

1
2

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

Proposed Response to ACMA Draft Five-year Spectrum Outlook 2024–29 and 2024–25 Work Program				
Date: 2024-05-02				
Author(s):				
Name	Company	Address	Phone	email
Hassan Yaghoobi	Intel			hassan.yaghoobi@intel.com
Edward Au	Huawei			edward.ks.au@gmail.com
Gaurav Patwardhan	Hewlett Packard Enterprise			gauravpatwardhan1@gmail.com

3
4
5

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”.

Notice: This document has been prepared to assist IEEE 802.18. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) reserve(s) the right to add, amend or withdraw material contained herein.

6 Electronic filing May 6, 2024
7

8 Re: Consultation “Five-year spectrum outlook 2024–29 and 2024–25 work program, Draft for
9 consultation”
10

11 Dear Manager of Spectrum Licensing Policy Section,
12

13 IEEE 802 LAN/MAN Standards Committee (LMSC) thanks the Australian Communications and
14 Media Authority (ACMA) for issuing the consultation “Five-year spectrum outlook 2024–29 and
15 2024–25 work program” and for the opportunity to provide feedback on this draft outlook and
16 work program.
17

18 IEEE 802 LMSC is a leading consensus-based industry standards body, producing standards for
19 wireless networking devices, including wireless local area networks (“WLANs”), wireless
20 specialty networks (“WSNs”), wireless metropolitan area networks (“Wireless MANs”), and
21 wireless regional area networks (“WRANs”). We also produce standards for wired Ethernet
22 networks, and technologies produced by implementers of our standards are critical for all
23 networked applications today.
24

25 IEEE 802 LMSC is a committee of the IEEE Standards Association and Technical Activities, two
26 of the Major Organizational Units of the Institute of Electrical and Electronics Engineers (IEEE).
27 IEEE has about 400,000 members in over 160 countries. IEEE’s core purpose is to foster
28 technological innovation and excellence for the benefit of humanity. In submitting this document,
29 IEEE 802 LMSC acknowledges and respects that other components of IEEE Organizational Units
30 may have perspectives that differ from, or compete with, those of IEEE 802 LMSC. Therefore,
31 this submission should not be construed as representing the views of IEEE as a whole¹.
32

33 Please find below the responses of IEEE 802 LMSC to this consultation.
34

35 **A. Five-year spectrum outlook 2024–29**

36 *Wi-Fi provides significant societal and economic value to Australia*

37
38 IEEE 802 LMSC noted the recognition of Wi-Fi technology in the 2024 State of Australia’s
39 Regions report². As reported in Mapping the Digital Gap: 2023 Outcome Report³, IEEE 802.11
40 based Wi-Fi technologies brings unique and almost exclusive improvements to access and
41 affordability measures as the suitable complement to full-fibre upgrades in regional Australia.
42
43

44 Significant global deployment of Wi-Fi, which are based on IEEE 802.11 technologies, **are-is**
45 evident **by-from** the data **that** there are currently an estimated 19.5 billion devices in use in 2023
46 and there are **-over** 473 million Wi-Fi CERTIFIED 6E devices **were expected to entered** the market

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.

² See page 44 of the report, <https://www.infrastructure.gov.au/sites/default/files/documents/state-of-australias-regions-2024.pdf> [accessed: 18 April 2024] (“As part of the Better Connectivity Plan, grants under Round 3 of the Regional Connectivity Program and Round 7 of the Mobile Black Spot Program were announced in December 2023, and will provide \$170.2 million for 136 projects. These aim to narrow the digital divide in rural and regional communities, providing investment to improve mobile coverage issues, fund public Wi-Fi, and deliver fibre upgrades.”)

³ See page 41 of the report, <https://apo.org.au/sites/default/files/resource-files/2023-09/apo-nid324397.pdf> [accessed: 18 April 2024] (“The Importance of Wi-Fi in Remote First Nationals Communities”).

47 by the end of 2023⁴. In addition, significant economic value is provided by Wi-Fi to the Australia's
48 economies: the economic value reached USD \$34.7 billion in 2021, and is expected to increase by
49 20% to USD \$42 billion by 2025⁵.

50

51 *Wi-Fi also contributes significant sustainability value to Australia*

52

53 Australia has been investing heavily on its full-fibre NBN upgrades in regional Australia. The
54 NBN-enabled internet not only provides positive economical outcomes to the country, but also
55 brings a positive environmental outcome⁶.

56

57 Fibre-enabled Wi-Fi networks contributes to environmental sustainability⁷ since fibre optics is
58 energy efficient for transmitting data over long distances and IEEE 802.11 based Wi-Fi
59 technologies already and continue to provide a rich toolbox of energy efficient features. For
60 example, the IEEE Std 802.11ax-2021 standard⁸ (also known as Wi-Fi 6) introduces a new feature,
61 namely broadcast Target Wake Time (TWT), as an energy-efficient scheduling mechanism for
62 transmissions between an AP and a wireless client. It has the advantage of allowing larger
63 throughput while lowering latency since both devices are not only be aware of when transmissions
64 will be made, but also enable energy efficiency since the devices can be idle or quiet when
65 transmissions do not need to be made. Wi-Fi 7 specification built on IEEE P802.11be project⁹
66 specifies multi-link operation (MLO), which defines an energy-efficient way for an AP to
67 coordinate traffic management over several bands with a multi-link device (MLD). If such an MLD
68 is capable of simultaneously sending traffic on links operating at 2.4 GHz, 5 GHz and 6 GHz
69 bands, but the current load on the network is such that only one or two of these links are necessary
70 to provide a robust service level, the other one or two links can be quieted and/or can be in power
71 save mode dynamically. The links can be un-quieted once the load on the network increases, with
72 the result that the radios consume only the amount of energy they need for a given traffic load.

73

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

75

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

77

78 As recognized in the paper “Proposed updates to the LIPD Class Licence for 6 GHz RLANs
79 Outcomes paper”¹⁰, there is a strong argument for the introduction of arrangements for RLANs
80 across the entire 6 GHz band.

⁴ See Wi-Fi Alliance: Wi-Fi® by the numbers: Technology momentum in 2023, <https://www.wi-fi.org/beam/the-beacon/wi-fi-by-the-numbers-technology-momentum-in-2023> [accessed: 18 April 2024].

⁵ See Wi-Fi Alliance: Global economic value of Wi-Fi® to reach \$5 trillion in 2025, https://www.wi-fi.org/system/files/Economic_Value_of_Wi-Fi_Highlights_202305.pdf [accessed: 18 April 2024].

⁶ See page 53 of “The economic and social impact of investment in the nbn network Methodology Report January 2024”, <https://www.nbnco.com.au/content/dam/nbn/documents/about-nbn/reports/reports-and-publications/accnture-2024-economic-and-social-impact-methodology-report.pdf.coredownload.pdf> [accessed: 6 April 2024] (“How nbn-enabled internet impacts environmental outcomes”)

⁷ See pages 35 and 36 of the WIK Consult: Sustainability Benefits of 6 GHz Spectrum Policy, Study for Wi-Fi Alliance, July 2023, <https://www.wi-fi.org/system/files/SustainabilityBenefitsof6GHzSpectrumPolicy202307.pdf> [accessed: 18 April 2024]

⁸ See “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.

⁹ See “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/D5.0, November 2023, vol., no., pp.1-1045, 3 Jan. 2024.

¹⁰ See page 6 of “Proposed updates to the LIPD Class Licence for 6 GHz RLANs Outcomes paper” https://www.acma.gov.au/sites/default/files/2022-03/Outcomes%20Paper_Proposed%20updates%20to%20the%20LIPD%20Class%20Licence%20for%206%20GHz%20RLANs.pdf [accessed: 18 April 2024]. (“We see strong arguments for the introduction of arrangements for RLANs across the entire 6 GHz band, and do not believe that

81
 82 In January 2024, Wi-Fi Alliance introduced¹¹ Wi-Fi CERTIFIED 7™ based on IEEE P802.11be
 83 technology¹². With Wi-Fi 7 products already in the market, Wi-Fi deployments are going through
 84 a second generation upgrade in the entire 6 GHz band globally¹³ and there are no good reasons to
 85 defer a decision on the upper 6 GHz band. IEEE 802 LMSC reiterates its recommendation made
 86 in 2023¹⁴ to authorize LIPD Class Licence operation in the upper 6 GHz (6425 MHz – 7125 MHz)
 87 band.

88 89 *Initiate authorization proceedings for ‘standard’ power RLAN under supervision of AFC*

90
 91 IEEE 802 LMSC, in its response to the former consultation “Five-year Spectrum Outlook 2023–
 92 28”, recommended to ACMA to initiate proceedings to ~~authorization of~~ authorize Standard Power
 93 (SP) mode under supervision of an Automated Frequency Coordination (AFC) System in the 6
 94 GHz band¹⁵. SP mode enables Wi-Fi operation at higher power than both the Very Low Power
 95 (VLP) and Low Power Indoor (LPI) modes to optimally utilize the 6 GHz spectrum. As ACMA
 96 already authorized VLP and LPI modes in the 6 GHz band, IEEE 802 LMSC kindly requests
 97 ACMA to initiate the process to authorize SP mode and certification of AFC Devices (SP access
 98 points or fixed clients) and AFC Systems.

99
 100 AFC technology is considered as the state-of-the-art mitigation technique to protect incumbent
 101 services for outdoor and indoor operation at SP level. In the consultation paper, ACMA refers to
 102 AFC as a potential mitigation technique to protect incumbent services for outdoor operation along
 103 with VLP mode but at higher power level¹⁶. IEEE 802 LMSC believes that an AFC System, as an
 104 effective automated spectrum sharing technology, is critical in enabling essential Wi-Fi technology
 105 applications and use cases not only for outdoor operation but also indoor operation at SP level.

106
 107 Authorizing SP mode at a maximum EIRP of 36 dBm for access points and 30 dBm for client
 108 devices for indoor and outdoor operation enables many key applications including metaverse,
 109 multigigabit per second outdoor coverage (e.g., parks, stadiums), multi-gigabit point-to-multipoint
 110 connectivity, and low-latency applications including industrial IoT and Voice over IP (Wi-Fi
 111 calling). SP operation also improves indoor Wi-Fi performance to match coverage performance of
 112 the 5 GHz band.

waiting for the outcomes of WRC-23 agenda item 1.2 is itself a valid reason to defer a decision on the upper 6 GHz band (especially given that it is only considering 100 MHz from the band in our region.”)

¹¹ See Wi-Fi Alliance: Wi-Fi Alliance® introduces Wi-Fi CERTIFIED 7™, <https://www.wi-fi.org/news-events/newsroom/wi-fi-alliance-introduces-wi-fi-certified-7> [accessed: 13 April 2024].

¹² See “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/D5.0, November 2023, vol., no., pp.1-1045, 3 Jan. 2024. With introduction of 320 MHz channel bandwidth, Wi-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 (MLO) over multiple bands in 2.4 GHz, 5 GHz, and 6 GHz bands. Wi-Fi 7 also provides higher efficiency, relative to Wi-Fi 6E, through offering of 4096 QAM. In addition, spectrum puncturing improves flexibility in utilizing spectrally efficient wide channel bandwidth, e.g., 160 MHz and 320 MHz, while protecting incumbent operation in the band.

¹³ See Wi-Fi Alliance: Wi-Fi 7 market momentum: Wi-Fi 7 is here – is your network ready?, <https://www.wi-fi.org/beacon/chris-hinsz/wi-fi-7-market-momentum-wi-fi-7-is-here-is-your-network-ready> [accessed: 18 April 2024].

¹⁴ See pages 2 and 3 of the submission “Public - IEEE 802 LAN-MAN Standards Committee_Redacted.pdf”, <https://www.acma.gov.au/sites/default/files/2023-10/Submissions%20-%20IFC%2028-2023.zip> [accessed: 18 April 2024]. (“Authorize LIPD Class Licence operation in the entire 6 GHz band is beneficial to Australia.”)

¹⁵ See page 3 of the submission “Public - IEEE 802 LAN-MAN Standards Committee_Redacted.pdf”, <https://www.acma.gov.au/sites/default/files/2023-10/Submissions%20-%20IFC%2028-2023.zip> [accessed: 18 April 2024]. (“It is the right time to actively pursue Dynamic Spectrum Access arrangements, specifically AFC, in Australia”)

¹⁶ See page 62 of the consultation paper.

114 The USA and Canada have already authorized SP mode and started certification of AFC systems.
115 The certification process for AFC systems and devices is based on the industry developed
116 recommended compliance specifications^{17,18}. On 21 August 2023, Innovation, Science and
117 Economic Development Canada (ISED) approved¹⁹ an AFC System for operation in Canada. On
118 23 February 2024, Federal Communications Commission (FCC) announced²⁰ approval of seven
119 AFC systems for commercial operation in the USA. A number of AFC devices and Fixed Client
120 devices are already certified too. Many other countries, including Japan, Saudi Arabia, South
121 Korea, and Brazil, are also studying enablement of SP mode.

122

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

129

130 In anticipation of deployment of indoor SP access points and to improve interoperability with
131 various client device types, IEEE 802.11 recently updated its sets of supported regulatory
132 capability signaling²¹ to distinguish indoor SP access points amongst other improvements and
133 expansion in the regulatory signaling.

134

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

141

142 IEEE 802 LMSC noted the presence of different types of incumbent services, including Point-to-
143 Point, Satellite Receive, Fixed Earth, and Radiodetermination, in Australia Register of
144 Radiocommunications Licences database²². With proper consideration of protection criteria for the
145 incumbent services, we believe that AFC Systems can properly implement the frequency
146 coordination and maximum allowable power settings for AFC Devices. As an example, in US,
147 AFC Systems determine frequency and channel availability and maximum permissible power
148 levels for AFC Devices considering incumbent Fixed Services and Radio Astronomy Services as
149 well as neighboring countries incumbent services at the borders.

150

151 **Conclusion**

152

¹⁷ See: Wi-Fi Alliance: 6 GHz AFC resources, Specifications, test plans, and training modules to enable implementation of the 6 GHz standard power devices under AFC system control. <https://www.wi-fi.org/discover-wi-fi/6-ghz-afc-resources> [accessed: 18 April 2024].

¹⁸ See Wireless Innovation Forum: Specifications, <https://6ghz.wirelessinnovation.org/baseline-standards> [accessed: 18 April 2024].

¹⁹ See Innovation, Science and Economic Development Canada: List of designated Dynamic Spectrum Access System Administrators (DSASAs), Automated Frequency Coordination System Administrators (AFCSAs), issue 1 of DBS-06, <https://ised-isde.canada.ca/site/certification-engineering-bureau/en/node/116> [accessed: 18 April 2024].

²⁰ See 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, <https://docs.fcc.gov/public/attachments/DA-24-166A1.pdf> [accessed: 18 April 2024].

²¹ See "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/D5.0, February 2024, vol., no., pp.1-6203, 18 March 2024.

²² See ACMA: Register of Radiocommunications Licences, <https://web.acma.gov.au/rl/> [accessed: 18 April 2024].

153 IEEE 802 LMSC thanks ACMA for the opportunity to provide this submission and respectfully
154 requests to consider our responses to:

- 155 • authorize LIPD Class Licence operation in the upper 6 GHz (6425 MHz – 7125MHz) band
- 156 given Wi-Fi contribute significant societal, economic, and sustainability value to Australia;
- 157 • initiate authorization proceedings for standard power RLAN under supervision of AFC,
- 158 and authorize standard power mode at a maximum EIRP of 36 dBm for access points and
- 159 30 dBm for client devices for indoor and outdoor operation

160
161 Respectfully submitted

162
163 By: /ss/.
164 James Gilb
165 IEEE 802 LAN/MAN Standards Committee Chairman
166 em: gilb_ieee@tuta.com