

Apple Response to Australian Communications and Media Authority (ACMA) “Exploring RLAN use in the 5 GHz and 6 GHz bands Discussion and options paper”

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Executive Summary

Apple Inc. (Apple) appreciates the opportunity to submit this filing in response to the Australian Communications and Media Authority (ACMA) “Exploring RLAN use in the 5 GHz and 6 GHz bands Discussion and options paper”.

Apple supports access to the full 6 GHz band (5925-7125 MHz) for Wireless Access Systems / Radio Local Area Networks (WAS/RLANs) under a licence-exempt regulatory regime for Low Power Outdoor (LPI), Very Low Power (VLP) portable indoor and outdoor, Standard Power outdoor with Automated Frequency Coordination (AFC) with appropriate regulatory conditions.

Apple does not believe an IMT identification is needed in any part of the 5925-7125 MHz frequency range as this would deny businesses and citizens the benefits of next generation of Wi-Fi technologies.

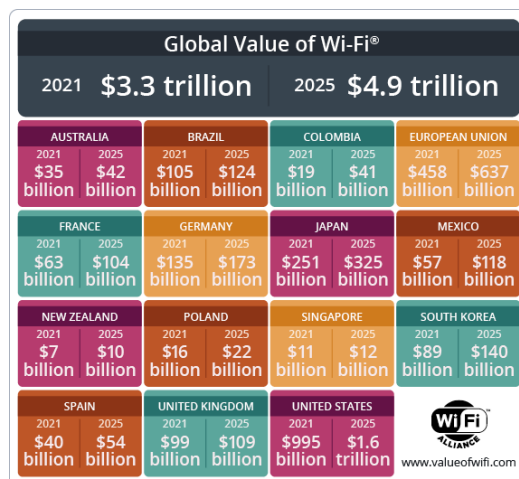
Apple supports implementing the conclusion of WRC-19, contained in Resolution 229, including allowing higher power levels in 5150-5250 MHz.

Apple Response

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

Across the world, government spectrum identifications have not kept pace with the extraordinary growth and adoption of Wireless Access Systems / Radio Local Area Networks (WAS/RLAN). In particular, the issue of a significant shortfall in licence-exempt mid-band spectrum is not new and has been under consideration for number of years including two World Radiocommunications Conference four-year study periods. Other countries efforts to address this shortfall are well underway and Australia should not fall behind.

Apple supports access to the full 6 GHz band (5925-7125 MHz) for Wireless Access Systems / Radio Local Area Networks (WAS/RLANs) under a licence-exempt regulatory regime to support growth of Australia's digital economy. Specifically, the recent revision to a previously published the Wi-Fi Alliance (WFA) economic assessment study on the value of Wi-Fi to economies, indicates that the new value to the global economy is anticipated to be \$4.9 trillion by 2025. For Australia it could be as much as \$42 billion by 2025. We note that ACMA acknowledge this, but realisation will require access to appropriate spectrum, i.e., 5925-7125 MHz.



Apple would like to call to your attention, two studies undertaken that justify additional mid-band spectrum for Wi-Fi; one by Quotient Associates Limited on behalf of the Wi-Fi Alliance (WFA) and the other by Qualcomm.

The “[Wi-Fi Spectrum Needs Study](#)” (undertaken by Quotient Associates Limited) concluded that between 500 MHz and 1 GHz of additional mid-band spectrum in various world regions may be needed to support even already-expected growth in Wi-Fi by 2020; but if demand for Wi-Fi exceeds expected growth, then between 1.3 GHz and 1.8 GHz more mid-band spectrum may be required by 2025 just to keep pace.

Similarly, the Qualcomm mid-band study¹ concluded that in dense environments that primarily rely on Wireless Local Area Networking (WLAN) networking, a total amount of approximately 1280 MHz of additional mid-band licence-exempt spectrum is required, centred near the existing licensed-exempt 5 GHz bands.

Both studies have similar conclusions despite different methodologies and models that regulators should consider licence-exempt mid-band spectrum. Specifically, the WFA Study concludes that between 500 MHz and 1 GHz of **additional** licence-exempt mid-band spectrum may be needed to support expected growth in Wi-Fi by 2020. The Qualcomm study concludes that approximately 1280 MHz of **additional** licence-exempt mid-band spectrum is required. Access to lower 6 GHz (5925-6425 MHz) plus upper 6 GHz (6425-7125 MHz) frequency bands offers significant potential to assist meeting the demand for mid-band licence-exempt spectrum as identified by the independent studies.

While efforts are underway in the World Radiocommunications Conference 2023 (WRC-2023) Agenda Item 1.2, on a possible IMT identification in the upper 6 GHz band (6425-7125 MHz), we see this as a parallel activity and should not impede Administrations making some or all of the 5925-7125 MHz available under a licence-exempt regulatory regime.

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?

Apple believes ACMA should consider the full 6 GHz band (5925-7125 MHz) under a licence-exempt regulatory regime for Wireless Access Systems / Radio Local Area Networks (WAS/RLANs), **Low Power Indoor (LPI)**, **Very Low Power (VLP) portable indoor and outdoor**, **Standard Power outdoor** with Automated Frequency Coordination (AFC) with appropriate regulatory conditions.

We recommend ACMA consider adopting the technical / regulatory conditions detailed in the tables below.

Low Power Indoor (licence-exempt)

Use Case	Equipment	Operation Band	Maximum Power	Power Spectral Density Limited to EIRP	Considerations
Low Power Indoor	Access Points	5925-7125 MHz	30 dBm EIRP	10 dBm / MHz	Use not allowed outdoors Use for drones is prohibited
	User Devices		24 dBm EIRP	10 dBm / MHz	

Very Low Power Indoor and Outdoor (licence-exempt)

Use Case	Equipment	Operation Band	Maximum Power	Power Spectral Density Limited to EIRP	Considerations
Very Low Power Indoor and Outdoor	Devices	5925-7125 MHz	14 dBm EIRP	10 dBm / MHz	Use for drones is prohibited

Standard Power Outdoor (licence-exempt with AFC)

Use Case	Equipment	Operation Band	Maximum Power	Power Spectral Density Limited to EIRP	Restrictions
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¹ [A Quantification of 5 GHz Unlicensed Band Spectrum Needs, 2016](#)

Standard Power Outdoor	Access Points	5925-7125 MHz	36 dBm EIRP	23 dBm / MHz	Access points can only operate under an automated frequency coordination (AFC) system to avoid interference with the services allocated on a primary basis. Use for drones is prohibited.
	User Devices		30 dBm EIRP	17 dBm / MHz	

Apple suggests that the introduction of innovative approaches to spectrum management using databases (e.g. AFC) needs to be balanced noting the possible complexity in the design and implementation of multiple individual national databases.

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?

Apple, as previously stated, believes that ACMA should consider making the entire 5925-7125 MHz frequency range available under a license-exempt regulatory regime. While we respect the World Radiocommunications Conference 2019 decision to study coexistence between IMT with other incumbent services, we do not believe that these studies should delay opening 5925-7125 MHz frequency range should Administrations wish to do so.

We do not believe an IMT identification is needed in any part of the 5925-7125 MHz frequency range as this would deny businesses and citizens the benefits of next generation of Wi-Fi technologies.

Apple previously contained in our response to Question 2, we suggest that adopting the best international regulatory practice for 5925-7125 MHz (e.g., CEPT, UK, USA) has significant benefits including global economies of scale. We therefore consider it feasible to open 5925-7125 MHz for licence-exempt Wireless Access Systems / Radio Local Area Networks (WAS/RLANs), **Low Power Indoor (LPI), Very Low Power (VLP) portable indoor and outdoor, Standard Power outdoor** with Automated Frequency Coordination (AFC) with appropriate regulatory conditions.

We recommend ACMA consider adopting the technical / regulatory conditions detailed in the tables below.

Low Power Indoor (licence-exempt)

Use Case	Equipment	Operation Band	Maximum Power	Power Spectral Density Limited to EIRP	Considerations
Low Power Indoor	Access Points	5925-7125 MHz	30 dBm EIRP	10 dBm / MHz	Use not allowed outdoors Use for drones is prohibited
	User Devices		24 dBm EIRP	10 dBm / MHz	

Very Low Power Indoor and Outdoor (licence-exempt)

Use Case	Equipment	Operation Band	Maximum Power	Power Spectral Density Limited to EIRP	Considerations
Very Low Power Indoor and Outdoor	Devices	5925-7125 MHz	14 dBm EIRP	10 dBm / MHz	Use for drones is prohibited

Standard Power Outdoor (licence-exempt with AFC)

Use Case	Equipment	Operation Band	Maximum Power	Power Spectral Density Limited to EIRP	Restrictions
Standard Power Outdoor	Access Points	5925-7125 MHz	36 dBm EIRP	23 dBm / MHz	Access points can only operate under an automated frequency coordination (AFC) system to avoid interference with the services allocated on a primary basis.
	User Devices		30 dBm EIRP	17 dBm / MHz	

					Use for drones is prohibited.
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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.

Please see the Apple response to Questions 2 and 3 where we recommend ACMA consider making the entire 5925-7125 MHz frequency range available under a license-exempt regulatory regime. As previously stated, respecting the World Radiocommunications Conference 2019 decision to study coexistence between IMT with other incumbent services, we do not believe that these studies should delay opening 5925-7125 MHz frequency range should Administrations wish to do so. We do not believe an IMT identification is needed in any part of the 5925-7125 MHz frequency range.

Apple suggest it feasible to open 5925-7125 MHz for licence-exempt Wireless Access Systems / Radio Local Area Networks (WAS/RLANs), **Low Power Indoor (LPI), Very Low Power (VLP) portable indoor and outdoor, Standard Power outdoor** with Automated Frequency Coordination (AFC) with appropriate regulatory conditions as detailed in our response to Questions 2 and 3.

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.

As previously stated in our response to Questions 2, 3, and 4, we recommend that ACMA consider making the entire 5925-7125 MHz frequency range available under a license-exempt regulatory regime for Wireless Access Systems / Radio Local Area Networks (WAS/RLANs), **Low Power Indoor (LPI), Very Low Power (VLP) portable indoor and outdoor, Standard Power outdoor** with Automated Frequency Coordination (AFC) with appropriate regulatory conditions.

For Standard Power Apple recommends ACMA consider adopting the technical / regulatory conditions detailed in the table below.

Standard Power Outdoor (licence-exempt with AFC)

Use Case	Equipment	Operation Band	Maximum Power	Power Spectral Density Limited to EIRP	Restrictions
Standard Power Outdoor	Access Points	5925-7125 MHz	36 dBm EIRP	23 dBm / MHz	Access points can only operate under an automated frequency coordination (AFC) system to avoid interference with the services allocated on a primary basis. Use for drones is prohibited.
	User Devices		30 dBm EIRP	17 dBm / MHz	

6. Should the higher power regulatory arrangements and associated interference mitigation measures added to the International Telecommunication Union (ITU) Radio Regulations at WRC-19 (see [*Resolution 229 \(Rev WRC-19\)*](#)) in the 5 GHz band be included in any amendment to the LIPD class licence?

Yes, Apple supports ACMA implementing the conclusion of WRC-19, which “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.”^{2/}

^{2/} [World Radiocommunication Conference 2019 Final Acts](#)