the adoption of an AFC framework in Australia to enable outdoor and indoor standard-power (SP) operations. Outdoor SP operation supports both cost-effective point-to-point (P2P) deployments for wireless internet service providers (WISPs) and wide-area Wi-Fi deployments for residential and business users. Indoor SP operation improves the reliability of indoor Wi-Fi deployments by enabling higher power transmissions compared to the low-power indoor (LPI) mode and allows for improved whole-home coverage using a single access point, reducing deployment cost.

The introduction of an AFC framework would promote efficient spectrum use through approved AFC systems that enable SP devices to operate while protecting incumbent fixed licensed P2P services from harmful interference. 6 GHz AFC systems are not designed to enable spectrum sharing between unlicensed equipment and terrestrial mobile operations.

AFC technologies have been implemented or are being explored by global leaders, including, Canada, Japan, Saudi Arabia, South Korea, the United Kingdom, and the United States. CEPT has been studying AFC and in December of last year completed the first draft of an ECC report on compatibility in the lower 6 GHz band.¹ In addition, the Wi-Fi Alliance released specifications, training modules, and test plans for the implementation of 6 GHz standard power devices under AFC system control. International experience with approved AFC systems in Canada and the United States demonstrates that they can provide regulators with meaningful observability and control. Observability would provide access to device usage statistics that can inform ACMA's decision-making. Controllability would allow ACMA to modify AFC sharing parameters, create geographic or frequency-based exclusion zones, and disable certain device types or manufacturers if necessary.

2. How might AFC change the way WISPs and other communications service providers operate, particularly in terms of supporting greater spectrum efficiency or service innovation?

Our experience in Canada and the U.S. shows that SP operation is feasible at a large number of locations without causing harmful interference to licensed incumbent fixed licensed P2P users of the 6 GHz band. AFC enables underutilized spectrum to be identified and used as an underlay system, which improves spectrum efficiency.

We also note that, in addition to WISPs, residential and enterprise users of equipment that operates in unlicensed 6 GHz spectrum would benefit from SP operations by enabling Wi-Fi coverage with fewer access points, reducing deployment cost and complexity. In fact, residential and enterprise deployments are expected to account for the majority of standard-power use as the ecosystem matures.

¹ More details provided in this link: <https://cept.org/ecc/groups/ecc/wg-se/se-45/news/se45-finalised-draft-ecc-report-on-sp-wasrlan-in-the-5945-6425-mhz-band>

3. Are there any alternatives to AFC that could support dynamic and efficient frequency assignments in the 6 GHz band?

Qualcomm believes that an AFC framework is the best solution for dynamic and efficient usage of the 6 GHz band by both current incumbent licensees and unlicensed device operations.

4. Would established models in other jurisdictions such as the US and Canada, or aspects of these models, be appropriate for the Australian radiocommunications environment?

Qualcomm is an approved AFC system operator in Canada and the U.S. We also provide approved geolocation solutions, both hardware-based and software-based, for streamlined adoption of SP operations. Qualcomm's AFC Service was approved to manage spectrum access in Canada in 2023 and in the United States in early 2024.² Qualcomm is supportive of efforts to implement AFC as a spectrum sharing mechanism in Australia to enable the use of SP devices and would be happy to provide ACMA with additional information regarding the deployment of Qualcomm's AFC services to-date. Furthermore, Qualcomm supplies our customers with chipsets that are used in SP access points. Based on our experience, the models employed in the Canada and the U.S. are efficient and applicable to the Australian radiocommunications environment.

Canada and the U.S. allow multiple industry players, like Qualcomm, to build and provide AFC systems solutions. This approach is preferable to models in which the regulator builds AFC systems in-house or designates a single dedicated AFC provider. Allowing multiple AFC operators supports a dynamic market that encourages competition and innovation that, in turn, reduces costs to end users.

With respect to AFC system requirements, e.g., propagation models used, adjacent channel protection, data access and storage, the regulatory frameworks in both Canada and in the U.S. include sufficient rules that we consider appropriate for Australia as well.

5. How much spectrum should be made available under AFC, and what bandwidths should be allocated to support individual AFC service offerings? Should part or all of the 6 GHz spectrum available for RLAN use be made available for AFC-enabled access by standard power devices, or is there a case for arrangements supporting a range of power levels above VLP/LPI and below/including standard power?

No separate spectrum allocation is needed for AFC system operation. Qualcomm believes that SP operations should be allowed to use the same frequencies currently used by VLP/LPI categories. Our experience indicates that there is no need to assign parts of the band to different AFC operators or to define a fixed bandwidth for SP devices. Wi-Fi 6E and 7 devices can operate at bandwidths of 20 MHz, 40 MHz, 80 MHz, 160 MHz and 320 MHz. SP devices should be allowed to operate at any bandwidth for which they are tested and certified under the control of an approved AFC system.

AFC systems determine and communicate the allowed power at an SP device's location. While there is no need to define a power range, the maximum power level for SP devices should be defined in the AFC framework. In order to have economies of scale and incentives to fully use SP operation, the maximum power limit should be set to at least 36 dBm with a PSD limit of 23 dBm/MHz, as is the case in Canada and the U.S.

² Qualcomm, "Taking Wi-Fi to New Heights: FCC's Advancement of Standard Power and Automated Frequency Coordination," February 23, 2024, QnQ blog, <https://www.qualcomm.com/news/ong/2024/02/taking-wi-fi-to-new-heights-fcc-advances-standard-power-and-automated-frequency-coordination>.

6. What degrees of geographic and spectrum segmentation should be considered when planning for individual AFC system deployments? For example, would planning for localized, self-contained areas or multiple sub-bands foster competition in the market for the provision of AFC services, or would that come at too much of a cost to spectrum efficiency (through the need for guard bands/spaces)?

Qualcomm believes the identification of specific areas for AFC operations may not be required, as the incremental cost of serving the entire national territory rather than dedicated, localized areas is negligible. Thus, we recommend that AFC deployment be implemented on a national level. Qualcomm's prototype AFC system, which is used in the Australian AFC trial with Cambium and WISPAU, is already capable of operating in the entirety of Australia.

Qualcomm also notes that the same out-of-band emissions limits that apply to LPI unlicensed equipment (i.e., -27 dBm/MHz) should apply to AFC-enabled SP unlicensed equipment, lessening the need for additional IMT guard band requirements.

7. What are the respective roles and responsibilities for industry and government in realising an AFC regime? Should AFC be operated by industry under government-set rules or should government play a more direct role in providing AFC services?

As noted in our response to Question 4, Qualcomm believes that AFC systems should be operated by industry providers, while ACMA should be responsible for setting the regulatory framework, handling authorizations, and auditing of AFC systems.

Qualcomm has already built a prototype AFC system for Australia and would be interested in becoming an AFC system operator in Australia, leveraging our experience in Canada and the U.S., once the details of AFC system operator responsibilities are defined.

8. What role should databases such as the ACMA's RRL or other coordination mechanisms, such as those administered by the ACMA but used by accredited assigners, play in the process?

ACMA's Register of Radiocommunications Licences (RRL) should be used as the source of incumbent spectrum user data. ACMA should ensure all licensed user data is available and up to date in the RRL. Authorized AFC systems should be responsible for the registration and storage of unlicensed SP user data and should be required to provide this data to ACMA if requested.

9. What is the need for, and potential structure of, a tiered access model for incorporating standard power RLAN devices in the 6 GHz band?

Qualcomm believes that there is no need to define tiers within unlicensed device categories such as SP, LPI and VLP. We note that SP devices are not considered a higher tier than LPI and VLP devices, but rather have similar access rights while having higher power limits. The only necessary access tiers are for licensed P2P incumbents and unlicensed devices.

Regulation should require a contention-based protocol to ensure LPI, VLP, and SP devices can share the available spectrum fairly among themselves. In addition, contention-based protocols reduce the interference potential of multiple co-located unlicensed devices to incumbent systems by preventing simultaneous transmission by those unlicensed devices.

10. With respect to licensing, should individual AFC-coordinated devices be registered on the RRL or covered by broader system-wide licensing arrangements, or are there other authorisation models that we should consider?

Qualcomm recommends a class licensing framework for SP devices. AFC systems can be required to maintain the registration of individual SP devices. In AFC systems operating in Canada and the U.S., SP devices are identified through their certification IDs and unique serial numbers. For each device, spectrum requests are stored in the AFC system, which includes device location, certification ID, serial number, and the requested frequency range for operation. Imposing a requirement for SP devices to register with the RRL would significantly constrain the adoption of SP devices, particularly for residential and enterprise deployments as well as increasing the administrative burden on the ACMA RRL.

11. What processes and safeguards would need to be established to accredit, audit and ensure ongoing compliance of industry-led AFC operators? What type of rules should be imposed on prospective AFC operators and how should those rules be codified?

Qualcomm recommends that ACMA follow requirements similar to those outlined in the Innovation, Science and Economic Development Canada (ISED) Database Specification 06 (DBS-06) framework.³ ISED's framework provides more comprehensive detail than the United States' Federal Communications Commission's (FCC) framework and outlines all aspects of AFC system certification, audit options, and operator responsibilities.

Qualcomm looks forward to the release of a draft ACMA framework and welcomes the opportunity to provide comments on its provisions, including incorporation of lessons learned from Qualcomm's experience in Canada and the U.S.

12. What technical or administrative features (e.g., real-time geolocation, exclusion zones, device registration, database accuracy and latency) will be critical to the successful implementation of AFC?

For fixed SP access points, Qualcomm believes that there is no need to require real-time geolocation updates. The location of such devices only changes upon disconnection from the power source and a power-cycle. Hence, geolocation data only needs to be updated at the initial device power-up. If ACMA allows mobile operation of AFC-controlled SP devices, more restrictive geolocation requirements could be defined to ensure appropriate protection of incumbent fixed P2P spectrum users. We recommend ACMA allow flexible geolocation methods and avoid mandating a single geolocation solution for all SP devices. Both in Canada and the U.S., devices may use any geolocation method as long as they can guarantee 95% confidence in the reported uncertainty area communicated to the AFC system.⁴ A similar requirement would be appropriate for Australia.

³ Innovation, Science and Economic Development Canada (ISED). Database Specification (DBS) for Automatic Frequency Coordination Systems (DBS-06). December 2022. <https://ised-isde.canada.ca/site/spectrum-management-telecommunications/sites/default/files/attachments/2022/DBS-06-i1-2022-12EN.pdf>.

⁴ See Federal Communications Commission (FCC), *Electronic Code of Federal Regulations*, Title 47 § 15.407(k)(9)(i), [https://www.ecfr.gov/current/title-47/part-15#p-15.407\(k\)\(9\)\(i\)](https://www.ecfr.gov/current/title-47/part-15#p-15.407(k)(9)(i)).

A standard power access point and a fixed client device must include either an internal geo-location capability or an integrated capability to securely connect to an external geolocation devices or service, to automatically determine the standard power access point's geographic coordinates and location uncertainty (in meters), with a confidence level of 95%. The standard power access point and fixed client device must report such coordinates and location uncertainty to an AFC system at the time of activation from a power-off condition.

Regarding the details of other technical features, we recommend that ACMA adopt requirements aligned with those set out in ISED's DBS-06 framework.

13. How should data integrity, ownership, and update mechanisms be managed in AFC systems? Are ACMA's existing systems (such as the RRL) sufficient, or would changes or new systems be required to support real-time coordination?

AFC systems could manage SP registration data; however, information on licensed incumbents should be provided to AFC systems by ACMA. While application programming interface (API) access to the RRL could be useful, it is not necessary and file transfer protocol (FTP) or web access to the relevant RRL information would be sufficient. As for formatting the incumbent spectrum user data, Qualcomm prefers ISED's 6 GHz-band data extract format for AFC.⁵ However, our system can also work with the existing RRL data format as well, as is currently the case in Australia's AFC trial.

Under Canadian and U.S. regulations, AFC systems are required to access and download the latest incumbent data once per day. SP devices similarly obtain updated channel availability information from the AFC system on a daily basis. Beyond these daily updates, there is no need for "real time coordination" as incumbent data is typically updated well ahead of new registered fixed P2P links beginning operation.

Qualcomm recommends that SP unlicensed operations enabled by AFC systems be designed to cease transmission in the event of an AFC system outage to protect licensed operations.

14. What is the expected market for the provision of AFC services in Australia?

Qualcomm's AFC system customers in the Canada and the U.S. include outdoor P2P device manufacturers, enterprise network equipment suppliers, and residential internet providers. We expect AFC will be used to serve similar types of devices and users in Australia.

15. What standards or other mandatory specifications should be prescribed to ensure AFC-enabled devices comply with operational rules (for example, GPS accuracy, firmware requirements, revalidation intervals)? What are the implications for manufacturers and operators?

Qualcomm recommends that ACMA consider the requirements set out in ISED's DBS-06 framework. We believe the parameters established under the DBS-06 framework are comprehensive and could be adapted effectively for the Australian radiocommunications environment. The DBS-06 framework addresses many matters raised in ACMA's discussion paper and may provide more useful guidance on technical specifications and compliance mechanisms for AFC-enabled devices.

5 Conclusion

Qualcomm appreciates the opportunity to contribute to this consultation and to support ACMA's efforts to establish an AFC framework for the 6 GHz band. Our experience in the Canada and the United States demonstrates that AFC frameworks can enable efficient, predictable, and scalable spectrum sharing while protecting incumbent licensed operations. We believe a similar approach in Australia would provide material benefits to residential, enterprise and service-provider users, and would align Australia with international best practices in the deployment of next-generation wireless technologies.

⁵ ISED, Spectrum Management System (SMS) data, <https://ised-isde.canada.ca/site/spectrum-management-system/en/download-sms-data>.

We welcome ACMA's continued engagement on this matter and look forward to the release of a draft AFC system framework. We stand ready to provide further technical input as the ACMA progresses its consideration of an AFC framework for SP operation in the 6 GHz band.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Nies Purwati', with a horizontal line underneath.

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