

Dear respected officers,

IEEE 802 LAN/MAN Standards Committee (LMSC) thanks the Agencia Nacional del Espectro (ANE) on its ongoing work in the area of spectrum management. The consultation on the proposed regulatory modification to allow the flexibility of the 900 MHz band is valuable to inform the public of the areas in which ANE expects to focus and to solicit feedback that will provide the ANE with the information necessary to proceed.

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 over 460,000 members in more than 190 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 that other components of IEEE Organizational Units may have perspectives that differ from, or compete with, those of IEEE 802 LMSC<sup>1</sup>.

Please find below the responses of IEEE 802 LMSC on this consultation.

IEEE 802 LMSC commends ANE for its leadership in adopting a flexible use of the 900 MHz band with the objective of bringing internet services to rural and remote areas in Colombia. Flexibility helps enable the use of various unlicensed technologies for different applications that are important to the communities of rural and remote areas and help ANE to close the digital divide.

***Large diversity of uses enabled by IEEE Std 802.11 and IEEE Std 802.15 based systems operating at the 900 MHz band***

While LoRaWAN and NB-IoT are mentioned in the consultation paper as the access technologies for low-power wide-area networks, IEEE 802 LMSC would like to inform ANE that IEEE 802.11ah-based Wi-Fi HaLow and IEEE 802.15.4-based Wi-SUN should also be considered as unlicensed technologies operating in the 900 MHz band. 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 to be over 120 million smart electric meters<sup>2</sup> deployed across North America.

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<sup>1</sup> This document solely represents the views of IEEE 802 LMSC and does not necessarily represent a position of either IEEE or the IEEE Standards Association.

<sup>2</sup> Information derived from Guidehouse Global AMI Tracker 4Q23 research data.

IEEE Std 802.11ah-2016<sup>3</sup>, known as Wi-Fi HaLow in the marketplace<sup>4</sup> and now incorporated into the IEEE Std 802.11-2024,<sup>5</sup> 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 relevance to Colombian marketplace. It excels in long range coverage of over 1 km (subject to the maximum allowed transmit power)<sup>6</sup> 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 a wide range of IoT devices with low to extremely low energy consumption. IEEE Std 802.15.4-based Wi-SUN<sup>7</sup> 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 Smart Utility Networks (SUN) and other large scale IoT networks<sup>8</sup>, such as smart city networks. The propagation characteristics of the sub-1 GHz bands coupled with commonly used mesh network topologies provide flexible ways to cover large areas with low to very low transmit power, which provides support for both wide areas and high density coverage. Devices using IEEE Std 802.15.4-2024 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 cities<sup>9</sup> but also for smart agriculture and healthcare<sup>10</sup>.

The large diversity of uses enabled by IEEE Std 802.11 and IEEE Std 802.15 based systems operating in sub-1 GHz bands, without the need for high power or exclusive access, is a proven means to achieve greater value from the limited available spectrum than from exclusive use.

IEEE 802 LMSC respectfully requests ANE to consider introducing IEEE 802.11ah-based HaLow and IEEE 802.15.4-based Wi-SUN as additional radio-based technologies that provide low-power communications for various applications that are of particular relevance to rural and remote areas in Colombia.

### ***Proposed changes to Table 15.A***

<sup>3</sup> 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 802.11ah-2016), vol., no., pp.1-594, 5 May 2017, doi: 10.1109/IEEESTD.2017.7920364.

<sup>4</sup> Wi-Fi Alliance: Wi-Fi (MAC/PHY) technologies, <https://www.wi-fi.org/wi-fi-macphy> [Last accessed: 26 June 2025].

<sup>5</sup> See clauses 10.45 to 10.62, clause 23, and Annex L of “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,” in *IEEE Std 802.11-2024 (Revision of IEEE Std 802.11-2020)*, vol., no., pp.1-5956, 28 April 2025, doi: 10.1109/IEEESTD.2025.10979691.

<sup>6</sup> 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/> [Last accessed: 26 June 2025].

<sup>7</sup> “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.

<sup>8</sup> 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/> [Last accessed: 26 June 2025]. 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.

<sup>9</sup> 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> [Last accessed: 26 June 2025].

<sup>10</sup> 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> [Last accessed: 26 June 2025].

While IEEE 802 LMSC supports ANE's proposal to adopt a flexible use of the 900 MHz band, we would like to suggest mentioning explicitly that the FDD configuration is applicable to the operation of IMT. We respectfully ask ANE to consider adopting the FCC Part 15 rules<sup>11</sup> for any license-exempt radio-based technologies operating at either 896 MHz to 915 MHz or 941 MHz to 960 MHz band,.

## **Conclusion**

IEEE 802 LMSC thanks ANE for the opportunity to provide this submission and respectfully requests to consider the responses provided in this document.

Respectfully submitted

By: /ss/.

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<sup>11</sup> FCC § 15.247 Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz., <https://www.ecfr.gov/current/title-47/chapter-I/subchapter-A/part-15/subpart-C/subject-group-ECFR2f2e5828339709e/section-15.247> [Last accessed: 26 June 2025]