

Re: Public Consultation - Position Paper on IoT and M2M in the State of Qatar

Dear President,

IEEE 802 LAN/MAN Standards Committee (LMSC) thanks Communications Regulatory Authority (CRA) for providing an opportunity to comment on the public consultation - Position Paper on IoT and M2M in the State of Qatar.

IEEE 802 LAN/MAN Standards Committee (IEEE 802 LMSC) is a leading consensus-based open standards development committee for networking standards that are used by industry globally. It produces standards for networking devices, including wired and wireless local area networks (“LANs” and “WLANs”), wireless specialty networks (“WSNs”), wireless metropolitan area networks (“Wireless MANs”), and wireless regional area networks (“WRANs”). Technologies produced by implementers of our standards are a critical element for all networked applications today.

IEEE 802 LMSC is a committee of the IEEE Standards Association and of Technical Activities, two of the Major Organizational Units of the IEEE. IEEE has about 400,000 members in over 160 countries and its core purpose is to foster technological innovation and excellence for the benefit of humanity. IEEE is also a major accredited standards development organization whose standards are recognized worldwide. In submitting this document, IEEE 802 LMSC acknowledges and respects that other components of IEEE Organizational Units may have perspectives that differ from, or compete with, those of IEEE 802 LMSC. Therefore, this submission should not be construed as representing the views of IEEE as a whole¹.

IEEE 802 LMSC commends CRA for developing a position paper that is strategically important to support the growth of the ICT sector in Qatar. Please find below the responses of IEEE 802 LMSC to Question 6 of this consultation.

Question 6: Please provide your feedback and suggestions for CRA for the potential adjustments to the spectrum plan to accommodate increased IoT use cases and the promotion of IPv6 adoption for IoT services.

IEEE 802.11ah-based Wi-Fi HaLow and IEEE 802.15.4-based UWB and Wi-SUN should be considered as short range technologies for various IoT and M2M applications

In addition to the IEEE 802.11-based Wi-Fi technologies operating in 2.4 GHz, 5 GHz, and 6 GHz frequency bands, other IEEE 802 standards-based technologies, specifically IEEE 802.11ah-based Wi-Fi HaLow, and IEEE 802.15.4-based Ultra-Wideband (UWB), and Wi-SUN (Smart Utility Network), should be considered as short-range technologies for various IoT and M2M applications. These technologies are widely used worldwide in applications that include door entry systems, environmental sensors, fire and security alarms, smart meters, smart-parking devices, smart signs, streetlights, and structural integrity sensors. As an example, there are estimated over 120 million smart electric meters² deployed across the North America.

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 or the IEEE Technical Activities.

² Information derived from Guidehouse Global AMI Tracker 4Q23 research data.

IEEE Std 802.11ah-2016³, known as Wi-Fi HaLow in the marketplace⁴ and now incorporated into the draft IEEE 802.11-2024 standard,⁵ specifies mechanisms for the operation of Wi-Fi in the license exempt sub-1 GHz bands. IEEE 802.11ah was developed for long range, low power sensor and IoT networks and applications, which support many use cases of particular relevance to Qatar as shown in Figure 4 of the position paper. It excels in long range coverage of over 1 km (subject to the maximum allowed transmit power)⁶ and has excellent penetration through walls and obstacles. The standard supports a wide range of data rates that allow support for sensors and new applications that may combine video applications with sensing operation. It also introduced many features to increase energy efficiency and optimize device power consumption.

The IEEE 802.15.4 standard has excellent support for IoT devices with low to extremely low energy consumption. IEEE Std 802.15.4z-2020⁷ uses the 6 GHz to 8 GHz bands for precision ranging applications, with UWB technology operation finding adoption for numerous short-range sensing and ranging applications. These technologies are being used worldwide for a wide range of IoT and M2M applications in communication, measurement, location, imaging, surveillance, and medical systems⁸. The extremely low transmission power of UWB assures a near zero interference footprint. There is also an ongoing project IEEE P802.15.4ab⁹ which will further improve ranging precision and accuracy, and support emerging applications such as high-definition audio.

In addition, IEEE Std 802.15.4-based Wi-SUN¹⁰ specifies physical layer radio and medium access control mechanisms for operation in sub-1 GHz license exempt frequency bands from 169 MHz to 928 MHz. The technology was initially developed for SUN and other large scale IoT networks¹¹, such as smart city networks. Devices using IEEE Std 802.15.4-2020 SUN are extensively deployed as Wi-SUN home area network (HAN) and Wi-SUN field area network (FAN) in a range of applications not only for smart utilities and smart cities¹² but also for smart agriculture and healthcare¹³.

³ IEEE Standard for Information technology—Telecommunications and information exchange between systems - Local and metropolitan area networks—Specific requirements - Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications Amendment 2: Sub 1 GHz License Exempt Operation, IEEE Std 802.11ah-2016 (Amendment to IEEE Std 802.11-2016, as amended by IEEE Std 802.11ai-2016), vol., no., pp.1-594, 5 May 2017, doi: 10.1109/IEEESTD.2017.7920364.

⁴ Wi-Fi Alliance: Wi-Fi CERTIFIED HaLow, <https://www.wi-fi.org/discover-wi-fi/wi-fi-certified-halow> [accessed: 12 September 2024]

⁵ See clauses 10.45 to 10.62, clause 23, and Annex L of “IEEE Draft Standard for Information Technology -- Telecommunications and Information Exchange Between Systems Local and Metropolitan Area Networks -- Specific Requirements - Part 11: Wireless Local Area Network (LAN) Medium Access Control (MAC) and Physical Layer (PHY) Specifications,” in IEEE P802.11-REVme/D7.0, August 2024, vol., no., pp.1-6213, 30 July 2024.

⁶ See Morse Micro: Pushing the limits: Wi-Fi HaLow Testing in Joshua Tree National Park, <https://www.morsemicro.com/2024/09/09/pushing-the-limits-wi-fi-halow-testing-in-joshua-tree-national-park/> [accessed: 12 September 2024].

⁷ “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.

⁸ See FiRa Consortium: Unleashing the Potential of UWB: Regulatory considerations, August 2022, <https://www.firaconsortium.org/sites/default/files/2022-08/Unleashing-the-Potential-of-UWB-Regulatory-Considerations.pdf> [accessed: 12 September 2024]. The introduction of IEEE 802.15 UWB-enabled devices in smartphones and laptops puts forecasts at more than 1 billion devices shipped annually worldwide by 2025.

⁹ See IEEE P802.15.4ab, <https://www.ieee802.org/15/pub/TG4ab.html> [accessed: 9 September 2024].

¹⁰ “IEEE Standard for Low-Rate Wireless Networks,” 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.

¹¹ See Wi-SUN Alliance: Wi-SUN Alliance marks a year of strong growth in membership and 91 million devices awarded globally, <https://wi-sun.org/news/wi-sun-alliance-marks-a-year-of-strong-growth-in-membership-and-91-million-devices-awarded-globally-2/> [accessed 9 September 2024]. Wi-SUN Alliance has also seen its influence grow, with more than 91 million Wi-SUN capable devices (Navigant Research) awarded globally as service providers and city developers deploy new IoT applications and services for smart cities and utilities.

¹² National Institute of Information and Communications Technology: World’s First Application of Wi-SUN Radio Sensor Network to Fishery Industry, MOZUKU Seaweed Aquaculture, 25 December 2015, <https://www.nict.go.jp/en/press/2015/12/25-1.html> [accessed: 12 September 2024]

¹³ Japan Science: Successful multi-stage relay demonstration experiment performed at Kyoto University medical institution, 26 July 2021, <https://sj.jst.go.jp/news/202107/n0726-03k.html> [accessed: 12 September 2024]

IEEE 802 LMSC respectfully requests CRA to update Section 2.2 of the position paper to

- Include the fact that Wi-Fi operates not only in 2.4 GHz, 5 GHz, and 6 GHz frequency band, but also in the sub-1 GHz band.
- Introduce IEEE 802.15.4-based UWB and SUN as additional radio-based technologies that provide low-power and short-range communications for various IoT and M2M applications that are of particular relevance to Qatar.

Conclusion

IEEE 802 LMSC thanks CRA for the opportunity to provide this submission and kindly requests consideration of our response by including IEEE 802.11ah-based Wi-Fi HaLow and IEEE 802.15.4-based UWB and Wi-SUN into the position paper.

Respectfully submitted,

By: /ss/.

James Gilb

IEEE 802 LAN/MAN Standards Committee Chairman

em: gilb_ieee@tuta.com