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VIA ELECTRONIC FILING

The Manager
Spectrum Planning Section
Australian Communications and Media Authority
PO Box 78
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RE: New Arrangements for Low Interference Potential Devices - Consultation Number 35/2022

Dear Colleagues,

Wi-Fi Alliance commends the Australian Communications and Media Authority (the "ACMA") on its ongoing work in the area of spectrum management. The Consultation on Draft Radiocommunications (Low Interference Potential Devices) Class Licence Variation 2022 (No. 2) ("*Consultation*")[1/] remains a critical tool to inform the public of the areas in which the ACMA expects to focus and to solicit feedback that will provide the ACMA with the information necessary to proceed. The Low Interference Potential Devices (LIPD) such as Wi-Fi play an essential role in delivering wireless connectivity to consumers and enterprises in Australia. In considering the LIPD regulatory framework, Wi-Fi Alliance urges the ACMA to ensure future Wi-Fi functionality.

Introduction

Wi-Fi Alliance is a global, non-profit industry association of over 900 leading companies from dozens of countries devoted to seamless interoperability. With technology development, market building, and regulatory programs, Wi-Fi Alliance has enabled widespread adoption of Wi-Fi worldwide, certifying thousands of Wi-Fi products each year.

Radio Local Area Network systems (RLANs) using Wi-Fi standards have become increasingly important in connecting people and devices. Hundreds of millions of people rely on Wi-Fi to connect billions of devices every day, and studies show this is increasing rapidly.[2/] Devices using spectrum that supports Wi-Fi are now

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1/ ACMA proposed New Arrangements for Low Interference Potential Devices - Consultation Number 35/2022 available at https://www.acma.gov.au/consultations/2022-10/new-arrangements-low-interference-potential-devices-consultation-352022

2/ *See Wi-Fi Celebrates 20 Years with More Than 20 Billion Anticipated Device Shipments over the Next Six Years*, ABI Research (Jun. 13, 2019) available at: https://www.abiresearch.com/press/wi-fi-celebrates-20-years-more-20-billion-anticipated-device-shipments-over-next-six-years/

the primary means by which Australia connects to the Internet.[3/] Also Wi-Fi technology is essential for wireless networks traffic offload.[4/] Growing Wi-Fi demand and devices requires spectrum access. In this regard, Wi-Fi Alliance commends the ACMA for the recent decision that partially mitigated Wi-Fi spectrum shortfall by allowing LIPD access to the 5925-6425 MHz band,[5] but without access to the remaining portion of the 6 GHz (6425-7125 MHz band), the future of Wi-Fi functionality in Australia remains uncertain.

Wi-Fi Alliance Responses to the *Consultation Paper* Questions

RLAN radiocommunications transmitters in the 5150–5250 MHz band

Question 1: Should a separate new item be introduced to facilitate higher-power RLAN transmitters in 5150–5250 MHz, or should existing item 61 be modified? Question 2: Which of the 2 simple emission masks outlined in ITU Resolution 229 (Rev. WRC-19) should be implemented in Australia for 1 W RLAN transmitters in the 5150–5250 MHz band? Question 3: Subject to which emission mask is implemented (see Question 2), would a device registration system (or similar – see Canadian approach above) be needed for outdoor deployments exceeding 200 mW (23 dBm) transmission power? Note that such a regime would require further regulatory development. Accordingly, a decision to implement such a regime may delay access under those arrangements.

Response: Wi-Fi technology has proven to be a tremendous success in providing affordable and ubiquitous broadband connectivity in Australia and around the world. Over the last two decades, Wi-Fi evolved to become an integral component of the Australia's telecommunications infrastructure. The need for outdoor Wi-Fi deployments is significant and includes:

- Remote and underserved areas,
- Smart cities and communities;[6]
- Mobile Data – volume of mobile data traffic offloaded to Wi-Fi significantly exceeds traffic carried (remaining) on cellular networks;[7]
- Locations which are increasingly expected to offer ubiquitous Wi-Fi access including outdoor areas such as sports arenas, municipal/private networks, parks, and other high traffic areas as well as indoor areas such as shopping malls, airports, hotels, restaurants, office buildings and schools;

3/ CISCO, *VNI Complete Forecast Highlights Tool*, Asia Pacific, Australia, Wired Wi-Fi and Mobile Growth (2016), http://www.cisco.com/c/m/en_us/solutions/service-provider/vni-forecast-highlights.html (select "Australia" from the "Asia Pacific" drop-down menu and expand "Fixed/Wi-Fi." ("CISCO VNI")

4/ Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2017–2022**,** White Paper at page 18, available at https://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/white-paper-c11-738429.pdf

5 Radiocommunications (Low Interference Potential Devices) Class Licence Variation 2022 (No. 1), available at: https://www.legislation.gov.au/Details/F2022L00249/Explanatory%20Statement/Text

6 https://www.itu.int/en/ITU-T/ssc/Pages/default.aspx

7 https://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/vni-hyperconnectivity-wp.html

- Sensors and connectivity for public transport, automotive, utilities, etc. rely on Wi-Fi connectivity;
- Internet of Things (IoT) technologies entail both indoor and outdoor deployments;
- Connected wearables and other consumer applications rely on Wi-Fi to support various use cases.

Access to the 5150-5250 MHz band offers unique advantages in addressing the growing need for outdoor Wi-Fi deployments. Other spectrum in the 5 GHz range harmonized for RLANs on a worldwide basis is subject to the dynamic frequency selection (DFS) constraint. The DFS constraint, albeit necessary, reduces spectrum access and raises equipment cost and complexity for RLAN implementations.

In light of the above, Wi-Fi Alliance respectfully provides the following responses:

- (Question 1) A new emission mask in item (61A) would not impact ongoing operations while facilitating higher-power RLAN transmissions in the 5150–5250 MHz frequency band.
- (Question 2) Many countries have adopted the RLAN transmitter limit at 125 mW (21 dBm) EIRP above 30 degrees of elevation for protection of the Mobile Satellite Service feeder-links. Harmonizing Australia's regulations with this limit would facilitate equipment commonality and operational compatibility.
- (Question 3) Wi-Fi Alliance shares the ACMA's concern that a regulatory regime requiring RLAN device registration system would delay access and the associated benefits. In this regard, Wi-Fi Alliance wishes to emphasize the following points:
    - Resolution 229 does not mandate RLAN coordination or registration. Hence, RLAN device registration is not necessary for conformance with international regulations.
    - Following WRC-19 decision, with outdoor RLAN deployments underway in multiple countries, there are no indications that the revised limits have resulted in increased RLAN interference to the Mobile Satellite Networks (MSS) feeder uplink operations.
    - At WRC-19, several administrations declared their intention to "*allow operation of stations in the mobile service in the band 5 150-5 250 MHz subject to other conditions than those contained in that Resolution 229, including higher power levels operate in the 5150-5250 MHz*."[8/] In fact, Canada joined this declaration because it allows outdoor RLAN operations at up to 4W e.i.r.p. (i.e., maximum conducted power at 1W and maximum antenna gain at 6 dBi).[9] With that, it is not clear why there is a need to apply the "Canadian approach" to RLANs at the ACMA's proposed 1W e.i.r.p. limit.

Wi-Fi Alliance is of the view that a burdensome device registration system would not effectively manage outdoor RLAN deployments in the 5150-5250 MHz band. Instead, such a registration system will unnecessarily constrain and delay a wide range of innovative outdoor RLANs use cases. One of the reasons for Wi-Fi's success is the "light-touch" regulatory approach. Except for necessary technical specifications and equipment approval processes, the ACMA has wisely declined to impose regulations that would impede innovation. As a result, use of Wi-Fi has changed the way Australians work, receive healthcare, learn, and

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[8/] *See* World Radiocommunication Conference 2019 Final Acts, page 88, available at https://www.itu.int/dms_pub/itu-r/opb/act/R-ACT-WRC.14-2019-PDF-E.pdf

[9] See the Innovation, Science and Economic Development Canada website for more information, Table 1.

consume entertainment media.[10/] Wi-Fi Alliance respectfully asks the ACMA to maintain its approach to regulation of the LIPDs.

[10/] *See Wi-Fi is Essential for Remote Working, Learning, and Playing*, INTEL, https://www.intel.com/content/www/us/en/products/docs/wireless/essential-for-remote-working-learning-playing.html ("Wi-Fi is now the primary method for the remote workforce, students, and families to connect"); *see also Wi-Fi CERTIFIED 6™ in Healthcare*, WI-FI ALLIANCE (last visited Oct. 2, 2021), https://www.wi-fi.org/download.php?file=/sites/default/files/private/Wi-Fi_6_in_Healthcare.pdf (noting several healthcare use cases for Wi-Fi such as patient monitoring, scheduling medicine delivery, imaging, and telemedicine); *see also Wi-Fi® in Education*, WI-FI ALLIANCE (last visited Oct. 2, 2021), https://www.wi-fi.org/download.php?file=/sites/default/files/private/Wi-Fi_in_Education_0.pdf (showing that Wi-Fi is changing education and allowing for new classroom innovations).

Radiocommunications receivers communicating with satellites in the 915–928 MHz and 2400–2483.5 MHz bands

Question 11:

Should we consider the introduction of arrangements to facilitate systems that utilise space-based transmitters that operate in the bands 915–928 MHz and 2400–2483.5 MHz at power levels higher than currently permitted under the LIPD class licence? If so, what matters should be considered in the regulatory framework? In particular, comment is sought on:

- 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.
- 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).
- 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?
- 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?
- 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.)

Response: Wi-Fi Alliance respectfully asks the ACMA to note that the 915-928 MHz and 2.4 GHz frequency bands are extensively used by a number of LIPD class licensed technologies. Specifically:

- the 915-928 MHz frequency band deployments include Wi-Fi HaLow (IEEE 802.11ah) as well as Wi-SUN (IEEE 802.15.4g), LoRaWAN and RFID;
- the 2.4 GHz frequency band deployments include Wi-Fi 4 and Wi-Fi 6 (IEEE 802.11n/ax) as well as Bluetooth, Zigbee and Thread (IEEE 802.15.4).

Most of these LIPD class licensed technologies share spectrum using an energy detect contention-based protocol based on a "listen-before talk" spectrum access scheme. Wi-Fi, for example, implements the Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA) protocol, which ensures equitable spectrum access and protects other operations in a shared frequency band. With the CSMA/CA implementation, before initiating any packet delivery, a Wi-Fi device listens to the wireless medium and, only if the medium is idle, the station may transmit; otherwise, the device must wait until the active transmission is complete before transmitting.

Based on the information provided in the *Consultation*, it is not evident how the proposed space-based transmissions, particularly "*at power levels higher than currently permitted under the LIPD class licence*", will

coexist with Wi-Fi's CSMA/CA. Specifically, Wi-Fi Alliance is concerned that space-based transmissions may prevent LIPDs that rely on energy detect contention-based protocols from accessing spectrum over a wide area within a satellite signal's footprint. In considering regulations for the satellite-based transmissions, Wi-Fi Alliance asks the ACMA to take in to account the energy detect levels of Wi-Fi and other LIPD class licensed technologies:

- Wi-Fi devices (IEEE Std 802.11ah) in the 915-928 MHz band energy detect level: -75 dBm
- IEEE 802.15.4g devices in the 915-928 MHz band energy detect level:
  - 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]
- Wi-Fi devices (IEEE Std 802.11n/ax) in the 2.4 GHz devices energy detect level: -62 dBm

Importantly, most commercially available LIPDs implement energy detect levels that are lower than levels prescribed by the IEEE standards. Wi-Fi Alliance, therefore, recommends that a regulatory framework for space-based transmitters in the 915–928 MHz and 2400–2483.5 MHz bands, at a minimum, must include a stringent power-flux density regulatory limit regime (e.g., mask) that ensures coexistence with terrestrial based technologies.

Frequency hopping transmitters in the 5925–6425 MHz band

Reference: Draft LIPD Variation 2022 (No. 2), Schedule 1, 57A

Concerning the above referenced draft variation, Wi-Fi Alliance respectfully asks the ACMA to establish appropriate spectrum access mechanisms to ensure coexistence and fair spectrum sharing among different LIPD technologies in the 5925-6425 MHz band.

Definition of "indoor"

Reference: Draft LIPD Variation 2022 (No. 2), Schedule 1, Subsection 3A(1)

Wi-Fi Alliance agrees that structural attenuation of the LIPD signals is a key factor in minimizing the potential for harmful interference. Wi-Fi Alliance however notes that many facilities that provide structural shielding of the LIPD's signals may not comport with the proposed definition. For example, indoor locations such as warehouses, retail, sports stadium, hospitality spaces or temporary (e.g., emergency) installations may not meet all aspects of the proposed definition. Similarly, LIPD installations below ground (e.g., mine shafts or basements) would be in contravention of the proposed definition as "*a space on or above land*". Also, Wi-Fi Alliance asks the ACMA to consider that under the proposed definition, extensive LIPD use on maritime vessels such as cruise liners would be precluded.

Considering above, Wi-Fi Alliance recommends that in lieu of proposed definition for "indoor" the ACMA should adopt the following regulatory measures to effectively restrict the LIPDs to operations at indoor locations:

(1) Require that indoor-only LIPDs cannot be weather resistant.
(2) Require indoor-only LIPDs to have integrated antennas and prohibit the capability of connecting other antennas to the devices, which will prevent substituting higher gain directional antennas and make the devices less capable or suitable for outdoor use.
(3) Prohibit indoor-only LIPDs from operating on battery power.

Conclusion

Policymakers worldwide recognize that wireless connectivity is increasingly dependent on Wi-Fi. Through innovation in license-exempt spectrum, Wi-Fi technology has enabled anyone, anytime, and anyplace to set up an affordable network that simply works — and this utility is benefiting many Australians while delivering billions of dollars of economic value. Indeed, the economic value generated by Wi-Fi connectivity in Australia is estimated to exceed AU$44 billion in 2021 and AU$53 billion by 2025.[11/]

Wi-Fi Alliance appreciates the opportunity to contribute to ACMA's efforts.

Respectfully submitted,

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11/ *Value of Wi-Fi*, WI-FI ALLIANCE