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

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| Proposed Response to ACMA Draft Five-year Spectrum Outlook 2024–29 and 2024–25 Work Program |
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This document drafts a proposed response to the Australia ACMA’s consultation “Five-year spectrum outlook 2024–29 and 2024–25 work program, Draft for consultation”.

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Electronic filing April 30, 2023

Re: Consultation “Five-year spectrum outlook 2024–29 and 2024–25 work program, Draft for consultation”

Dear Manager of Spectrum Licensing Policy Section,

IEEE 802 LAN/MAN Standards Committee (LMSC) thanks the Australian Communications and Media Authority (ACMA) for issuing the consultation “Five-year spectrum outlook 2023–28 and 2023–24 work program” and for the opportunity to provide feedback on this draft outlook and work program.

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).

The IEEE Std 802.11ax-2021 standard[[2]](#footnote-2) supports operation in the 2.4 GHz, 5 GHz, and 6 GHz bands, and products based on this standard are seeing significant adoption where regulatory rules permit deployment[[3]](#footnote-3). Based on IEEE Std 802.11ax-2021, the Wi-Fi industry is taking the lead in developing Wi-Fi 6E certification program and specifying a number of complementary coexistence strategies for bands with incumbent users, such as automated frequency coordination (AFC)[[4]](#footnote-4),[[5]](#footnote-5) for the entire 6 GHz band (i.e., 5.925 GHz to 7.125 GHz). Wi-Fi technology, based on the IEEE 802.11 standard, has an estimated 18 billion devices in use world-wide, with over 4 billion devices added annually[[6]](#footnote-6). In addition, the list of Wi-Fi 6E certified products (which are also based on IEEE 802.11 technologies) is growing. In 2022, over 350 million Wi-Fi 6E devices entered the market[[7]](#footnote-7).

A new generation of IEEE 802.11 technologies, currently under development in the IEEE P802.11be amendment[[8]](#footnote-8), will continue to improve performance and enhance spectrum coexistence capacities. To achieve the targeted performance improvements, IEEE P802.11be introduces advanced features including channel bandwidths of up to 320 MHz, multiple resource units to a single station, multi-link operation, enhanced quality of service (QoS), improved Target Wake Time, and improved spectrum management by spectrum puncturing to accommodate coexistence with incumbents more effectively and efficiently. Please note that the P802.11be amendment currently supports carrier frequency operation between 1 GHz and 7.125 GHz with extension to 7.250 GHz under consideration.

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

***Five-year spectrum outlook 2024–29***

***Closing the Gap with Wi-Fi***

IEEE 802 LMSC noted the recognition of Wi-Fi technology in the State of Australia’s Regions 2024[[9]](#footnote-9) report as it is highlighted in Better Connectivity Plan for Regional and Rural Australia and three round grant Regional Connectivity Program[[10]](#footnote-10).

As reported in Mapping the Digital Gap[[11]](#footnote-11), IEEE 802 based Wi-Fi technologies brings unique and almost exclusive improvements to Access and Affordability measures as the suitable complement to full-fibre upgrades in regional Australia.

[High level Recommendation on 6GHz and future allocation for LIPD Class Licence TBD]

***Contribution of Wi-Fi technologies to Net Zero Emission***

According to Ofcom[[12]](#footnote-12) around three-quarters of data connections in Europe were made over Wi-Fi rather than over mobile network (73% urban vs. 71% rural). Another survey conducted by Ofcom[[13]](#footnote-13) shows that up to 80% of mobile traffic is indoor vs 20% outdoor. According to NBN, in Australia, an estimated 90% of data downloads are via home broadband connections and 80% of households already have access to 100-1000 Mbps broadband connection heavily relying on Gigabit fibre[[14]](#footnote-14). Considering the energy efficiency of indoor technologies to provide indoor connectivity, IEEE 802 LMSC believes that a short and mid-term forward looking spectrum policy in Australia to authorize additional LIPD Class Licence for Wi-Fi networks would greatly contribute to the Australian Government commitment to achieving net zero emissions by 2050.

***2024–25 Annual Work Program: 6 GHz (5925–7125 MHz)***

***Authorize LIPD Class Licence operation in the upper 6 GHz (6425-7125MHz) band in Australia***

In January 2024, Wi-Fi Alliance introduced Wi-Fi CERTIFIED 7™ [[15]](#footnote-15) [[16]](#footnote-16) based on IEEE P802.11be. With Wi-Fi 7 products already in the market, Wi-Fi deployments are going through 2nd generation upgrade in the 6GHz band globally.

With introduction of 320MHz channel bandwidth, W-Fi 7 doubles throughputs relative to Wi-Fi 6E and significantly improves latency for Extended Reality (XR), bringing determinism through enablement of Multi-link Operation over multiple bands in 2.4GHz, 5GHz and 6GHz bands, higher efficiency, relative to Wi-Fi 6E, through offering of 4K QAM. In addition, static puncturing improves flexibility in utilizing spectrally efficient wide channel bandwidth, e.g. 160MHz and 320MHz, while protecting incumbent operation in the band.

IEEE 802 LMSC reiterates its recommendation to ACMA Five-year Spectrum Outlook 2023–28 to authorizes LIPD Class Licence operation in the upper 6 GHz (6425-7215MHz) band.

***Initiate authorization proceedings for ‘standard’ power RLAN under supervision of AFC, in Australia***

IEEE 802 LMSC, in its response to Five-year Spectrum Outlook 2023–28, recommended to ACMA to initiate proceedings to authorization of Standard Power (SP) mode under supervision of an Automated Frequency Coordination (AFC) System in the 6GHz band. As ACMA already authorized Very Low Power (VLP) and Low Power Indoor (LPI) modes in the 6 GHz band, IEEE 802 LMSC kindly requests ACMA to initiate the process to authorize SP mode and certification of AFC Devices and AFC Systems.

AFC technology is considered as the state-of-the-art mitigation technique to protectincumbent services for outdoor and indoor operation at standard power level. SP mode enables Wi-Fi operation at higher power than VLP mode outdoor and higher power than LPI mode indoor to optimally utilize the 6 GHz spectrum. IEEE 802 LMSC believes that an AFC System, as an effective automated spectrum sharing technology, is critical in enabling essential Wi-Fi technology applications and use cases not only for outdoor operation but also indoor operation at standard power level.

Authorizing SP mode at a maximum EIRP of 36 dBm for access points and 30 dBm for client devices for indoor and outdoor operation enables many key applications including metaverse, multigigabit per second outdoor coverage (e.g., parks, stadiums), multigigabit point-to-multipoint connectivity, low-latency applications including industrial IoT and Voice over IP (Wi-Fi calling). SP operation also improves indoor Wi-Fi performance to match coverage performance of the 5 GHz band.

The USA and Canada have already authorized SP mode and started certification of AFC systems. The certification process for AFC system and device is based on the industry developed recommended compliance specification[[17]](#footnote-17),[[18]](#footnote-18),[[19]](#footnote-19). On 23 February 2024, Federal Communications Commission (FCC) announced[[20]](#footnote-20) approval of seven AFC systems for commercial operation. Innovation, Science and Economic Development Canada (ISED) also approved an AFC System for operation in Canada. A number of AFC devices and Fixed Client devices are already certified too. Many other countries including Japan, Saudi Arabia, South Korea, and Brazil are studying enablement of SP mode.

As AFC Devices are being certified and introduced in the market, Wi-Fi industry expects that the first significant deployments of SP mode to be indoor through upgrading of LPI access point to indoor SP access points i.e. SP/LPI converged access points. These converged access points are targeting simultaneous support of LPI-only clients, SP clients and dual LPI/SP clients in the same indoor network to improve overall system efficiency and spectrum utilization while protecting incumbent services.

In anticipation of deployment of indoor SP access points and to improve interoperability with various client device types, in Jan 2024, IEEE 802.11 upgraded its set of supported regulatory capability signaling in IEEE P802.11 REVme to distinguish indoor SP access point amongst other improvements and expansion in the regulatory signaling.

As indoor SP access points are operating indoor, they should be entitled to an additional Building Entry Loss (BEL) credit to be considered in AFC System calculation of spectrum availability and maximum permissible transmit power. US FCC allows indoor SP operation and also considers BEL credit for such operation using waiver request. IEEE 802 LMSC recommends to ACMA to consider maximum flexibility including those related to indoor SP mode in its future rulings for the 6GHz band.

In the consultation paper, ACMA refers to AFC as a potential mitigation for impact on incumbent services for outdoor operation along with VLP mode but at higher power level. IEEE 802 LMSC believes that an AFC System, as an effective automated sharing technology, is critical in enabling essential Wi-Fi technology applications and use cases not only for outdoor operation but also indoor operation at standard power level.

IEEE 802 LMSC noted presence of different types of incumbent services, including Point-to-Point, Satellite Receive, Fixed Earth and Radiodetermination, in ACMA Register of Radiocommunications Licenses [[21]](#footnote-21) and believe that with proper consideration of protection criteria for the incumbent services, AFC Systems can properly implement the frequency coordination and maximum allowable power settings for AFC Devices. As an example, in US, AFC Systems determine frequency and channel availability and maximum permissible power levels for AFC Devices considering incumbent Fixed Services and Radio Astronomy Services as well as neighboring countries incumbent services at the borders.

**Conclusion**

IEEE 802 LMSC thanks the ACMA for the opportunity to provide this submission and kindly requests ACMA to consider our responses in its future decisions regarding the LIPD Class Licence of upper 6 GHz band for RLAN use and authorization of Standard Power mode under AFC supervision.

Respectfully submitted

By: /ss/.

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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)
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 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. [↑](#footnote-ref-2)
3. Wi-Fi Alliance: Wi-Fi 6E momentum underscores need for entire 6 GHz band, November 2022. [Available online](https://www.wi-fi.org/news-events/newsroom/wi-fi-6e-momentum-underscores-need-for-entire-6-ghz-band) [accessed: 26 March 2024]. [↑](#footnote-ref-3)
4. Dynamic frequency coalition: Automated frequency coordination - an established tool for modern spectrum management, March 2019. [Available online](https://dynamicspectrumalliance.org/wp-content/uploads/2019/03/DSA_DB-Report_Final_03122019.pdf) [accessed: 24 March 2024]. [↑](#footnote-ref-4)
5. Intel: Spectrum sharing using automated frequency coordination. [Available online](https://www.intel.com/content/www/us/en/wireless-network/spectrum-using-automated-frequency-coordination.html#:~:text=Introducing%204th%20Gen%20Intel%C2%AE%20Xeon%C2%AE%20Scalable%20Processors%20Spectrum,and%20compliance%20considerations%20in%20the%206%20GHz%20band.) [accessed: 26 March 2024]. [↑](#footnote-ref-5)
6. Wi-Fi Alliance: Value of Wi-Fi. [Available online](https://www.wi-fi.org/discover-wi-fi/value-wi-fi) [accessed: 26 March 2024]. [↑](#footnote-ref-6)
7. Wi-Fi Alliance: Wi-Fi 6E certified products. [Available online](https://www.wi-fi.org/product-finder-results?keywords=wi-fi+6E&op=Search&form_build_id=form-5F5bhfMUfZOoa0Xo4k9oQD8nsj0GQLww76EPepJC5QQ&form_id=wifi_cert_api_simple_search_form) [accessed: 26 March 2024]. [↑](#footnote-ref-7)
8. “IEEE Draft 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: Enhancements for Extremely High Throughput (EHT),” in IEEE P802.11be/D5.1, April 2024 [↑](#footnote-ref-8)
9. <https://www.infrastructure.gov.au/sites/default/files/documents/state-of-australias-regions-2024.pdf> [↑](#footnote-ref-9)
10. <https://www.infrastructure.gov.au/media-communications-arts/internet/regional-connectivity-program-including-mobile-black-spot-opportunities> [↑](#footnote-ref-10)
11. <https://apo.org.au/sites/default/files/resource-files/2023-09/apo-nid324397.pdf> [↑](#footnote-ref-11)
12. <https://www.ofcom.org.uk/__data/assets/pdf_file/0015/224070/mobile-matters-2021-report.pdf> [↑](#footnote-ref-12)
13. <https://www.ofcom.org.uk/__data/assets/pdf_file/0028/248770/update-on-upper-6hz-band.pdf> [↑](#footnote-ref-13)
14. <https://www.nbnco.com.au/content/dam/nbn/documents/about-nbn/reports/reports-and-publications/accenture-2024-economic-and-social-impact-methodology-report.pdf.coredownload.pdf> [↑](#footnote-ref-14)
15. <https://www.wi-fi.org/news-events/newsroom/wi-fi-alliance-introduces-wi-fi-certified-7> [↑](#footnote-ref-15)
16. <https://www.wi-fi.org/beacon/chris-hinsz/wi-fi-7-market-momentum-wi-fi-7-is-here-is-your-network-ready> [↑](#footnote-ref-16)
17. Wi-Fi Alliance: AFC Specification and Test Plans. [Available online](https://www.wi-fi.org/file/afc-specification-and-test-plans) [accessed: 28 March 2024]. [↑](#footnote-ref-17)
18. Wireless Innovation Forum: Specifications. [Available online](https://6ghz.wirelessinnovation.org/baseline-standards) [accessed: 28 March 2024]. [↑](#footnote-ref-18)
19. Wi-Fi Alliance: 6 GHz AFC resources. [Available online](https://www.wi-fi.org/discover-wi-fi/6-ghz-afc-resources) [accessed: 28 March 2024]. [↑](#footnote-ref-19)
20. Federal Communications Commission: OET announces approval of seven 6 GHz band automated frequency coordination systems for commercial operation and seeks comment on C3 Spectra's proposed AFC system. [Available online](https://docs.fcc.gov/public/attachments/DA-24-166A1.pdf) [accessed: 28 March 2024]. [↑](#footnote-ref-20)
21. <https://web.acma.gov.au/rrl/> [↑](#footnote-ref-21)