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| U.S. Radiocommunications SectorFact Sheet |
| **Working Party:** ITU-R WP1A | **Document No:** USWP1A-03\_FINAL |
| **Ref:**  WORKING DOCUMENT TOWARDS A PRELIMINARY DRAFT NEW REPORT ITU-R SM.[UWB.EVOLUTION]  | **Date:** 8 April 2025 |
| Document Title: Proposed revisions to WORKING DOCUMENT TOWARDS A PRELIMINARY DRAFT NEW REPORT ITU-R SM.[UWB.EVOLUTION]  |
| **Author(s)/Contributors(s):**Dan ManserghApple Inc. | **Email**: dmansergh@apple.com **Phone**: 415-999-8754 |
| **Purpose/Objective:** At the previous meeting of Working Party 1A, several contributions regarding the present state of ultra-wideband technology were considered, and the meeting decided to develop a new working document to incorporate these inputs and others under the auspices of a Correspondence Group. While the work of that CG is expected to run in parallel with the US preparatory process leading up to the June 2025 Working Party 1A meeting, it is anticipated that the Working Document will benefit from further content and editorial review prior to the meeting to ensure that it fully reflects the state of UWB technology in the United States. The purpose of this proposed contribution would be to provide suggested content and editorial revisions to improve the document and progress the work of developing the new report during the WP1A meeting. |
| **Abstract:** Ultra-wideband technology has evolved significantly from its earliest incarnations and is now finding widespread use in the United States in industrial, residential and consumer applications where high-resolution sensing and secure authentication are required. This contribution is intended to progress the development of a new report detailing the use cases and regulatory framework of UWB by suggesting content additions and editorial improvements to the Working Document currently being drafted. |

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| **Radiocommunication Study Groups** |  |
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| Received: XX May 2025Subject: Evolution of UWB Technology | **Document 1A/xx-E** |
| **XX May 2025** |
| **English only** |
| United States of America |
| proposed revisions to WORKING DOCUMENT TOWARDS A PRELIMINARY DRAFT NEW REPORT ITU-R SM.[UWB.EVOLUTION] |
| Evolution of devices using ultra-wideband (UWB) technologies |

Background

ITU-R Study Group 1 has previously considered the development and introduction of ultra-wideband (UWB) technology under Questions ITU-R 226/1 and ITU-R 227/1, resulting in the publication of Report ITU-R SM.2057-0 and Recommendation ITU-R SM.1755-0. Since the last of these documents was issued in 2006, UWB has evolved and seen significant market adoption with its inclusion in smartphones beginning in 2019. The current published Report and Recommendation do not reflect this evolution and there is a need for more current information.

Discussion

At the June 2024 meeting of Working Party 1A, contributions proposing to revise Report ITU-R SM.2057-0 and Recommendation ITU-R SM.1755-0 were presented and considered. Ultimately, WP1A agreed to begin drafting a new Report SM.[UWB.EVOLUTION] to document the subsequent changes in UWB technology and usage patterns for the benefit of ITU-R members.

Proposal

The attached contribution is intended to progress the development of Report SM.[UWB.EVOLUTION], detailing the use cases and regulatory framework of UWB in the United States in new text for incorporation into the Working Document.

**Attachment:** WORKING DOCUMENT TOWARDS A PRELIMINARY DRAFT
NEW REPORT ITU-R SM.[UWB.EVOLUTION]

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| WORKING DOCUMENT TOWARDS A PRELIMINARY DRAFT NEW REPORT ITU-R SM.[UWB.EVOLUTION] |
| **Evolution of devices using ultra-wideband (UWB) technologies**  |

This Report addresses devices using ultra-wideband (UWB) technologies in the frequency range below 10.6 GHz. It provides information on current and future use of UWB technology, including characteristics and assumed deployment information, including possible national experiences.

[Editors Note: Definition of UWB is understood to be as described in Recommendation ITU-R SM.1755 Annex 1]

[Editors Note: Explanation as to why below 10.6 GHz was chosen]

[Editors Note: Some elements in Doc. 1A/[32](https://www.itu.int/md/R23-WP1A-C-0032/en) might (or not) be useful in developing this Report. Some concerns were raised about the information, therefore more background, references and reasoning are needed around that information]

*[Editors Note: Text above is from Annex 12 of the June 2024 WP1A Chair’s Report. Text below is the proposed US contribution.]*

# 1 Introduction

This report provides information about the evolution of ultra-wideband (UWB) technology and its usage, particularly since the 2019 introduction of UWB capabilities in smartphones.

Additional information about UWB technical parameters and industrial/commercial use cases may be found in Report ITU-R SM.2057-0 and Recommendation ITU-R SM.1755-0.

# 2 Consumer UWB Use Cases

With broad availability of UWB capabilities in smartphones from multiple manufacturers and ecosystems of compatible products on the market, consumer-facing implementations of UWB technologies are commonplace.

## 2.1 High Precision Asset Tracking

The most widespread adoption of UWB to date has been in asset trackers. While previous generations of asset tracking “tags” have used other technologies such as Bluetooth LE to provide users with a general location of an item, the addition of UWB provides accurate direction and distance information. UWB-capable tags come in multiple form factors and accessories allow attachment to virtually any item, including keys, wallets, handbags, backpacks and luggage. UWB chips are also being incorporated into electronic devices in addition to phones, such as tablets, headphones, chargers and battery banks.

## 2.2 Premise Access Systems

Building upon their experience with UWB-enabled access systems in the commercial sector, manufacturers of residential door locks and security systems are incorporating UWB into their smart home products. UWB enables secure touchless unlocking when a user approaches a locked door with a linked smartphone. As the user approaches, a Bluetooth LE or Wi-Fi connection will communicate with the phone for preliminary authorization and then a UWB connection calculates range and location to provide validation of the user’s smartphone location for an extra layer of security before the door unlocks. While several manufacturers have released proprietary implementations of UWB, the Connectivity Standards Alliance is including a standardized implementation in the Aliro[[1]](#footnote-1) specification.

## 2.3 Automotive

In the automotive industry, adoption of UWB for key fobs surpassed 20% of new vehicles in 2024[[2]](#footnote-2). To support smartphone integration, the Connected Car Consortium Digital Key[[3]](#footnote-3) standard includes UWB with a combination of radio technologies to support remote locking and unlocking, as well as remote start. Including the technology in vehicles has also opened up other possible features, including using UWB sensing to detect passengers and pets in the rear seats.

## 2.4 Consumer Electronics

Some companies are using UWB as an alternative to Bluetooth for high-fidelity audio, with several headphone and UWB hub products announced since 2024.

# 3 Industrial/Commercial UWB Use Cases

[Reserved for potential contributions]

# 4 Technical and Regulatory Considerations

Regulations written in the early 2000’s did not anticipate how UWB technology would eventually evolve. Much of the initial concern of incumbents was focused on high-data-rate communications being delivered by networks of continuously operating UWB transmitters, especially outdoors. Further, the wide individual channel bandwidth and very broad range of spectrum potentially used by UWB devices included many different incumbent operations using a range of different wireless technologies. Naturally, national regulatory authorities (NRA’s) drafted conservative rules to limit power and location to protect against unknown risk. As the UWB market has developed, however, some of these early assumptions may need to be reassessed by NRA’s within a particular administration’s national context and revise their local rules to reflect experience and current applications of the technology.

## 4.1 Opportunistic and User-Initiated Transmission

One key mitigation that reduces risk of interference to incumbents is reducing overall duty cycle. All of the consumer use cases described in Section 2 are characterized by limited transmission durations over short distances that are controlled by a user or use an alternate radio technology to enable the UWB connection. This is particularly important for portable devices such as smartphones, key fobs and small UWB tags, where battery life is a key development constraint. Even the UWB audio use case has a low duty cycle, since the data bandwidth is so large relative to the payload.

## 4.2 Channel Utilization

Another mitigation is the relatively limited number of channels used by most UWB implementations. Of the fifteen channels specified for High Data Rate operation in IEEE 802.15.4 and shown in Figure 1, only two (Channels 5 and 9) are used for most consumer applications.

FIGURE 1

UWB Channels in IEEE 802.15.4



This focus on two specific channels is due to a combination of regulatory and technical factors. First, not all channels are available for use in every regulatory domain and the consumer UWB market is global. Second, while UWB can be quite resistant to interference it operates better in bands where there are fewer high-power operations. This led chipmakers to focus on developing products for Channel 5 and Channel 9, where incumbent operations include fixed service, PMSE, satellite and radar systems that are best suited to coexist with the relatively low-power and intermittent consumer UWB use cases.

It is important to note, however, that many industrial and commercial UWB products use the other available UWB channels depending on the suitability of specific frequencies for different applications.

# 5 Summary

UWB is a maturing technology with use cases and operating parameters very different than what was envisioned when the technology was in its infancy. In particular, the rise of smartphone-enabled consumer use cases has driven growth in adoption while the operational characteristics of these applications may serve to mitigate some of the risks originally anticipated by incumbents and NRA’s.

1. <https://csa-iot.org/all-solutions/aliro/> [↑](#footnote-ref-1)
2. <https://www.autosinnovate.org/resources/papers-reports/Ultra-Wideband%20%28UWB%29%20Technology.pdf> [↑](#footnote-ref-2)
3. <https://carconnectivity.org/wp-content/uploads/2022/11/CCC_Digital_Key_Whitepaper_Approved.pdf> [↑](#footnote-ref-3)