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VIA ELECTRONIC FILING

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Re: RLAN use in the 5 GHz and 6 GHz bands- Consultation 12/2021

The undersigned companies, representing a cross section of the world's leading silicon vendors, system manufacturers, and application providers, welcome this opportunity to submit comments in response to the public consultation of the Australian Communications and Media Authority (ACMA) regarding radio local area network (RLAN) use in the 5 GHz and 6 GHz bands.¹ The companies strongly support the ACMA's proposal to make the 6 GHz band available for Low Interference Potential Devices (LIPD) on a Class Licence basis for use by RLAN equipment. Making the 6 GHz band available on a Class Licence basis is an important opportunity for Australia to support broadband connectivity in both 5G and next generation networks and will open the door to a host of new and innovative use cases. However, to reap the full potential of the 6 GHz band and the device ecosystem that is developing in this band, we respectfully request that the ACMA make the full 1200 MHz (5925 MHz to 7125 MHz) available for RLAN use.

As detailed in response to the ACMA's specific consultation questions below, we recommend that the ACMA establish three classes of devices in the 6 GHz band: (1) low power indoor (LPI); (2) very low power portable (VLP); and (3) standard power with automated frequency coordination (AFC). In our response below, we also recommend technical operating parameters for these device classes. These recommendations are based on a number of technical coexistence studies with incumbent users that we have undertaken in Europe and the United States. By adopting these three device classes and the recommended technical parameters, the ACMA would maximize the utility of the 6 GHz band, while also protecting incumbent users from harmful interference.

¹ "RLAN use in the 5 GHz and 6 GHz bands- consultation 12/2021" at <https://www.acma.gov.au/consultations/2021-04/rlan-use-5-ghz-and-6-ghz-bands-consultation-122021> ("Discussion Paper").

Responses to the ACMA’s Consultation Questions

1. What is the demand for spectrum for RLAN use in the 6 GHz band (5925–7125 MHz)?

Demand for Class Licence spectrum continues to grow. Researchers have noted that the widespread adoption of Wi-Fi in consumer devices such as laptops and the original iPhone fuelled demand for mobile data access, which in turn drove rapid adoption of mobile broadband services.² And as more consumers began to use more data-intensive devices, they relied more on Wi-Fi offload—both for affordability and quality-of-service. Today, roughly half of global mobile data is offloaded onto Wi-Fi, and by 2022, nearly 60 percent of global mobile data traffic is projected to be offloaded onto the fixed network through Wi-Fi or femtocells.³

Given this, industry stands ready to deploy devices in Class Licence spectrum in the 6 GHz band as it becomes available globally. Wi-Fi standards for the 6 GHz band are in place and ready for use when the spectrum is made available. For example, in the United States, the FCC has published its test requirements for 6 GHz,⁴ and devices have already been certified.⁵ By 2021, the Wi-Fi Alliance is projecting 300 million “6E” chipsets will be shipped.

2. Should the ACMA proceed, as proposed, to consult on a formal variation to the LIPD class licence that adds the frequency range 5925–6425 MHz for RLAN use, bounded by the parameters described in the ACMA’s preliminary view section of this paper?

We respectfully ask the ACMA to consider the full 1200 MHz (5925-7125 MHz) for use on a Class Licence basis for three device classes (1) low power indoor (LPI); (2) very low power portable (VLP); and (3) standard power with automated frequency coordination (AFC). In the charts below, we provide our joint proposal for technical parameters for Class Licence wideband operations in the band for all three device classes. In response to Question 4 below, we provide additional detail on why the full 1200 MHz of the 6 GHz band is necessary.

Based on the findings of the comprehensive studies of coexistence between Wi-Fi and incumbent users of the 5925-7125 MHz band conducted in both the United States and Europe,⁶

² Oughton, Edward, et al. “Revisiting Wireless Internet Connectivity: 5G v. Wi-Fi 6,” *Telecommunications Policy*, Vol. 45, Issue 5 (Jun. 2021). <https://www.sciencedirect.com/science/article/pii/S030859612100032X?via%3Dihub>. (“Oughton Paper”).

³ Cisco, *Virtual Networking Index: Global Mobile Data Traffic Update (2017-2022): White Paper*, (Feb. 2019) at https://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/white-paper-c11-738429.html#_Toc953332.

⁴ Knowledge Data Base (KDB) 987594, released December 10, 2020 <https://apps.fcc.gov/oetcf/kdb/forms/FTSSearchResultPage.cfm?id=277034&switch=P>

⁵ FCC News Release, “Chairman Pai Statement on Authorization of First 6 GHz Wi-Fi Device,” released December 10, 2020 available at <https://docs.fcc.gov/public/attachments/DOC-368593A1.pdf>.

⁶ See CEPT Electronic Communications Committee. *ECC Report 302*, available at <https://docdb.cept.org/download/cc03c766-35f8/ECC%20Report%20302.docx>, *ECC Report 316: Sharing studies*

with specific consideration given to the conditions specified by Ofcom UK⁷ and the United States Federal Communications Commission,⁸ the undersigned companies encourage the ACMA to adopt the following technical conditions for wideband operations of 6 GHz Class License LPI and VLP equipment:

Operating band	5925-7125 MHz	
Device category	Low-Power Access Point	Very Low Power mobile equipment
Operating location	Indoor only	Indoor & Outdoor
Licensing scheme	Class Licence	Class Licence
Transmit power (e.i.r.p.)	30 dBm	17 dBm

We further invite the ACMA to authorize Standard Power equipment in the 5925-7125 MHz band with automated frequency coordination to further facilitate sharing with incumbent services at higher power levels for outdoor use. (See also response to Question 5).

Operating band	5925-7125 MHz
Device category	Standard-Power Access Point
Operating location	Indoor & Outdoor
Licensing scheme	Class Licence (with AFC)
Transmit power (e.i.r.p.)	36 dBm

assessing short-term interference from Wireless Access Systems including Radio Local Area Networks (WAS/RLAN) into Fixed Service in the frequency band 5925-6425 MHz, May 21, 2020, available at <https://www.ecodocdb.dk/download/8951af9e-1932/ECC%20Report%20316.pdf>; and, *ECC Decision 20(01): On the harmonised use of the frequency band 5945-6425MHz for Wireless Access Systems including Radio Local Area Networks (WAS/RLAN)*, Annex 1, A1.2, Nov. 20, 2020, <https://docdb.cept.org/document/16737> (listing technical conditions for LPI and VLP in Europe) (*ECC Decision 20(01)*).

⁷ Ofcom, *Statement: Improving spectrum access for Wi-Fi*, Statement, 4.51, (July 24, 2020), (<https://www.ofcom.org.uk/consultations-and-statements/category-2/improving-spectrum-access-for-wi-fi>) (confirming that radiated power limits of 25 mW for VLP are “sufficient to manage the risk of interference”).

⁸ *Unlicensed Use of the 6 GHz Band*, Report and Order and Further Notice of Proposed Rulemaking, ET Docket No. 18-295 (Apr. 24, 2020) https://ecfsapi.fcc.gov/file/0424167164769/FCC-20-51A1_Rcd.pdf.

3. **If class licensing arrangements are to be made in the lower 6 GHz band (by variation to the LIPD class licence), should alternative/additional power limits and/or other conditions be considered?**

Please see our response to Question 2 for recommended device classes and technical parameters.

4. **Is it appropriate to consider inclusion of the upper 6 GHz band (6425–7125 MHz) in the LIPD class licence or should this be deferred to monitor future developments (for example, in the wide-area International Mobile Telecommunications (IMT) space) as outlined in the ACMA’s preliminary view? We invite comments from submitters on the utility of the band for IMT use.**

Allocating the full 1200 MHz for Class Licence use will bring the greatest benefit to Australia. The rapid expansion of 5G networks will require next generation Wi-Fi over the full 6 GHz band. As noted in response to Question 1, demand for Class-Licence spectrum continues to grow. It is a key enabler of 5G and high-capacity broadband.

The full 6 GHz band offers contiguous spectrum blocks to accommodate seven 160 MHz channels, and three 320 MHz channels.⁹ This would provide Australia with excellent future connectivity capabilities, a robust 5G ecosystem, and future innovative technologies all while enabling incumbent users to continue operations.

Many of the top 20 economies in the world have opened, or in the process of opening, the full 5925-7125 MHz band for Class License use. Given this global momentum, many types of equipment are expected to support the entire 1200 MHz because markets like the United States, Brazil, Chile, Saudi Arabia, and Korea are enabling the band for such operations.

Moreover, as evidenced by countries located in all three ITU Regions moving forward to allocate the full band for Class Licence use, waiting for the outcome of WRC-23 is unnecessary especially in ITU Region 3 where 6425-7025 is not being considered, and only the top 100 MHz is to be studied for a possible IMT identification. The 5925-7125 MHz range is already allocated to the mobile service on a primary basis. Therefore, an IMT identification is not necessary and waiting until the end of WRC-23 for a decision will just result in delay of delivering advanced mobile technologies to the Australian market.

⁹ For example, the latest generation of Wi-Fi technology, Wi-Fi 6, can utilize radio channels as broad as 80 or 160 megahertz, and in the near future Wi-Fi 7 technology that is already in development will utilize channels of 320 megahertz. “Wi-Fi 6 Certified, Capacity, efficiency, and performance for advanced connectivity,” Wi-Fi Alliance, <https://www.wi-fi.org/discover-wi-fi/wi-fi-certified-6>. There are a number of technological improvements contained in Wi-Fi 6 that make this generation of technology the most spectrally efficient version of Wi-Fi in history, including multi-user MIMO, beamforming, and “target wake time” to improve network efficiency and device battery life. When deployed in 6 GHz, Wi-Fi 6 will be called Wi-Fi 6E.

Additionally, opening up the full 6 GHz band for Class Licence use will have tremendous benefits for the economy and connectivity in Australia. And these economic benefits of Wi-Fi would be available now. Wi-Fi standards for the 6 GHz band are in place and ready for use when the spectrum is made available. As noted in response to Question 1, in the United States, the FCC has only published its test requirements for 6 GHz within the last six months,¹⁰ and devices have already been certified.¹¹ By 2021, the Wi-Fi Alliance is projecting 300 million “6E” chipsets will be shipped. By contrast, delaying a decision on the upper 700 MHz of the band and ultimately designating it for IMT would tie this spectrum up for years while incumbents are relocated. Without the full band, Australia would not be able to enjoy the full benefit of future Wi-Fi technologies that can fully utilize multiple wide channels and their associated advanced technologies further reducing economic benefit.

Lastly, by opening up the full 1200 MHz rather than just 500 MHz, the ACMA would allow more spectrum to be made available for a range of Class License technologies, and it would also enable easier sharing of the band amongst the different users, as usage would be distributed across more spectrum.

5. Should standard power (that is, higher power devices, including for outdoor use) operating under a dynamic spectrum access system such as the automatic frequency coordination (AFC) system adopted in the USA, be adopted in Australia for some or all of the 6 GHz band? Is there an appetite and capability for industry to provide the necessary systems to enable such use? We welcome views and evidence on the commercial and technical feasibility of introducing AFC systems in the band

Yes, standard power operations are desirable from an industry perspective because the power levels will best ensure that a consumer has a consistent experience relative to 5 GHz RLAN networks. For example, standard power with AFC provides a path for industry to deliver outdoor wireless technologies to enterprises such as at loading docks and outdoor public areas. AFC systems will allow the 6 GHz band to be used for these use cases while also protecting incumbent users. As noted in response to Question 2, we respectfully recommend that the ACMA consider a device class for standard power operations subject to AFC.

¹⁰ Knowledge Data Base (KDB) 987594, released December 10, 2020 <https://apps.fcc.gov/oetcf/kdb/forms/FTSSearchResultPage.cfm?id=277034&switch=P>

¹¹ FCC News Release, “Chairman Pai Statement on Authorization of First 6 GHz Wi-Fi Device,” released December 10, 2020 available at <https://docs.fcc.gov/public/attachments/DOC-368593A1.pdf>.

We recommend the following technical specifications:

Operating band	5925-7125 MHz
Device category	Standard-Power Access Point
Operating location	Indoor & Outdoor
Licensing scheme	Class License (with AFC)
Transmit power (e.i.r.p.)	36 dBm

The U.S. FCC has provided a final rules framework that will promote speedy development of AFCs in other countries, by resolving whole categories of general implementation topics that do not need to be the subject of repeated industry negotiation.¹² Some topics of AFC testing and how to test that Standard Power devices work with an AFC remain to be decided. The U.S. FCC has asked for recommendations from a Multi-Stakeholder group on these and other topics, and it is anticipated that the fruits of this work will yield recommendations sometime in late 2021.¹³ AFC technology, however, is similar to existing TV White Spaces database technology, and is far simpler than Citizens Broadband Radio Service (CBRS) database technology that supports commercial service in the U.S. Database providers already active in these other band sharing regimes are participating in or closely monitoring the Multi-Stakeholder group's activities. This will enable them to discuss final testing rules with the FCC as the Multi-Stakeholder group produces its recommendations and to be ready for commercial implementation as promptly as the FCC's decisions permit, most likely in late 2021 or 2022.

Both the Wi-Fi Alliance (for IEEE 802.11) and the technology-agnostic Wireless Innovation Forum (WinnForum) have committees focusing on development of 6 GHz AFC standards. More specifically, the Wi-Fi Alliance AFC Task Group is engaged in projects to develop an AFC to AFC device interface specification, and the development of certification tests for AFC systems and AFC devices. Standardization of the AFC interface helps to accelerate the availability of AFC devices and AFC systems. As a result, there is a built-in incentive for AFCs to utilize the standards. The interface standard also helps device manufacturers and users because Standard Power APs can be manufactured and used with the confidence that the equipment will

¹² FCC, *Unlicensed Use of the 6 GHz Band*; Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz, Report and Order and Further Notice of Proposed Rulemaking, 35 FCC Rcd 3852, Appendix A, 47 C.F.R. §§ 15.407(k), (l), (m) and (n) (2020) (*FCC Report & Order*).

¹³ *Id.* ¶¶174-180.

interface with any AFC using the standard.¹⁴ The specifications can be considered for compliance testing of AFC devices, including Standard Power Access Points and Fixed Client Devices, under control of AFC as well as compliance of the AFC Systems to the target regulatory domains. The Wi-Fi Alliance compliance specifications are flexible to comply with various National Regulatory Authorities requirements and databases for protection of incumbent services against harmful interference.

The ACMA can monitor these AFC-related activities and ultimately decide if the FCC certification rules for AFCs and Standard Power APs are suitable for Australia. With jurisdictions such as Canada and Mexico consulting on Standard Power devices subject to AFC,¹⁵ the ACMA would be well served to indicate its preference for a Standard Power device class to better leverage discussions with potential vendors as early implementation decisions are occurring.

Respectfully submitted,

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¹⁴ In contrast, standardization of AFCs themselves should not be attempted. Outcome-oriented rules frameworks for AFCs are critical, as discussed in response to questions 10-15, but AFCs themselves should be able to innovate and differentiate offerings above the regulatory minimums.

¹⁵ See Canada. Innovation, Science and Economic Development Canada (ISED), on behalf of the Minister of Innovation, Science and Industry, initiated a consultation on the technical and policy framework for license-exempt [class licence] use of the 5925-7125 MHz frequency band (referred to as the 6 GHz band), [https://www.ic.gc.ca/eic/site/smt-gst.nsf/vwapj/SMSE-014-20-2020-11EN.pdf/\\$file/SMSE-014-20-2020-11EN.pdf](https://www.ic.gc.ca/eic/site/smt-gst.nsf/vwapj/SMSE-014-20-2020-11EN.pdf/$file/SMSE-014-20-2020-11EN.pdf), IFT, *El IFT abre Consulta Pública sobre uso de la banda de 6 GHz en México (Comunicado 85/2020)*, Nov. 6, 2020, <http://www.ift.org.mx/comunicacion-y-medios/comunicados-ift/es/el-ift-abre-consulta-publica-sobre-uso-de-la-banda-de-6-ghz-en-mexico-comunicado-852020-06-de>.

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