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

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| Proposed Response to ACMA consultation “New arrangements for low interference potential devices” | | | | |
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This contribution proposed a response to:

Australian Communications and Media Authority (ACMA) New arrangements for low interference potential devices - consultation 35/2022

https://www.acma.gov.au/consultations/2022-10/new-arrangements-low-interference-potential-devices-consultation-352022

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<https://www.acma.gov.au/consultations/2021-08/form/consultation-test-beta?source_entity_type=node&source_entity_id=3917>

Re: Consultation on “New arrangements for low interference potential devices - consultation 35/2022”

Dear ACMA,

IEEE 802 LAN/MAN Standards Committee (LMSC) thanks ACMA for issuing the consultation and the opportunity to provide feedback on “New arrangements for low interference potential devices - consultation 35/2022”. The Consultation is an important mechanism for soliciting feedback that will provide ACMA with the information necessary.

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.

IEEE 802 LMSC is a committee of the IEEE Standards Association and Technical Activities, two of the Major Organizational Units of the Institute of Electrical and Electronics Engineers (IEEE). IEEE has about 400,000 members in over 160 countries. IEEE’s core purpose is to foster technological innovation and excellence for the benefit of humanity. 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 whole[[1]](#footnote-1).

In the past ten years, the IEEE 802 LMSC has overseen the development of many standards (including IEEE Std. 802.11ac-2014 [1], IEEE Std. 802.11ah-2016 [2], and IEEE Std. 802.11ax-2021 [3]) that operate in unlicensed bands and can provide physical layer throughputs from 150 Kbps in support of IoT devices to over 1 Gb/s in support of applications such as teleconferencing, video and video gaming. The current Wi-Fi HaLow technology [4] is based on the IEEE Std. 802.11ah-2016 standard [2]. The current Wi-Fi 6 and Wi-Fi 6E technologies [5] are based on the IEEE Std. 802.11ax-2021 standard [3]. IEEE P802.11be [6] will provide physical layer throughput capacity at gigabit speeds and is the basis that the upcoming Wi-Fi 7 technologies [7] utilize for development. These IEEE 802 technologies have become an integral part of global citizens’ lives.

IEEE Std 802.15.4 serves billions of devices worldwide using unlicensed spectrum for many applications such as IoT sensors, monitoring, control, real-time location services, and secure access control. A major revision to the IEEE Std 802.15.4-2020 standard has commenced, rolling up several published amendments since 2020, including IEEE Std 802.15.4z-2020 [8], which defined enhanced UWB technology. IEEE Std 802.15.4z-2020 is already widely being used in consumer, automotive, commercial, and industrial markets. In addition to the revision to IEEE Std 802.15.4-2020 a new amendment on "Next generation UWB", which will be rolled up in a future revision to IEEE 802.15.4, is being developed in task group IEEE 802.15.4ab [9] to further enhance UWB capabilities for better performance, greater precision, and new uses such as presence detection and other sensing applications.

**Discussion: The 915-928 MHz and 2.4 GHz Bands are Already Heavily Used**

Satellite IoT undoubtedly has a role to play in Australia where the population is concentrated in towns and cities, and where the use of sensors in remote areas is desirable, e.g., for agricultural, mining, flood, and bushfire monitoring use cases.

However, the 915-928 MHz and 2.4 GHz LIPD frequency bands in Australian towns and cities are already heavily used by the following and other technologies.

In the 915-928 MHz band, Wi-Fi HaLow (IEEE 802.11ah), Wi-SUN (IEEE 802.15.4g), LoRaWAN, and RFID devices are present throughout Australia. In particular:

* IEEE 802.15.4g (Wi-SUN) mesh networks are deployed in the state of Victoria, and the city of Melbourne in particular, for smart meters [10, 11].
* LoRaWAN IoT devices are widely used across Australia, which is supported by the heat map provided by the Things Network (<https://ttnmapper.org/heatmap/>) that illustrates the concentration of these devices in the major centers across Australia and the relative sparseness elsewhere.
* RFID is used extensively across the country in logistics and for applications such as road toll collection. Existing congestion in the 915-928 MHz band led to an allocation of an additional 7 MHz for duty cycle-based devices in the 928-935 MHz band, effective in 2021 [12].
* The 915-928 MHz band in Melbourne has been studied for potential use by Satellite IoT [13]. The band was found to be “highly” used and that additional use of the band by Satellite IoT would need consideration of “smarter” medium access methods. The study did not consider hotspots that may occur in buildings and particular areas, or the effect of Satellite IoT on existing terrestrial devices already using the band, or the likelihood of additional terrestrial devices using the band in future. ACMA is already aware of this potential growth [14].

In the 2.4 GHz band, there are Wi-Fi 4 (IEEE 802.11n), Wi-Fi 6 (IEEE 802.11ax), Bluetooth, Zigbee, and Thread (IEEE 802.15.4) devices.

**Responses to Question 11**

***Q: What is an appropriate power for such services so that there is no impact on other services? While some might operate at power levels slightly higher than those currently supported under the LIPD class licence, others could at operate higher levels. The impact also depends on other technical parameters such the orbital characteristics, number of satellites and what types of services are sharing the band. Such considerations suggest a case-by-case approach (more akin to an apparatus licensing regime) may be required.***

Satellite IoT at any transmit power is likely to impact existing services in centers where the frequency band is already congested. Existing devices may cease to operate reliably due to congestion or raising of the noise floor. Detailed comments or recommendations would require knowledge of the technology involved, for example, what are the size of messages, transmit power, medium access control method, number of devices in a given area, direction and volume of data traffic, antenna orientation, receive footprint, duty cycle, and location of devices. IEEE 802 LMSC agree that a case-by-case approach may be required.

***Q: What effect, if any, will the proposed use have on existing services such as the amateur-satellite services and services authorised under the LIPD class licence? For example, Wi-Fi, Bluetooth and radio frequency identification devices (RFID).***

This depends on the level to which the overall noise floor is raised by Satellite IoT and on the potential increase in the number of packet collisions. Additional devices in the frequency band will cause an increase in packets and therefore, an increase in packet collisions, which in turn decrease the achievable throughputs for all existing technologies. An overall increase in noise floor above certain energy detect levels would cause existing LIPD devices relying on listen before talk (LBT), such as Wi-Fi and Wi-SUN based on IEEE 802.11 and IEEE 802.15 technologies, to cease transmission. It would also cause duty cycle-based technologies, e.g., LoRaWAN, relying on very low receiver sensitivities to fail to receive packets, and similarly cause RFID tags to become unreadable.

Energy detect levels for representative LBT technologies are provided as reference.

* IEEE Std 802.11ah devices operating at 915-928 MHz: -75 dBm [2]
* IEEE Std 802.15.4g devices operating at 915-928 MHz [15]:
  + OFDM PHY: in [-100 dBm, -78 dBm]
  + O-QPSK PHY: in [-100 dBm, -80 dBm]
  + FSK PHY with FEC: in [-100 dBm, -78 dBm]
  + FSK PHY without FEC: in [-94 dBm, -72 dBm]
* IEEE Std 802.11n and IEEE Std 802.11ax devices operating at 2.4 GHz: -62 dBm [1]

Typical recommended sensitivity levels for representative duty cycle devices are also provided as reference.

* LoRaWAN [16]: -120 dBm
* RFID reader receive sensitivity [17]: -90 dBm

***Q: Do systems need to be brought under the scope of the Radiocommunications Act via variations to the Radiocommunications (Australian Space Objects) Determination 2014 or the Radiocommunications (Foreign Space Objects) Determination 2014?***

No comment.

***Q: Is the LIPD class licence or the communication with space objects (CSO) class licence the appropriate legislative instrument to be used to facilitate such systems?***

No comment.

***Q: If apparatus licensing is used, are the current apparatus licence fees and taxes appropriate? (Assuming the entire band is licensed, for the 915–928 MHz band, the annual tax for an Australia-wide space licence is estimated as $36,673; for the 2400–2483.5 MHz band, the annual tax for an Australia-wide space licence is $235,194.)***

No comment.

**Conclusion**

IEEE 802 LMSC thanks the ACMA for providing this invaluable opportunity to provide this submission on “New arrangements for low interference potential devices - consultation 35/2022”.

Respectfully submitted

By: /ss/.

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References:

[1] “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 802.11-2020 (Revision of IEEE Std 802.11-2016), pp.1-4379, 26 February 2021, doi: 10.1109/IEEESTD.2021.9363693.

[2] “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,” in 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.

[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 1: Enhancements for High-Efficiency WLAN,” in IEEE Std 802.11ax-2021 (Amendment to IEEE Std 802.11-2020) , vol., no., pp.1-767, 19 May 2021, doi: 10.1109/IEEESTD.2021.9442429.

[4] Discover Wi-Fi: Wi-Fi CERTIFIED HaLow. Online: <https://www.wi-fi.org/discover-wi-fi/wi-fi-certified-halow>

[5] Discover Wi-Fi: Wi-Fi CERTIFIED 6. Online: <https://www.wi-fi.org/discover-wi-fi/wi-fi-certified-6>

[6] IEEE 802.11 Enhanced High Throughput Task Group (P802.11be). Online: <https://www.ieee802.org/11/Reports/tgbe_update.htm>

[7] Wi-Fi 7. Online: <https://www.wi-fi.org/who-we-are/current-work-areas#Wi-Fi%207>

[8] “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 August. 2020, doi: 10.1109/IEEESTD.2020.9179124.

[9] IEEE 802.15 WSN™ Task Group 4ab (TG4ab) 802.15.4 UWB Next Generation. Online: <https://www.ieee802.org/15/pub/TG4ab.html>

[10] Silver Spring Networks’ Response to AEMC Power of Choice Draft Report. Online: <https://www.aemc.gov.au/sites/default/files/content/1494afbe-7bca-477d-aae1-d6625d6559ef/Silver-Spring-Networks-received-22-October-2012.pdf>

[11] AusNet Services Selects Silver Spring Networks for Advanced Metering Roll-Out. Online:<https://www.itron.com/na/company/newsroom/2015/04/16/ausnet-services-selects-silver-spring-networks-for-advanced-metering-roll-out>

[12] ACMA 803–960 MHz overview.

[13] B. Al Homssi *et al.*, “Free Spectrum for IoT: How Much Can It Take?” in *Proceedings of 2018 IEEE International Conference on Communications Workshops (ICC Workshops)*, 2018, pp. 1-6, doi: 10.1109/ICCW.2018.8403749.

[14] ACMA Internet of Things in media and communications: Occasional paper.

[15] Y. Nagai *et al.*, “Sub-1 GHz Frequency Band Wireless Coexistence for the Internet of Things,” in in IEEE Access, vol. 9, pp. 119648-119665, 2021, doi: 10.1109/ACCESS.2021.3107144.

[16] LoRa. Online: <https://lora.readthedocs.io/en/latest/>

[17] Receive Sensitivity and Transmit Power Index-Value Table. Online: <https://support.impinj.com/hc/en-us/articles/1500003981601-Receive-Sensitivity-and-Transmit-Power-Index-Value-Table>

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)