Comments of

The Ultra Wide Band (UWB) Alliance

Before the

Australian Communications and Media Authority

Regarding

Updating the spectrum plan

December 12, 2024

About the UWB Alliance

The Ultra Wide Band (UWB) Alliance is a global not-for-profit organization that works to collectively establish ultra-wideband (UWB) technology as an open-standards industry. A coalition made up of vendors that either design, manufacture, or sell products that use ultra-wideband technology, the UWB Alliance aims to promote and preserve the current allocation of bandwidth as well as promote the continuing globalization of the technology. As part of our mission, we advocate UWB technology and use cases to promote verticals showing the value of UWB for IoT and Industry 4.0 and to build a global ecosystem across the complete UWB value chain, from silicon to service. In addition, the Alliance is promoting and assuring interoperability through its work with Standards Development Organizations such as the IEEE and ETSI and then working with members to define upper layers and testing to assure compliance. For more information, please visit us at www.UWBAlliance.org.

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Introduction

The UWB Alliance thanks the Australian Communications and Media Authority (ACMA) for providing this opportunity to provide comments on updating the Australian Radiofrequency Spectrum Plan.

UWB is a significant and rapidly growing industry that is providing spectrum-efficient solutions in a diverse set of applications that provide high economic and social value. Since 2018, UWB use has expanded greatly and continues to grow rapidly following its introduction into consumer products such as smartphones and personal accessory devices. Very precise ranging and tracking are common examples of capabilities enabled using UWB. UWB applicability reaches beyond this set of uses. Other examples of important deployed applications using UWB include but are not limited to wall scanners, heart monitoring devices, and High Definition audio.

Key market drivers for UWB include:

- **Consumer Electronics.** Increasing adoption of UWB in smartphones is facilitating features like secure sharing, accessory tracking, and improved connectivity between devices**.**
  UWB headphone and loudspeaker product sales were launched in 2024 and are creating significant excitement. UWB audio products have been demonstrated at numerous conventions, including the Munich High End Audio Show, CES, and the Audio Engineering Society convention. The products have received much attention and garner extremely positive reviews due to excellent audio quality combined with exceedingly low latency.
  In addition, the high quality wall and floor scanners are in use by consumers to safely make modifications to their homes and apartments without cutting pipes or electrical wiring.
- **Automotive:** UWB is used by vehicle access control systems to provide keyless entry and enhanced security. Additionally, UWB is being used to detect when a child is left unattended in a vehicle to prevent accidental heat strokes.
- **Healthcare:** UWB is used for tracking life-saving equipment in hospitals such as infusion pumps, mobile X-ray machines, and defibrillators. UWB is also being used to monitor patient vitals, track the location of staff and patients, and monitor environmental factors in sensitive areas that require precise temperature, humidity, and air quality.
- **Manufacturing:** UWB is used for real-time location tracking of materials, tools, and finished products on factory floors. It is also used for streamlining operations and improving worker safety.
- **Retail:** UWB improves inventory management and customer experience through targeted advertisements and product information based on customer location relative to products.

UWB adoption is expected to continue acceleration as UWB technology awareness among consumers increases, as the cost of UWB chipsets decreases, and as universally standardized protocols for UWB are developed[1].

Fostering innovation is essential to developing spectrum policy that can evolve to the needs of an increasingly wireless world. Innovation requires looking at problems in new ways, challenging conventional assumptions, and developing state-of-the-art solutions. With the many competing interests for spectrum resources, we believe that enabling and encouraging innovative ways to use spectrum for a diversity of uses provides the most value form the scarce resources. Some conventional technologies are inherently not able to share, and require exclusive use, and/or are disruptive to other services. The greatest efficiencies can be achieved when many different techniques of sharing spectrum are utilized rather than granting exclusive use to any single entity. The traditional model of exclusive use has become unsustainable. We believe a sustainable policy includes consideration of the role of non-disruptive technologies that support a diversity of uses that are compatible with other technologies using the same frequency bands. We encourage ACMA to consider the role of UWB as one such technology, and in considering new allocations for other services, also consider compatibility with existing UWB deployments.

UWB systems have proven capable of sharing the spectrum with many other technologies and services. The experience worldwide for over 2 decades is that UWB operates without causing harmful interference. This proven method of coexistence is an important and valuable means of sharing spectrum that does not entail the expense, time, or complexity of repurposing, relocating, or re-designing RF systems. The experience with UWB can provide a proven model of compatible multi-use.

The ability to use a given band for many things at the same time is an advanced method of spectrum sharing. Future policy should preserve and foster this proven model of sharing.

ACMA Questions

This section provides responses to the Issues for comment identified in the Consultation Paper.

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[1] For example, see current work amending IEEE Std 802.15.4 https://www.ieee802.org/15/pub/TG4ab.html

Question 1: The ACMA seeks comment from interested parties on Chapter 1 – General information

The UWB Alliance has no comments on this question.

Question 2: The ACMA seeks comment from interested parties on Chapter 2.

With respect to Chapter 2, Table of frequency allocations: ACMA proposes a new identification for IMT in the frequency band 7025 to 7125. An allocation for high-powered IMT in this frequency band presents substantial risk for disruption to the UWB devices currently operating in this band. The goal of new allocations is to increase capacity for mobile services via frequency separation. However, high power reduces overall capacity by increasing the interference footprint, thus creating an ever increasing need for more spectrum to increase capacity. There are more efficient ways to increase coverage and capacity. Capacity can be increased by moving towards reducing the interference footprint of the base station and/or device. Spatial reuse is more scalable and sustainable than new frequency allocations, especially in the mid-band spectrum. Limiting transmit power to levels less likely to disrupt other uses increased the overall value of the spectrum via greater diversity of use.

Techniques such as ultra-low transit power and energy containment are examples of creating smaller spheres of influence, hence reducing potential interference. It gets progressively cheaper to use smaller spheres of influence as technology advances via innovation. A version of Moore's Law applies to RF devices. Scaling the radio sphere of influence (interference footprint) to only that which is needed for a given link and application can greatly improve the reuse of spectrum. Other techniques in use or under development, such as directional energy containment (beam steering) and intelligent real time spectrum analysis can be applied to reduce impact and improve coexistence, enabling more simultaneous uses. This also will increase the overall capacity of the mobile networks and enable supporting a higher density of users. It is key that the allowed power of any technology considers the power levels of the other users of that band.

Experience in the UWB industry shows that it is possible to operate at much lower power than previously thought. Challenging the assumption that high power is required can lead to true innovation and break this unsustainable cycle.

Maximum spectrum capacity can be realized by applying the optimum technology for a particular application or environment. There is no single RF technology that is ideal for all things. For example, RLAN is prolific for providing high speed data indoors. Most indoor spaces have internet access via RLAN, and with features such as Wi-Fi calling common in consumer handsets, can extend the mobile networks indoors at a small fraction of the power required to cover the space from a IMT basestation. Instead of increasing power to support IMT coverage indoors, transitioning to the RLAN is less disruptive and thus more efficient.

In other uses RLAN is not idealy suited. For example, RLAN is not ideal, and is spectrally inefficient for precise ranging applications. UWB is exceptionally good at providing ranging and localization with centimeter accuracy with virtually no interference to other users. UWB is also outstanding for providing low latency, full frequency audio required for the next generation of AR/VR systems. In these uses, UWB operates at transmit power, and interference impacts orders of magnitude lower than RLAN. The higher power needed by RLAN is disruptive to other RLAN uses. Applying UWB for these uses is more efficient, provides more capacity for RLAN data, and provides a better consumer experience.

By promoting the use of technologies that are efficient via coexisting with other technologies it is possible to increase the capacity of a frequency band in a given area. The ability of UWB to effectively coexist has been demonstrated in practical studies in both controlled environments and real-world deployments. UWB has been shown to coexist co-channel with many services, including Wi-Fi[2,3].

Question 3: The ACMA seeks comment from interested parties on the proposed action for decisions previously made by the ACMA under subsection 10(10) of the spectrum plan

The UWB Alliance has no comments on this question.

Conclusion

We thank the ACMA for this opportunity to provide input to the Radiofrequency Spectrum Plan. We encourage the ACMA to promote innovation and to raise expectations for efficient spectrum usage through positive coexistence. We encourage alternatives to exclusive and nearly exclusive use allocations and promote policies that encourage advancing technology through new thinking as well as leveraging what is proven to work, such as UWB. We strongly encourage ACMA to avoid repurposing spectrum in a way that reduces usability of bands for sharing-compatible technologies such as UWB.

[2] SSBD enabled UWB radio coexistence with Wi-Fi 6e demonstration, https://mentor.ieee.org/802.15/dcn/22/15-22-0642-02-04ab-ssbd-enabled-uwb-radio-coexistence-with-wi-fi-6e-demo.pptx

[3] Ultra-Wideband (UWB) Aggregation and Co-existence of Wi-Fi 6E Operating in the Presence of UWB, https://uwballiance.org/wp-content/uploads/2023/05/UWBA-Interference-Testing-Report-April-2023-corrected-final.pdf