Comments of

The Ultra Wide Band (UWB) Alliance

Before the

National Telecommunications and Information Administration
United States Department of Commerce

Regarding

National Spectrum Strategy Implementation Plan Request for Input

January 2, 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 protect 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 the silicon to the 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 Ultra Wide Band Alliance (UWB Alliance) thanks the NTIA for providing this opportunity to provide comments as input to the *Implementation Plan for the National Spectrum Strategy*. [1] The UWB Alliance offers the following comments as input to the development of the implementation plan.

Fostering innovation is essential to developing a living spectrum policy that can evolve to the needs of an increasingly wireless nation. Innovation is looking at problems in new ways, challenging conventional assumptions, and developing state-of-the-art solutions. The concept of a spectrum pipeline embodies a traditional approach that assumes exclusive use licensing, one we encourage the RF regulatory authorities to look beyond. Instead, we suggest the authorities to envision a new *spectrum paradigm*.

The greatest efficiencies can be achieved when many different techniques of sharing spectrum are utilized rather than granting exclusive use to any single entity. When traditional sharing mechanisms are employed, they avoid simultaneous occupancy by multiple systems. These models of sharing provide limited solutions as spectrum availability dwindles. There are other means of sharing that enable more efficient and sustainable use of spectrum. Developing new methods beyond the avoidance model will be key to sustained growth in spectrum usage efficiency.

Operating under FCC Part 15 subpart F, UWB systems have been sharing spectrum with many government and commercial users for over two decades without being noticed. 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.

UWB adoption has grown rapidly since 2019 and is now present in many consumer devices, including smartphones and the associated ecosystems. 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.

[1] https://www.ntia.gov/federal-register-notice/2023/notice-national-spectrum-strategy-implementation-plan-request-input

The 4 Pillars

The UWB Alliance provides the following comments to the four essential pillars outlined in the *National Spectrum Policy*.

Pillar 1: A Spectrum ~~Pipeline~~ Paradigm to Ensure U.S. Leadership in Advanced and Emerging Technologies

In evaluating bands for repurposing, we propose that the studies include evaluations of required power versus desired power.

Capacity can be increased by moving towards reducing the broadcast range of any individual device. This increases spectrum capacity by reducing the interference footprint. Thus, technologies that do require exclusive spectrum access can support a greater quantity of users. 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. This has been observed as the wireless service carriers have moved from high power analog coverage to digital mini and micro cells.

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.

Lower power will also minimize the amount of reallocation and relocation that is required by reducing the impact on incumbent services. 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.

Pillar 2: Collaborative Long-Term Planning to Support the Nation's Evolving Spectrum Needs

The UWB Alliance encourages the authorities to reach out to all the stakeholders affected by the spectrum strategy. There are new and alternative modulation schemes that exist and can be advanced if the requirements are shared with the broadest group of stakeholders.

Maximum spectrum capacity can be realized by applying the optimum technology for a particular application. There is no single RF technology that is ideal for all applications. Wi-Fi is incredibly effective at transmitting high speed broadband, but it is poor and spectrally inefficient for precise ranging applications. In contrast, UWB is exceptionally good at providing cm 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.

By promoting the use of technologies that are spectrally efficient via coexistence with other technologies it is possible to increase the capacity of a sphere of influence. 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]

Pillar 3: Unprecedented Spectrum Innovation, Access and Management Through Technology Development

To some degree, the present spectrum crisis is driven by inefficiencies. For example, forcing exclusive-use technologies into uses for which they are not well suited simply because 'we can' results in consuming more bandwidth than is needed for the specific application.

The demand for more devices to do additional things will continue to grow for both commercial and government users. Finding ways for multiple users to coexist in the same channel simultaneously enables long term solutions to satisfy the insatiable demand for new utilizations of the RF spectrum. Sharing via coexistence is more efficient and sustainable than sharing by avoidance. Coexistence in this context means multiple users can access the channel at the same time without needing to be aware of each other's presence.

We encourage challenging the assumption that increasing capacity requires more dedicated or nearly dedicated spectrum. Innovation can be enabled by challenging traditional concepts of exclusive or nearly exclusive use, rethinking the concept of a pipeline as described in the NSS. In developing the implementation plan, the NTIA should entertain policies that prioritize the use of inherently sharable technologies over those that are prohibitive to coexistence and sharing. We urge the NTIA to consider policies that preserve multi-use sharing.

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[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

In the search for new and innovative ways to provide solutions, unlicensed technologies tend to evolve the fastest. Technologies operating in the unlicensed bands are free to experiment using pioneering techniques. They can develop revolutionary answers to solve the boundless challenges of novel applications.

Spectrum policy should reward wider use of technologies that are already coexisting, expanding the ways UWB and other innovative techniques can be used more widely.

Pillar 4: Expanded Spectrum Expertise and Elevated National Awareness

Fostering spectrum expertise and awareness as envisioned in the *NSS Implementation Plan Request* is essential as we move through the next decades. No one can know all the improvements in sharing that can be accomplished by the marriage of expertise and technologies such as artificial intelligence (AI). The UWB Alliance applauds this pillar which will lead to revolutionary technological advances and enlightened policy development.

Innovative Sharing: There Are a Lot of Ways to Share

Sharing spectrum can be characterized in two distinct ways: coexistence and sharing via avoidance. Implicit in the avoidance approach is the assumption that at a given time, exclusive access to the wireless channel is required. Models such as coordinated use (e.g., CBRS, AFC), and to an extent emerging techniques such as Artificial Intelligence and Machine Learning (AI-ML) are ways to determine when the spectrum is free of other transmissions (idle). This still assumes a need to have the channel 'alone.'

Discouraging the use of technologies that require exclusive use when there are more appropriate and efficient solutions will reduce the need for more exclusive spectrum allocations. Technology innovation can come from challenging assumptions.

We urge the NTIA to consider sharing via coexistence as a high priority in future spectrum policy and discourage reallocation of spectrum for technologies that are incompatible with sharing. Instead, we encourage new methods, along with expanding on well proven sharing methods.

Effective Sharing Is Being Achieved by UWB Technologies Today

UWB is already sharing via coexistence with both government and commercial users. It is being employed effectively on a large scale. Regulations affecting its use should be preserved, encouraged,

and expanded in the implementation of a National Spectrum Strategy. We encourage the NTIA to include policies which will ensure UWB and other technologies that can coexist will continue to thrive. This can be done by rewarding (providing incentives for) coexisting and constraining non-coexisting technologies such as those that depend on high transmit power and very large impact footprints. We also encourage the NTIA to avoid introducing incompatible technologies into the bands that are currently being effectively shared by UWB.

Conclusion

We thank the NTIA for this opportunity to provide input to the NSS implementation plan. We encourage the NTIA to promote disruptive innovation and to raise expectations for sharing. This will result in delivering greater value from the current spectrum allocations. 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 NTIA to avoid repurposing spectrum in a way that reduces usability of bands for sharing-compatible technologies such as UWB. UWB is one of the key technologies that enables doing more with the spectrum resources.

We look forward to the ongoing conversation in which the UWB Alliance can provide useful perspective to assist the NTIA in developing the NSS implementation plan in 2024.