

Cambium Networks

Automatic Frequency Coordination-assisted spectrum sharing in the 6 GHz band

Response to Discussion Paper

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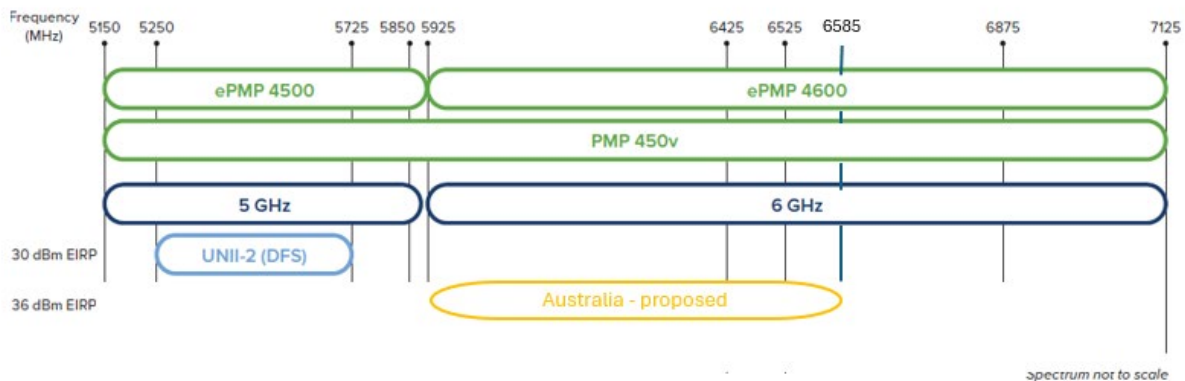
1 EXECUTIVE SUMMARY

Cambium Networks welcomes the fact that ACMA is exploring the introduction of an Automatic Frequency Coordination (AFC) system to enable standard-power outdoor operation of devices in part of the 6 GHz band (5925–6585 MHz).

The solution is already implemented and proven in US (FCC) and Canada (IC). It extends the available class licensed 5GHz band, already shared and used for Wi-Fi and Fixed Wireless, enabling entrepreneurial applications and investment

The solution facilitates adoption of Standard Power category in the 6GHz band, similar to 5 GHz, allowing the reuse of existing tower infrastructure, and will allow the use of wider channels to deliver high speed connections for both Wi-Fi and Fixed Wireless with compelling economics.

Cambium Networks currently offers two Fixed Wireless platforms (ePMP™ 4600 • PMP 450), both spanning the entire 6GHz band, which means both will be able to operate in the proposed 660MHz of 6GHz spectrum (5925–6585 MHz). Cambium also has an indoor/outdoor Wi-Fi 6/6E AP (XE3-4TN) approved for operation with the AFC in the US.



We have worked with WISPAU and Qualcomm to enable a trial AFC solution for Australia, operating along the same set of rules applied in the US and Canada. We are confident this is a valid solution for protecting incumbent licensed 6GHz PTP links and will effectively support band sharing in this space.

The trial is operational, and the first site is deployed with good results.

2 INTRODUCTION

2.1 INTRODUCTION TO CAMBIUM NETWORKS

At Cambium Networks, we support communications of life for millions of people around the world and connect enterprise networks where other options cannot. No matter what the conditions or locations, wherever people or networks need to be connected, our wireless broadband solutions deliver clear voice, data and video communications people and networks can rely on.

Our Mission is Connecting the Unconnected and delivering solutions and technology that Bridge the Digital Divide.

Cambium Networks provides professional grade Fixed Wireless broadband, PTP Microwave, narrowband IoT, Wi-Fi, switching and security/SD-WAN solutions, brought together under our [One Network](#) Cloud Management platform, cnMaestro. Our solutions are deployed in thousands of networks in over 150 countries, with our innovative technologies providing reliable, secure, cost-effective connectivity that's easy to deploy and proven to deliver outstanding performance metrics. To date Cambium Networks has delivered over ten million radio devices, a count that continues to accelerate year-over-year.

Cambium Networks are proven, respected leaders in the wireless broadband industry. We design, deploy and deliver innovative data, voice, and video connectivity solutions, through a qualified channel of distributors, Wireless Internet Service Providers, Telecommunications Companies, Value Added Resellers and System Integrators. Our solutions enable and ensure the communications of life, empowering personal, commercial, and community growth virtually everywhere in the world.

Following ten-years as a business unit within Motorola Solutions, Inc. Cambium Networks was established in 2011 following divestiture from Motorola Solutions.

2.2 WHAT IS FIXED WIRELESS?

Key to understanding the value of Fixed Wireless is understanding how it is different from and should not be confused with Mobile Broadband (MBB).

Mobile Broadband is synonymous with the networks that support mobile UE and are designed and built with that in mind.

Whilst similar in many respects, our Fixed Wireless broadband solutions are optimised to provide the best results for delivery of fixed data services using harmonized RF bands. The typical application for Fixed Wireless is to provide a fixed data service using RF, when the use of fiber or copper is not possible, suitable, available or affordable.

3 COMMENTS ON ISSUES

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?

Cambium Networks>>Yes, we strongly support the adoption of an AFC framework to enable standard-power outdoor operation in the 6 GHz band, subject to robust protection of incumbent licensed services. The use of the band outdoors at standard power will support the use of Wi-Fi 6E/Wi-Fi 7, as well as, and importantly Fixed Wireless. Key benefits include increased spectrum availability for high-capacity fixed wireless access and outdoor Wi-Fi deployments, improved service performance in congested 5 GHz environments, and faster deployment of cost-effective broadband infrastructure. Fixed Wireless has proven to be a valuable solution for “Connecting the Unconnected”. The ability to use the 6GHz band for outdoor Wi-Fi, as is currently possible for indoors, would also be valuable.

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?

Cambium Networks>>The extra 660 MHz of spectrum will allow products like our ePMP4600 and PMP450V to operate using wider channels or aggregate multiple channels to be able to deliver Gbps services. This will enhance the value of fixed wireless and make it suitable for services to meet the continued application demand for bandwidth. Additionally, more channels help in areas where the 5GHz band is saturated.

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

Cambium Networks>>AFC systems have been effectively implemented and delivered in US and Canada and are already proven to be effective. It is also an automated process that once implemented, makes use of the band exceptionally efficient. Alternatives (manual coordination, exclusion-only approaches) are less scalable and reduce spectrum utility.

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?

Cambium Networks>> Yes, we believe that these models are well considered and will be appropriate.

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?

Cambium Networks>> Cambium supports making the proposed 5925–6585 MHz (660 MHz) available for AFC-enabled standard-power operation as an appropriate first step. Once the usage of the band above 6585 MHz is finalized in Australia, AFC should also be considered in those frequencies to utilize spectrum in locations where other technologies are not deployed.

Standard Power devices should be permitted to operate across the same frequency range as LPI and VLP devices, with AFC coordination applied to Standard Power operation. There is no technical need to segregate device categories into dedicated sub-bands, provided appropriate power limits and contention-based sharing mechanisms are maintained.

6. What degrees of geographic and spectrum segmentation should be considered when planning for individual AFC system deployments? For example, would planning for localised, 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)?

Cambium Networks>> Cambium supports a nationally consistent AFC framework to maximise spectrum efficiency and minimise fragmentation. Multiple AFC operators can coexist without geographic segmentation, provided they operate under common technical rules and consistent incumbent protection requirements. Competition between AFC operators can be enabled through interoperability and accreditation requirements, rather than through geographic segmentation or sub-band partitioning.

Approved standard-power devices would provide compliant geolocation to the AFC system, enabling the AFC to assess potential interference and assign permitted channels and maximum EIRP at a given location.

AFC systems can also apply incumbent protection mechanisms such as exclusion zones (including site-specific or area-based restrictions) and dynamic EIRP/channel availability limits based on device geolocation and incumbent service information (for example, from the ACMA RRL).

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?

Cambium Networks>>>We suggest that Government (ACMA) defines the rules and AFC providers provide the service under those rules. Aligning Australia's AFC rules as closely as practical with established frameworks in the US and Canada would accelerate implementation in Australia.

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?

Cambium Networks>>>The ACMA RRL is a key component of the solution. It should be a primary source of incumbent license data used by AFC systems. The current trial AFC implemented by Qualcomm integrates into the RRL and uses the information related to installed 6GHz PTP Links to do calculations to provide the required protection. This is clearly an important component of any AFC solution. The RRL needs to be accurate and kept up to date.

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?

Cambium Networks>>> Cambium considers a tiered access framework to be appropriate to the extent that it clearly prioritises protection of incumbent licensed services. In practice, this can be implemented as: (1) incumbents as the highest tier with defined protection criteria, (2) standard-power RLAN devices operating under a class-license arrangement but only where authorised by an AFC grant (location-specific permitted channels and maximum EIRP/PSD, including exclusion zones where required), and (3) low-power indoor and very-low-power devices continuing to operate under existing class-license rules without AFC at lower power and on a non-protected basis. Beyond this, Cambium does not see a strong need for additional tiers within class-licensed RLAN access. The combination of AFC-controlled standard-power operation and existing contention-based sharing mechanisms should support efficient spectrum use while maintaining incumbent protection.

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?

Cambium Networks>>>We suggest that the AFC only provides co-ordination. The devices will be controlled by the AFC with respect to max EIRP. The devices will be running under a LIPD Class License with mandatory AFC control, so there is no need to register the individual standard-power devices on the RRL. Registering all Standard Power devices on the RRL would be costly and not required. AFC systems already store the location, serial number, and ACMA ID of all active devices.

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?

Cambium Networks>> AFC operators should be required to submit their application demonstrating compliance with ACMA's regulatory and technical requirements, including incumbent protection criteria, database integrity, security controls, operational performance, and auditability. Once approved, AFC operators should be accredited under an ACMA authorisation framework with defined conditions, including periodic audits and regular reporting to ACMA. While US and Canada rules are mostly similar, we recommend ACMA adopt a modified version Canada's Automated Frequency Coordination (AFC) System Specifications for the 6 GHz (5925-6875 MHz) Frequency Band (DBS-06)¹ standard which outlines approval process as well as technical details. DBS-06 is a comprehensive specification of AFC systems and lays out responsibilities of AFC operators in detail.

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?

Cambium Networks>>All these features are important. The AFC receives compliant real time geolocation from the Standard-Power devices so that the AFC can assess potential interference and assign permitted channels and maximum EIRP/PSD limits for that location... While our existing solutions use GPS, rules should allow other geolocation methods in order to allow innovation; both US and Canada rules only define the geolocation accuracy requirement and not the actual method used to obtain the geolocation information. Exclusion zones can be added to the AFC system which would then provide the required protection. As per Q8 above, database accuracy and timely updates of incumbent information are critical to ensure reliable protection outcomes. Latency needs to be sufficiently low to provide realistic and effective protection.

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?

Cambium Networks>>The ACMA RRL is sufficient for providing incumbent information to the AFC systems. However, a simpler way of providing incumbent information for AFC consumption would

¹ Available: <https://ised-isde.canada.ca/site/spectrum-management-telecommunications/en/devices-and-equipment/radio-equipment-standards/database-specifications-dbs/dbs-06-automated-frequency-coordination-afc-system-specifications-6-ghz-5925-6875-mhz-frequency-band>

be preferred. If ACMA decides to implement an AFC specific solution, we recommend ACMA adopts the format of ISED's 6 GHz band data extracts for AFC systems.²

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

Cambium Networks>>Qualcomm have demonstrated a desire and capability, with a trial running. We are sure others that operate in the US would also be interested.

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?

Cambium Networks>> It would be helpful if the Australia AFC standards or other mandatory specifications, are as close as possible to those that are already supported by the AFC providers already used in the US and Canada.

- GPS accuracy: The devices (APs and SMs) need to be tested and report their geolocation accuracy to the regulator. For devices that use an external geolocation source, the PMP device additionally requires the user to enter the distance (vertical and horizontal) between the device and the external geolocation source. The AFC then uses the most conservative location within the accuracy range provided by the device.
- Revalidation intervals: the US/Canada regulation requires the device to contact the AFC server every 24 hours. Our PMP devices use a 12-hour interval, to allow operator extra time to fix any potential issues if connectivity is lost.
- It would be beneficial if the device could optionally report its azimuth and beamwidth. This may require a certified professional installer (CPI), which is not currently required by the US/Canada rules, but having the flexibility to provide additional information would allow the AFC to perform more accurate calculations and allow higher EIRPs.

² Available: <https://ised-isde.canada.ca/site/spectrum-management-system/en/download-sms-data>