



NTIA Request for Comments – FiRa Consortium Reply

The FiRa™ Consortium¹ represents more than 120 companies² interested in **fine ranging** based on Ultra-Wideband (“UWB”) technology. The FiRa Consortium welcomes the opportunity to provide comment to the National Telecommunications and Information Administration (NTIA) on the development and implementation of a National Spectrum Strategy (NSS) for the United States.³ As explained herein, the FiRa Consortium believes that UWB considerations should be built into the NSS to ensure that Americans may access the benefits of UWB technology.

UWB is a cutting-edge wireless technology optimized for secure, high-precision location and tracking applications. It outperforms other technologies in terms of ranging accuracy, energy efficiency, cost, and security.⁴ These benefits have led to UWB’s widespread adoption – the number of UWB-enabled devices shipped globally is poised to grow from 109 million devices in 2019 to over 1 billion devices by 2025, with demand steadily rising.⁵

¹ The FiRa Consortium is an industry consortium that believes Ultra-Wideband (“UWB”) technology can transform the way people experience connectivity, and is committed to the widespread adoption of UWB-driven applications. See FiRa Consortium, *FiRa Consortium*, <https://www.firaconsortium.org/about/consortium>.

² Additional information about FiRa’s members is available on FiRa’s website. See FiRa Consortium, *Our Members*, <https://www.firaconsortium.org/about/members>.

³ NTIA, Development of a National Spectrum Strategy, Request for Comments, 88 Fed. Reg. 16244, 16245 (Mar. 16, 2023) (“RFC”).

⁴ See FiRa Consortium, *Unleashing the Potential of UWB: Regulatory Considerations* (Aug. 2022), <https://www.firaconsortium.org/sites/default/files/2022-12/Unleashing-the-Potential-of-UWB-Regulatory-Considerations-December-2022.pdf> (“Whitepaper”).

⁵ See ABI Research, *Ultra-Wideband (UWB) for the IOT—A Fine Ranging Revolution?*, (June 2021), <https://www.allaboutcircuits.com/uploads/articles/UWBWP.pdf>.

Although UWB technology holds the potential to become a vital mainstream wireless technology like Wi-Fi and Bluetooth, its widespread adoption faces regulatory challenges. Today, UWB operates under a regulatory framework that was adopted over 20 years ago based on outdated data and use cases. As a result, many innovators must seek waivers from the Federal Communications Commission (FCC) to bring devices to market. To ensure that UWB technology reaches its full potential, the NTIA should work with the FCC to modernize the regulatory framework to reflect new UWB use cases and operational advancements. As the NTIA moves forward with charting the NSS, it should ensure that UWB considerations remain a top priority, consistent with the comments provided below.

Pillar #1—A Spectrum Pipeline to Ensure U.S. Leadership in Spectrum-Based Technologies

UWB technology is currently addressed in Part 15, Subpart F of the FCC's regulations, covering 47 C.F.R. §15.501 - §15.525 ("Subpart F"). In recent years, UWB has seen a significant uptick in use cases and users for ranging, localization, and secure data transfer following recent and ongoing standards development in the Institute of Electrical and Electronics Engineers (IEEE) (i.e., IEEE 802.15.4z and IEEE 802.15.4ab).

Impulse radio-based UWB developed by IEEE 802.15.4 uses very low power pulsed transmissions, limited by regulations to -41.3 dBm/1 MHz power spectral density, or in other terms, 37 nJ/ms. UWB is widely deployed in mobile phones and accessories for highly reliable distance and direction measurement purposes. It is used for car keys and other very low power consumption device-to-device use cases. Such a solution provides significant energy savings compared to approaches that rely on larger infrastructure.

Spectrum policy can facilitate and encourage use of low power technologies. While UWB radios cause very little or no interference to other users of the same spectrum, UWB radios themselves are vulnerable to strong nearby signals. The UWB technology band uses various parts of 3.1 GHz to 10.6 GHz, with some restrictions. While UWB radios are not protected from interference, it is important to keep parts of the spectrum suitable and available for energy efficient low power device use. Allocation of spectrum for technologies that use high transmitter power and are ubiquitously deployed (e.g., IMT) especially in the

range from 6 GHz to 9.5 GHz would significantly degrade the reliability of low power technologies like UWB in the U.S. Providing an attractive framework for low-power technologies will increase spectrum efficiency and, furthermore, have a positive environmental impact.

With respect to the various questions that NTIA raises under Pillar #1, FiRa's input is as follows:

#1. Projected Future Spectrum Requirements

Subpart F currently defines the frequency range for UWB technology from 3.1 GHz to 10.6 GHz with a power level of -41.3 dBm. This serves as a good basis to allow the use of UWB technology to grow. However, new use cases continue to emerge that did not exist when the rules were originally adopted. A revision of the rules to accommodate these new use cases would allow for even more UWB innovation.

UWB provides totally new use cases in localization like ranging, sensing, and access—and many more. Figure 1 below illustrates the varied use cases as described in FiRa's Whitepaper, *Unleashing the Potential of UWB: Regulatory Considerations* (Whitepaper).⁶ Specifically, Chapter 7 of the Whitepaper describes regulatory challenges for UWB in 6 – 10.6 GHz⁷, in particular the importance of channels 9, 10 and 12.⁸ Chapter 7 also addresses the interest in extending the UWB band to include the 10.8 GHz to 12.7 GHz band.⁹ Further details about the importance of channels 9, 10 and 12 can be found in FiRa's *Spectrum Positioning Statement*.¹⁰

⁶ See FiRa Consortium, *Unleashing the Potential of UWB: Regulatory Considerations* ('Whitepaper', Aug. 2022), <https://www.firaconsortium.org/sites/default/files/2022-12/Unleashing-the-Potential-of-UWB-Regulatory-Considerations-December-2022.pdf>

⁷ See *id.* at 23-24.

⁸ HRP UWB PHY channels as defined by IEEE 802.15.4

⁹ See Whitepaper.

¹⁰ See FiRa Consortium, *Spectrum Position Statement* (Jan. 2023)

<https://www.firaconsortium.org/sites/default/files/2023-01/Spectrum-Position-Statement-January-2023.pdf>

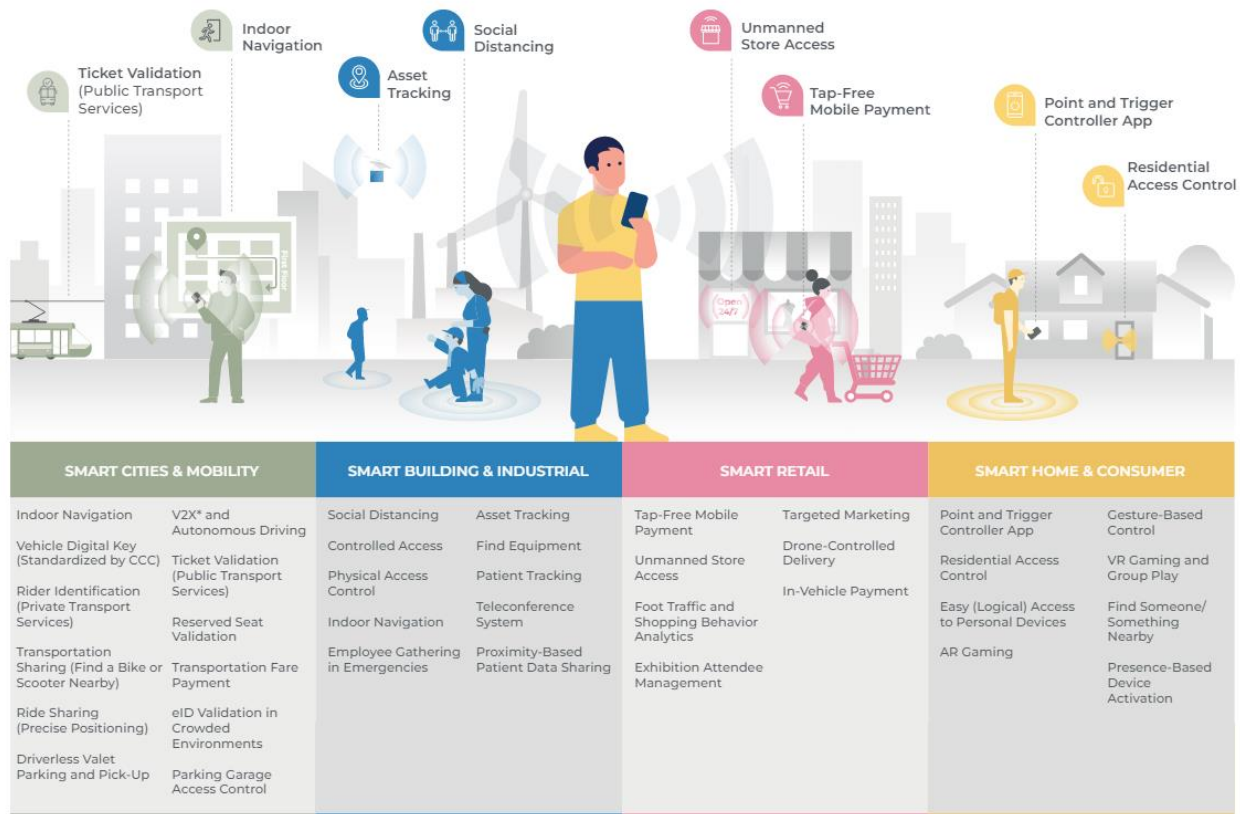


Figure 1: FiRa UWB use cases¹¹

#2 Why Will the Amount of Spectrum Now Available Be Insufficient for Current and Future Uses?

It is critical that the NTIA and the FCC maintain a steady pipeline of spectrum for UWB technologies and its innovative use cases, and as noted above, consider extending the spectrum available for UWB technologies to include the 10.8 GHz to 12.7 GHz band. Additionally, the frequency range should not be allocated to ubiquitously deployed technologies with high power that would significantly impair UWB. This may lead to a situation in which the amount of available spectrum would become insufficient.

¹¹See FiRa Consortium, *UWB Use Cases*, <https://www.firaconsortium.org/discover/use-cases>.

#3 & #4: What Spectrum Bands Should be Studied and What Factors Should be Considered in Identifying Spectrum for the Pipeline?

It is important that part of the spectrum remains free of new high-power applications to allow continued operation of UWB and other low power technologies. As referenced in the 2021 FiRa Consortium Annual Report¹², the UWB market is dynamic and growing rapidly. The marketplace is at an inflection point where a broad set of established companies are designing and building products and services utilizing UWB technology.

#5 Are There Changes the Government Should Make to its Current Spectrum Management Processes?

There is some need for changes, as outlined in the Whitepaper. As noted above, the FCC's current Part 15 rules hinder the development and deployment of UWB technologies. The rules were adopted over twenty years ago and do not reflect advancements in UWB technology nor current UWB use cases. Indeed, as written, the FCC's outdated Part 15 rules often do not permit UWB transmissions absent a waiver, which can be difficult and time-consuming to obtain. As part of the NSS, the NTIA should commit to working with the FCC to revise the Part 15 rules to create a more flexible, modernized approach to UWB device regulation. Consistent with this approach, the new rules should, among other things:

- Allow fixed outdoor operation for precise location and device control applications.
- Explicitly allow use of UWB both inside and outside of automobiles for digital key, location tracking, and sensing applications.
- Allow higher power indoors for precise location in large spaces, and for frequencies above 6 GHz, in particular.

¹² See FiRa Consortium, *FiRa Annual Report 2021* (Jan. 2022), <https://firaconsortium.org/sites/default/files/2022-02/FiRa-Annual-Report-2021.pdf>

- Allow additional spectrum in relatively low interference bands above 10 GHz.
- Permit UWB antennas to be mounted separately from the transmitting device, as permitted for other devices under Part 15 of the FCC's regulations.
- Permit measures more suitable to positioning and ranging applications that avoid unnecessary permanent transmissions.
- Eliminate a prohibition on UWB use in toys.
- Designate a safe harbor band for critical UWB services, where shared use is limited to other compatible low-power operations with low duty cycles.

#6 How Should Spectrum Sharing be Defined?

UWB serves as a shared spectrum success story, with its continued growth further enhancing this narrative. UWB spectrum is currently shared by UWB with many federal spectrum users, purely on the basis of its low transmit power, without any further complicated coexistence coordination.

Any decision to allow other use of the bands from 3.1 to 10.6 GHz, or at least the 6 GHz to 10.6 GHz band, should recognize this usage and seek to preserve this favorable coexistence environment. Use cases are described in Section #1 above and in the Whitepaper.

About FiRa Consortium

The FiRa Consortium is a member-driven organization dedicated to transforming the way we interact with our environment by enabling precise location awareness for people and devices using the secured fine ranging and positioning capabilities of Ultra-Wideband (UWB) technology. FiRa does this by driving the development of technical specifications and certification, advocating for effective regulations and by defining a broad set of use cases for UWB. To learn more about UWB and the FiRa Consortium, visit www.firaconsortium.org.

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