IEEE P802.18
Radio Regulatory Technical Advisory Group (RR-TAG)

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| Draft Response Czech Spectrum Strategy Consultation |
| Date: 2023-08-17 |
| Author(s): |
| Name | Company | Address | Phone | email |
| Benjamin Rolfe | BCA |  |  | ben.rolfe@ieee.org |
| Dries Neirynck | Ultra-Radio |  |  | dries.neirynck@ultra-radio.com |
| Edward Au | Huawei |  |  | edward.ks.au@gmail.com |
| Clint Powell | HID Global |  |  | cpowell@ieee.org |

This contribution proposed a response to:

Czech Republic Czech Telecommunications Office (CTU)’s call for comments on the update of the Radio Spectrum Management Strategy consultation. See <https://www.ctu.eu/call-comments-update-radio-spectrum-management-strategy>

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Electronic filing August 16, 2023

Re: Czech Republic CTU’s call for comments on the update of the Radio Spectrum Management Strategy update.

Dear Chairman, CTU, Radio Department, Policy and Strategy Unit

IEEE 802 LAN/MAN Standards Committee (LMSC) thanks Czech Republic Czech Telecommunications Office (CTU) for providing this opportunity to participate in the process of updating the current version of the Radio Spectrum Management Strategy (“report”).

IEEE 802 LMSC is a leading consensus-based industry standards body, producing standards for wireless networking devices, including wireless local area networks (“WLANs”), wireless specialty networks (“WSNs”), wireless metropolitan area networks (“Wireless MANs”), and wireless regional area networks (“WRANs”). We also produce standards for wired Ethernet networks, and technologies produced by implementers of our standards are critical for all networked applications today.

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Please find below the comments of IEEE 802 LMSC to selected sections of the report.

**Updates on UWB in Section 6.4.4.2: Short-range devices (SRD)**

As referred to Section 6.4.4.2 of the report, it states “*Applications using the ultra-wideband technology (UWB) met the expectations only to a very limited extent and tend to be used in industrial applications (cable detection, identification of vehicles and surveillance applications, support of safety in industry, etc.)*”. IEEE 802 LMSC would like to inform the CTU that the application and deployment of UWB technology has changed dramatically since the publication of the report. Today, UWB technology based on IEEE Std 802.15.4 is part of mass market consumer devices, including smartphones, vehicles, and consumer accessories. UWB is a key technology in indoor location tracking, material sensing and other industrial applications. Growth into consumer products, however, is a profound change.

***Current and future state of IEEE 802.15.4 UWB***

IEEE 802.15 standards specify Ultra Wideband technology operation. IEEE Std 802.15.4-2020 [1] and IEEE Std 802.15.4z-2020 [2] are standards for precision ranging that support data communication, location discovery, and device ranging. The standards support operation in many frequency ranges including sub-1 GHz bands and 3.1 GHz to 10.6 GHz bands [3] and are increasingly used in many high value applications. The capability of IEEE Std 802.15.4z-2020 to support secure ranging has led to a renewed interest in UWB from industry. The automotive industry was the driving force behind IEEE Std 802.15.4z-2020 and the first to include UWB in consumer products. Mobile handset makers have followed closely. This is generating significant economic and social value, attracting further interest in developing a robust and diverse industry ecosystem. For example, the UWB Alliance supports members in many application areas; the FiRa Consortium is focused on precise (fine) ranging applications and localization; OmLox is supporting industrial localization; the Car Connectivity Consortium has been focused on automotive uses; while the Connectivity Standards Alliance is focused on secure premises access for, but not limited to corporate, hospitality, university, single-family homes, and multi-family

homes. Other organizations are also building upon the IEEE 802.15.4 UWB standard. It is worth noting that there is a tight cooperation among these organizations to support the broad needs of the industry in complimentary ways. The harmonization of the ecosystem supports healthy growth and overcomes some of the barriers that led to the limited adoption CTU may have observed in the (distant) past.

IEEE 802 LMSC is supporting to expand the capabilities of UWB consumer devices, beyond ranging and localisation, in the IEEE 802.15.4ab task group [4]. IEEE P802.15.4ab is developing the next generation of UWB standard based on industry needs to fuel the next round of innovative products. The project is built on IEEE Std 802.15.4z-2020 which are capable of using both the 6 GHz and 7 GHz frequency bands and has been widely implemented and is supported by a rich ecosystem of industry alliances, silicon vendors and product developers. New developments supported by the project include features to improve link budget and/or reduce air-time, sensing capabilities to support presence detection and environment mapping, improved accuracy, precision and reliability for high-integrity ranging, interference mitigation techniques to support greater device density and higher traffic use cases and provide improved coexistence in the presence of other services in support of different regulatory regions, additional means to reduce complexity and power consumption, enhance support for ultra low energy, low latency streaming, while ensuring compatibility with the deployed base of products based upon IEEE Std 802.15.4z-2020. In addition, the project is built on the IEEE Std 802.15.4-2020 standard that supports peer-to-peer, peer-to-multi-peer, and station-to-infrastructure topologies and includes enhanced infrastructure synchronization mechanisms.

***Expanded applications and massive growth***

It can be noted that the uses which CTU identified in 2015 were, then and still today, critically important uses. UWB is still used for location tracking and material sensing in industrial environments extensively. The market has significantly expanded. Following completion of ECC Report 278 and IEEE Std 802.15.4z-2020, UWB has become ubiquitous and there are lots of active UWB development and deployments. For example, UWB is now used to secure passive keyless entry systems in many vehicles, and very soon for premises access. Mobile phone manufacturers have also been integrating ultra-wideband in their smart phones.

Sensing based upon UWB is another area of explosive growth. The ultra-low transmit power (at or below unintentional emissions limits) and very high dynamic response of impulse radio-UWB (IR-UWB) enables precise, fast, and accurate sensing for uses such as present detection of children left in vehicles.

As another example of current market trends, UWB is emerging as a leading technology for ultra-low power, ultra-low latency moderate data rate communications such as real time audio and real-time ultra-low latency human interface devices for gaming.

In summary, while it may have appeared in 2015 that UWB had not lived up to original expectations, presently UWB deployments are numbering over a billion devices and are growing exponentially [5]. If we examine the timeline in context of the larger view of wireless technology adoption, we see that adoption of UWB parallels, and is slightly ahead, of the time to mass market adoption for other popular wireless access technologies. From time rules first allowed UWB technology appearance in the mobile handset, for example, has traditionally been about 20 years. For UWB it was about 16 years.

***It is an appropriate time to develop a strategic plan for UWB***

Given the increasing importance of UWB, IEEE 802 LMSC would like to encourage the CTU to include a strategy for UWB developments in its radio spectrum management strategy.

Within CEPT, ECC Report 327 led to an update of ECC Decision (06)04 last year, removing the prohibition on fixed outdoor devices, simplifying the use of UWB in vehicular applications and enhancing the transmit power of indoor devices. We would like to encourage the CTU to include these measures in the Czech Republic’s national regulations. Harmonization of regulations has many benefits, both technical and economic. In addition, CEPT ECC SE24 is starting working to revisit the UWB regulations in 8.5 GHz to 10.6 GHz. The UWB industry looks forward to cooperating with the CTU on these investigations.

Furthermore, as the number and variety of applications of IEEE 802.15.4 UWB devices continues to grow, radio spectrum policy and spectrum regulations can help combat climate change by creating conditions conducive to lowering power usage. For example, with the constraint of -41.3 dBm/1 MHz power spectral density, or in other terms, 37 nJ/ms, the IEEE 802.15.4 UWB radios cause very little or no interference to other users of the same spectrum (e.g., there are defined restrictions for UWB radios to operate from 3.1 GHz to 10.6 GHz bands), but the IEEE 802.15.4 radios themselves may become blocked by strong nearby signals. While regulations do not protect IEEE 802.15 radios from interference, spectrum policy can keep parts of the spectrum suitable for energy efficient low power device use.

Additional information that CTU may find helpful in updating spectrum strategy, including potential updates to current rules for UWB, can be found in the references [6] [7].

**Conclusion**

Respectfully submitted

By: /ss/.

Paul Nikolich

IEEE 802 LAN/MAN Standards Committee Chairman

em: p.nikolich@ieee.org

References:

[1] “IEEE Standard for Low-Rate Wireless Networks,” in IEEE Std 802.15.4-2020 (Revision of IEEE Std 802.15.4-2015), vol., no., pp.1-800, 23 July 2020, doi: 10.1109/IEEESTD.2020.9144691.

[2] “IEEE Standard for Low-Rate Wireless Networks--Amendment 1: Enhanced Ultra Wideband (UWB) Physical Layers (PHYs) and Associated Ranging Techniques,” in *IEEE Std 802.15.4z-2020* (Amendment to IEEE Std 802.15.4-2020), vol., no., pp.1-174, 25 Aug. 2020, doi: 10.1109/IEEESTD.2020.9179124.

[3] IEEE 802.18 Wireless Standards Table of Frequency Ranges, Sept. 2022. [Available online](https://mentor.ieee.org/802.18/dcn/22/18-22-0009-01-0000-ieee-802-wireless-standards-table-of-frequency-ranges.xlsx)  [accessed: 17 August 2023]

[4] IEEE P802.15.4ab. [Available online](https://www.ieee802.org/15/pub/TG4ab.html) [accessed: 17 August 2023]

[5] FiRa Consortium, “Unleashing the Potential of UWB: Regulatory Considerations,” Dec. 2022. [Available online](https://www.firaconsortium.org/sites/default/files/2022-12/Unleashing-the-Potential-of-UWB-Regulatory-Considerations-December-2022.pdf) [accessed: 17 August 2023]

[6] FiRa Consortium, “Spectrum Position Statement,” Jul. 2023. [Available online](https://www.firaconsortium.org/sites/default/files/2023-07/spectrum-position-statement-july-2023.pdf) [accessed: 17 August 2023]

[7] Car Connectivity Consortium. “UWB Spectrum Regulatory Position, Car Connectivity Consortium Digital Key – The Future of Vehicle Access,” Dec. 2022, [Available online](https://carconnectivity.org/wp-content/uploads/2022/12/UWB-Spectrum-Regulatory-Position_v2-1.pdf) [accessed: 17 August 2023]

1. This document solely represents the views of IEEE 802 LMSC and does not necessarily represent a position of either the IEEE or the IEEE Standards Association. [↑](#footnote-ref-1)