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May 12, 2022

VIA ELECTRONIC FILING AT Online submissions

The Manager
Spectrum Management Outlook and Strategy Section
Spectrum Allocations Branch
Australian Communications and Media Authority
PO Box Q500
Queen Victoria Building NSW 1230

Re: **FIVE YEAR SPECTRUM OUTLOOK 2023-28 AND 2023-24 WORK PROGRAM– DRAFT FOR CONSULTATION**

Dear Sir or Madam,

Wi-Fi Alliance commends the Australian Communications and Media Authority (the "ACMA") on its ongoing work in the area of spectrum management. The Five Year Spectrum Outlook for 2023-2028 and 2023-24 Work Program ("*Spectrum Outlook*")[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. Wi-Fi Alliance applauds the ACMA for recognizing essential role Wi-Fi devices play in delivering wireless connectivity to consumers and enterprises in Australia and updating the Low Interference Potential Devices (LIPD) class licence to add the 5925-6425 MHz band for Wi-Fi access.[2/] But Wi-Fi Alliance urges the ACMA to note that future Wi-Fi functionality depends on access to the 5925–7125 MHz band ("6 GHz band").

The *Spectrum Outlook* accurately notes that Wi-Fi has become an integral part of everyday modern life and its use continues to expand.[3/] Wi-Fi devices are now the primary means by which Australians connect to the Internet. This central role will only increase in the future since Wi-Fi technology will be an essential complement to Fifth Generation wireless ("5G") networks. It is also important to recognize that connectivity provided by Wi-Fi through low-cost, LIPDs delivers billions of dollars in value to the Australia's economy. Indeed, a study by Telecom Advisory Services found

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1/ *Five Year Spectrum Outlook 2023-28 and 2023-24 Work Program, Draft for Consultation*, March 2022 ("Spectrum Outlook") available at https://www.acma.gov.au/consultations/2023-03/draft-five-year-spectrum-outlook-2023-28

2/ *Spectrum Outlook* at 15.

3/ *Spectrum Outlook* at 15.

that class-licensed networks like Wi-Fi generated over 35 billion dollars in value to the Australia's economy in 2021, a number expected to grow to 42 billion dollars by 2025.[4/]

In considering the "next steps" on the 6425-7125 MHz band ("upper-6 GHz band"), primarily the question of RLAN or IMT use of the band,[5] Wi-Fi Alliance respectfully asks the ACMA to consider the following:

(1) Leverage radio spectrum policy to combat climate change and mitigate other adverse environmental impacts

- *Efficiency*: The ACMA's spectrum policy should prioritize power-efficient wireless connectivity, especially lower-powered, short-range, localized connections that building structures or other obstacles do not wastefully reduce. In this regard, the ACMA should note that Australia aims to significantly improve energy efficiency of buildings.[6/] One consequence of such eco-centric building construction would be that the even more energy from an indoor device (i.e., low power indoor Wi-Fi) transmissions will be contained indoors, as intended, further improving coexistence with other services deployed outdoors. In contrast, wide-area network (i.e., IMT/cellular) connectivity between an outdoor base-station and an indoor-device will incur more degradation from building structure attenuation – requiring transmissions at even greater power levels.
- *Enablement*: The ACMA's spectrum policy should focus on enablement of connectivity use cases that have the most potential to combat climate change through low-emission activities. Australia is expending significant resources to deliver broadband connectivity by expanding fiber and fixed wireless deployments.[7/] But, the ACMA should note that broadband connectivity is predominately accessed via Wi-Fi indoors (e.g., video streaming, telework, telelearning, industrial automation, IoT, smart building, etc.). Wi-Fi, in combination with fiber or fixed-wireless installations, is far more efficient in enabling these use cases than wide-area IMT/cellular networks.
- *Embodiment*: The ACMA's spectrum policy should promote low amounts of energy/CO_2 in the manufacture and installation of new network infrastructure and devices. The physical engineering of new outdoor macro cell sites requires considerable infrastructure (concrete, steel, copper cabling, and other CO_2-intensive elements). Conversely, Wi-Fi network deployments require minimal installation or infrastructure resources.
- *Evolution*: The ACMA's spectrum policy should incorporate flexibility to combat climate change based on spectrum needs that may change over time. Wi-Fi incorporates

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4/ *Economic Value of Wi-Fi available at* http://valueofwifi.com

5 *Spectrum Outlook* at 39.

6/ *See* Improving Energy Efficiency and Emissions Performance of Buildings at https://www.energy.gov.au/sites/default/files/improving_the_energy_and_emissions_performance_of_buildings_-_factsheet.pdf

7/ *Spectrum Outlook* at 10, "The government committed $1.1 billion for full-fibre NBN upgrades in regional Australia, and $480 million for upgrades to the NBN fixed wireless network."

features that maximize spectrum utilization while preserving flexibility to accommodate current and future spectrum users. Self-coordinating, multi-channel Wi-Fi networks share spectrum using an energy detect contention-based protocol based on a "listen-before talk" spectrum access scheme, aka Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA) protocol. This protocol ensures equitable spectrum access and protection for other operations in a shared frequency band. With the CSMA/CA implementation, before initiating any transmission, a Wi-Fi device listens to the radio 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. This allows Wi-Fi technologies to coexist with incumbent as well as future priority deployments in the 6 GHz band.

(2) Growing demand for Wi-Fi connectivity is driving the need for access to 6425-7125 MHz frequency band while IMT/cellular spectrum needs are questionable

As the ACMA is aware, under Australia's National Broadband Network initiative[8], the average data traffic volumes are increasing.[9] Considering that most of this connectivity and data traffic is delivered over Wi-Fi, the requirements on Wi-Fi are increasing correspondingly. This *Spectrum Outlook* comes at a pivotal time in the development of the Wi-Fi ecosystem. Last year, Wi-Fi Alliance introduced the new Wi-Fi 6E brand to distinguish the latest generation Wi-Fi 6 devices that are capable of 6 GHz operation. Wi-Fi 6E brings a common industry name for Wi-Fi users to identify devices that offer the features and capabilities of Wi-Fi 6 – including higher performance, lower latency, and faster data rates – extended into the 5925–7125 MHz band. Wi-Fi 6E devices are quickly becoming available, following regulatory approvals in several countries. As the 6 GHz regulatory landscape evolves, Wi-Fi Alliance member companies continue to expand the Wi-Fi 6E ecosystem even further. The list of Wi-Fi 6E certified products is already growing. In 2022, over 350 million devices were expected in 2022. Regulatory harmonization in the 6 GHz band will create economies of scope and scale and produce a robust equipment market, benefitting Australian businesses, consumers, and the economy. But these benefits cannot be realized in the absence of Wi-Fi access to adequate spectrum capacity. Access to less than the entire 6 GHz band (i.e., lower- and upper-6 GHz bands) would substantively reduce Wi-Fi 6E performance in terms of latency and data throughput. The 5925-6425 MHz band (i.e., 500 MHz) does not provide sufficient spectrum bandwidth to support future Wi-Fi connectivity. And, importantly, there are no alternative frequency bands that may address expanding Wi-Fi spectrum requirements in the future. In fact, the next generation of Wi-Fi (Wi-Fi 7) is being designed.[10/] Wi-Fi Alliance asks the ACMA to note

[8] See https://www nbnco.com.au/

[9] Home Ultrafast plans offering peak download speeds between 500Mbps and 1Gbps are already available to more than 4.4 million premises that have FTTP (fibre to the premises) or HFC (hybrid fibre-coaxial), and NBN Co aims to increase this to eight million by the end of 2023.

[10/] *See* Wi-Fi 7: https://www.wi-fi.org/who-we-are/current-work-areas#Wi-Fi%207

that Wi-Fi 7 is designed to deliver unprecedented quality of service (QoS) benefits at higher data rates and lower latencies. But Wi-Fi 7 optimal performance will depend on access to multiple wider (e.g., 320 MHz) channels in the 6 GHz band– without Wi-Fi access to 6425-7125 MHz, Australian consumers and enterprises will not realize the full benefits of Wi-Fi 6E, Wi-Fi 7 and future generations of Wi-Fi technologies.

On the other hand, the spectrum needs of IMT networks are questionable at best, particularly in light of recent decisions on the 700 MHz, 3.5 GHz, 26/28 GHz and other frequency bands. According to statistics published by the UK[11] and German[12] regulators, only 1-3% of broadband traffic is carried over mobile networks. Thus, the IMT proponents' assertions on the need for identification in yet another frequency band (i.e., 6425-7125 MHz) are simply irrational. This fact is clearly evidenced by recently published European Commission's Digital Economy and Society Index 2022, "*spectrum assignment, an important precondition for the commercial launch of 5G, is still not complete: only 56% of the total 5G harmonized spectrum has been assigned, in the vast majority of Member States*".[13] Moreover, the IMT proponents are already advocating for alternative mid-band spectrum in the 7-24 GHz range.[14] Given that purported IMT/cellular spectrum needs can be accommodated in other frequency bands, Wi-Fi Alliance respectfully asks the ACMA to consider that the 6425-7125 MHz frequency range is the only mid-band spectrum that has been identified for Wi-Fi expansion by policymakers and industry worldwide. There is no alternative spectrum to support growing demand for Wi-Fi connectivity in Australia. Without access to the upper-6 GHz band, Wi-Fi capabilities in Australia will be permanently impaired, undermining connectivity goals and objectives.

(3) Sharing studies confirm that International Mobile Telecommunications (IMT) networks cannot coexist with incumbent services in the 6425-7125 MHz frequency band

Similar to the lower-6 GHz band, the upper-6 GHz band is predominately used by the Fixed Satellite Service (FSS) uplinks and extensive long distance and high capacity fixed microwave link deployments. Multiple spectrum sharing studies (e.g., ECC Report 302) already established regulatory conditions that are necessary for RLAN coexistence with these important incumbent operations in the 6 GHz band. These conditions are acceptable for LIPD networks (e.g., Wi-Fi) but are not feasible for *commercially viable* licensed IMT/cellular deployments.

To maintain the necessary quality of service, IMT/cellular wide-area networks require priority access to spectrum. Hence, licensed IMT/cellular networks cannot avoid interfering with or tolerate interference from the incumbent operations in the 6425-7125 MHz band. The IMT/cellular coexistence with fixed service deployments in the upper-6 GHz band has not been addressed.

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11 Communications Market Report 2021, UK Ofcom (p. 3)

12 Tätigkeitsbericht Telekommunikation 2020/2021, BNetzA (p. 20 ff.)

13 *See* EC Digital Economy and Society Index 2022: overall progress but digital skills, SMEs and 5G networks lag behind available at https://ec.europa.eu/commission/presscorner/api/files/document/print/en/ip_22_4560/IP_22_4560_EN.pdf

14 *Spectrum Outlook* at 18

Similarly, IMT/cellular coexistence with the incumbent satellite services is not ensured. It is, therefore, unrealistic to expect that IMT/cellular networks can avoid interfering with and tolerate interference from other incumbent operations in the 6425-7125 MHz band. And relocation of incumbents to another frequency band, even if an alternative frequency band is made available, may not be economically viable and would require extensive transition periods (i.e., years). The ACMA should also take in to account that IMT/cellular implementation in the upper-6 GHz band by some countries on a national level with bilateral cross-border coordination is impractical and contrary to the underlining premise of spectrum harmonization (intended goal of the IMT identification). Noting that the frequency band 6425-7075 MHz is used for FSS in the uplink direction, all countries, including Australia, are obligated by the international treaty to protect on-orbit FSS satellite receivers from interference that may be caused by the IMT network(s) deployed on its territories. This coexistence burden further undermines feasibility of IMT/cellular operations in the upper-6 GHz band. Conversely, Wi-Fi, built on IEEE 802.11 standards, has demonstrated the ability to coexist with and protect FSS-uplinks and other spectrum users as evidenced by regulatory decisions in several other countries. These protections are inherent to Wi-Fi technology and are critical to its efficient operations on a license-exempt basis worldwide. And the Wi-Fi industry is committed to implementing technical, operational, and regulatory solutions that ensure coexistence with ongoing, incumbent operations in the 6 GHz band.

(4) IMT identification in the 6425-7125 MHz frequency band will not enable commercially viable 5G deployments but will impede introduction of the latest Wi-Fi technologies and associated benefits in Australia.

Wi-Fi Alliance respectfully asks the ACMA to consider that even if the WRC-23 were to identify the 6425-7125 MHz band for IMT in some countries, significant time (i.e., years) and investments (i.e., billions of dollars) would be required to develop, implement, deploy and operate such IMT networks in the upper-6 GHz band. It is unlikely that these networks would be commercially viable, given their limited market scale and harmonization. Proposed "macro-base station" or other quasi-IMT implementations simply lack the economies of scope and scale necessary for a robust equipment ecosystem or commercial viability. In short, additional spectrum identification for IMT will not address the underlying problems of 5G network deployments. [15/]

In the meantime, the latest Wi-Fi technology, operating in the 6 GHz band, is already on the market, empowering tremendous connectivity benefits which are ready to be provided to Australia's businesses, consumers, and the economy. Access to less than the entire 6 GHz band (1200 MHz) would substantively reduce Wi-Fi performance in terms of QoS, latency and data throughput. Wi-Fi Alliance respectfully asks the ACMA to note that the 5925-7125 MHz band is uniquely suited to accommodate the urgent need for additional Wi-Fi spectrum access for the following reasons:

15/ *See* EC Digital Economy and Society Index 2022: overall progress but digital skills, SMEs and 5G networks lag behind

- Self-coordinating, multi-channel Wi-Fi networks relying on dynamic random spectrum access and contention-based protocols require access to multiple channels to maintain acceptable performance. The current Wi-Fi standard (IEEE 802.11ax, Wi-Fi 6/6E) specifies channel bandwidths of up to 160 MHz, while the next amendment under development (Extremely High Throughput, Wi-Fi 7) will specify channel bandwidths of up to 320 MHz. The 500 MHz is simply insufficient to accommodate multiple wider channels.
- Access to 1200 MHz in the 6 GHz band will enable new technologies, innovations and improvements in wireless connectivity. Contiguous spectrum would allow for wider, non-overlapping Wi-Fi channels with harmonized technical conditions. With access to 1200 MHz of contiguous spectrum (i.e., 5925-7125 MHz), 14 additional 80 MHz channels, 7 additional 160 MHz channels or 3 additional 320 MHz channels can be enabled to support high-bandwidth applications that require faster data throughput and lower latency such as high-definition video streaming and virtual reality. Wi-Fi 6E and subsequent generations of Wi-Fi technology will leverage these wider channels and additional capacity to deliver greater network performance and support more Wi-Fi users at once, even in very dense and congested environments, enabling automation, e-learning, e-health and many other Gigabit use cases.
- Wi-Fi devices operating in the 5925-7125 MHz band are already introduced in many countries (Brazil, Canada, Colombia, Saudi Arabia, South Korea, US and others). Regulatory harmonization with Australia would reduce equipment costs, improve availability and deliver the economic benefits described above.

Conclusion

Policymakers worldwide recognize that wireless connectivity is increasingly dependent on Wi-Fi. And the *Spectrum Outlook* represents an important step toward making much-needed spectrum available to address growing demand for Wi-Fi connectivity in Australia. Wi-Fi Alliance appreciates the opportunity to contribute to ACMA's spectrum management efforts.

Respectfully submitted,

/s/ Alex Roytblat

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[redacted]