

Cambium Networks Response

Future use of the upper 6 GHz band

Options paper

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1. EXECUTIVE SUMMARY

The Cambium Networks team covering Australia, New Zealand and the Pacific Islands, appreciates the opportunity to submit a response to the Options Paper for Future use of the upper 6 GHz band.

Cambium Networks empowers millions of people with wireless connectivity worldwide. Our wireless portfolio is used by commercial and government network operators as well as broadband service providers to connect people, places and things. With a single network architecture spanning fixed wireless and Wi-Fi, Cambium Networks enables operators to achieve maximum performance with minimal spectrum.

Cambium Networks is committed to supporting Wi-Fi 6E and Wi-Fi 7 standards and is delivering products that can support the extended WiFi 6GHz band. We are shipping Wi-Fi APs and Fixed Wireless products that are able to use both the lower and upper 6GHz bands. We appreciate that the ACMA made the lower 500 MHz of this band available in Australia for WiFi (LIPD) and appreciate this broader consultation for use of the entire 1200 MHz of the band for RLAN (Wi-Fi) and also use of the band for outdoor Wireless Broadband (WBB) or Fixed Wireless at standard power 36dBm (4Watts) as we refer to this technology.

2. INTRODUCTION

2.1. INTRODUCTION TO CAMBIUM NETWORKS

At Cambium Networks, we support the 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, microwave, narrowband IoT and Enterprise indoor and outdoor Wi-Fi networks. Our solutions are deployed in tens of 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.

Indoor and outdoor Enterprise Wi-Fi technology from Cambium Networks is used in K12 and higher education, MDU, hospitality, large public venues, public Wi-Fi hotspots, retail, warehousing, and enterprise networks. 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 the Fixed Wireless portfolio, 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 are not possible, suitable, available or affordable.

Mobile Broadband provides data connectivity for mobile User Devices whilst Fixed Wireless Broadband (FWBB) connectivity to a site where a fixed installation module (SM) is installed. The SM uses Gigabit Ethernet to connect to inside Ethernet switches or directly to a Wi-Fi access point. In a FWBB network, the client devices connect to broadband via Ethernet or Wi-Fi edge technology.

Effective Fixed Wireless is very much reliant a suitable and sufficient spectrum. The potential use of both the lower (UNII5) and Upper (UNII7) 6GHz bands to delivered fixed wireless connectivity is significant and presents an important opportunity help bridge the Digital Divide.

3. QUESTIONS FOR COMMENT

3.1.WHAT ARE YOUR VIEWS ON THE 4 BROAD PLANNING OPTIONS IDENTIFIED FOR THE UPPER 6 GHZ BAND?

Cambium>>

Cambium Networks broadly supports Option 2, to introduce arrangements to enable RLAN access to some or all of the upper 6 GHz band, via a variation to the LIPD Class License.

Why the additional upper 6 GHz for RLAN?

We recommend that ACMA follows the FCC (US) and ISED (Canada) and allocates the full upper band for Indoor Wi-Fi and then also considers making UNII5, 6 and 7 available for BWA/Fixed Wireless at

Standard Power (4W) in the same way UNII3 is available today as a class licensed solution. ACMA has already allocated the lower band, 500MHz, for low power RLAN, but an additional 700MHz or even 500MHz is required to support the 320MHz channel bandwidth option available with Wi-Fi 7, as outlined succinctly in page 17 and 18 of the consultation. In addition, for outdoor Fixed Wireless applications the option to combine 100MHz channels to deliver Gigabit broadband services is available and possible.

- 1200 MHz of viable spectrum supports wide channels, 160 MHz or 320 MHz, made possible with Wi-Fi 7, delivering Gigabit to the edge.
- Technology is available and ready for commercial deployment in both Wi-Fi and Fixed Wireless.
- Automated Frequency Coordination (AFC) solutions are readily available in the USA and Canada. For example from Qualcomm, whose solution Cambium already utilises for AFC today.
- Standard Power propagation is similar to 5 GHz, allowing the reuse of existing tower infrastructure
- Unlicensed spectrum enables entrepreneurial applications and investment
- Compelling economics

Regarding Wi-Fi 7 support, 2 key system features of Wi-Fi 7 are:

- a) Use of the tri-band of 3 x 320 MHz bandwidths at 6-7 GHz
- b) Multi-link-operation (MLO) between 2.4, 5 and 6 GHz.

Both features need the extra spectrum from the upper 6 GHz band to be effective.

In addition, a priority of Wi-Fi is the implementation of Wi-Fi 7 (802.11be) in a balanced network in terms of link budget and path loss.

Applications with a high demand for data like gaming, video, streaming etc. are industries which are only getting larger, which requires the necessary infrastructure in available spectrum to succeed.



Our suggestion is to follow the FCC (US) andISED(Canada) to enable the use of 6GHz at standard power for WiFi and also Broadband Wireless Access (Fixed Wireless). FCC has allowed use of 6GHz in UNII5(500 MHz) and UNII-7(350 MHz)

Canada has allowed an additional 100 MHz in UNII 6 for a total of 950 MHz, with rules similar to the FCC, helping to facilitate smoother operation on those large 160 MHz and 320 MHz channels.

NEW SUGGESTED RULES FOR 6 GHz:

- Frequency range 5925-7100 MHz to be allowed for indoor Wi-Fi and 850MHz or 950MHz for fixed outdoor use at 36 dBm EIRP (4W), as per US or Canada.
- Requires the use of AFC to protect incumbent licensed links, following guidance and test harnesses from the Wi-Fi Alliance referenced here: <https://www.wi-fi.org/discover-wi-fi/6-ghz-afc-resources>. AFC would also allow and enable outdoor use at standard power for under LIPD.
- For Fixed Wireless, all SMs and APs would require specific geolocation solution, such as GPS, from the manufacturer to indicate location.

WHAT IS THE PURPOSE OF THE AFC?

- Goal is to prioritize and protect incumbent 6 GHz licensed microwave networks while allowing them to expand their usage if needed.
- 6 GHz unlicensed networks can only use channels that are not previously assigned to licensed microwave
- There is no prioritization or channel assignment made by the AFC

As an example, here is a white paper which explain Qualcomm's capabilities to perform this task.

<https://www.qualcomm.com/content/dam/qcomm-martech/dm-assets/documents/Unlocking-6-GHz-Wi-Fi-whitepaper-Qualcomm-AFC-Suite.pdf>

Our recommendation is to follow the FCC in terms of regulations around the use of 6GHz and update LIPD as required.

Vendors who equipment operate under the AFC then pay a monthly or annual amount to the AFC. (ACMA would need to discuss commercial terms with Qualcomm and other AFC providers chosen)

3.2. IF WE DECIDE TO DIVIDE THE BAND INTO DIFFERENT RLAN AND WA WBB SEGMENTS, SHOULD THE WA WBB SEGMENT:

3.2.1 BE PLANNED BASED ON MULTIPLES OF 100 MHZ? THIS WOULD ALIGN WITH THE LARGEST WA WBB CHANNEL SIZE (NOTING THAT THE ABILITY FOR WA WBB OPERATORS TO DEPLOY ONE OR MORE 100 MHZ CHANNELS WILL DEPEND ON THE OUTCOME OF THE ASSIGNMENT PROCESS).

3.2.2 ALIGN WITH THE 160/320 MHZ WI-FI CHANNEL RASTER? THIS WOULD MAXIMISE THE NUMBER OF LARGER WI-FI CHANNELS AVAILABLE (BY AVOIDING OPTIONS THAT WOULD SPLIT THESE CHANNELS).

Cambium>> Not supported, but if it is implemented, Option 2 of 320 MHz raster is suggested over 100 MHz for the Wi-Fi 7 reasons listed earlier in the document.

3.3. OF THE SEGMENTATION OPTIONS BASED ON WI-FI CHANNELS (SCHEMES 1–3 ABOVE), WHICH IS THE PREFERRED OPTION AND WHY?

Cambium>> If Option 4 was adopted then Scheme 3 would be preferred.

3.4. IS IT APPROPRIATE TO LIMIT OUR CONSIDERATION OF HYBRID OPTIONS FOR ACCOMMODATING MULTIPLE SERVICES TO FREQUENCY SEGMENTATION ONLY? FOR EXAMPLE, SHOULD GEOGRAPHIC SEGMENTATION OR LESS TRADITIONAL SHARING MODELS BE CONSIDERED WHEN DETERMINING MODELS FOR ENABLING ACCESS TO THE UPPER 6 GHZ BAND BY BOTH WAVE AND RLAN SERVICES?

Cambium>> We would suggest frequency segmentation only if a hybrid path was adopted. For reference, in Ofcom's consultation below, they proposed this hybrid sharing option between fixed and mobile use with respect to geographical segmentation, and the idea was mostly disagreed with due to issues that would occur with interoperability.

<https://www.ofcom.org.uk/spectrum/innovative-use-of-spectrum/hybrid-sharing-to-access-the-upper-6-ghz-band/>