

Apple Response to Radio Spectrum Management (RSM) “WLAN use in the 6 GHz band Discussion Document”

Deadline 30 June 2021

Contact Details Yan Gao
APAC Regulatory Compliance Manager
Apple
+86 13910773330
ygao@apple.com

Date 29 June 2021

Executive Summary

Apple Inc. (Apple) appreciates the opportunity to submit this filing in response to the Radio Spectrum Management (RSM) “WLAN use in the 6 GHz band Discussion Document”.

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 Indoor (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 Wireless Access Systems / Radio Local Area Networks (WAS/RLANs) technologies, i.e., Wi-Fi 6E and Wi-Fi 7.

Opening 6 GHz for Very Low Power (VLP) allows a wealth of new innovative use cases. While Low Power Indoor (LPI) operations are foreseen at a Power Spectral Density (PSD) level of 10 dBm/MHz, the same PSD level should be allowed for VLP operations. Specifically, low latency applications will benefit significantly from a PSD level of 10 dBm/MHz rather than 1 dBm/MHz in RSM primary proposal. It will enable revolutionary use cases that are not possible today.

Apple Response

Q1. Do you agree with RSM’s proposal on making the 5925 - 6425 MHz available for WLAN use?

Apple believes RSM 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 RSM 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)

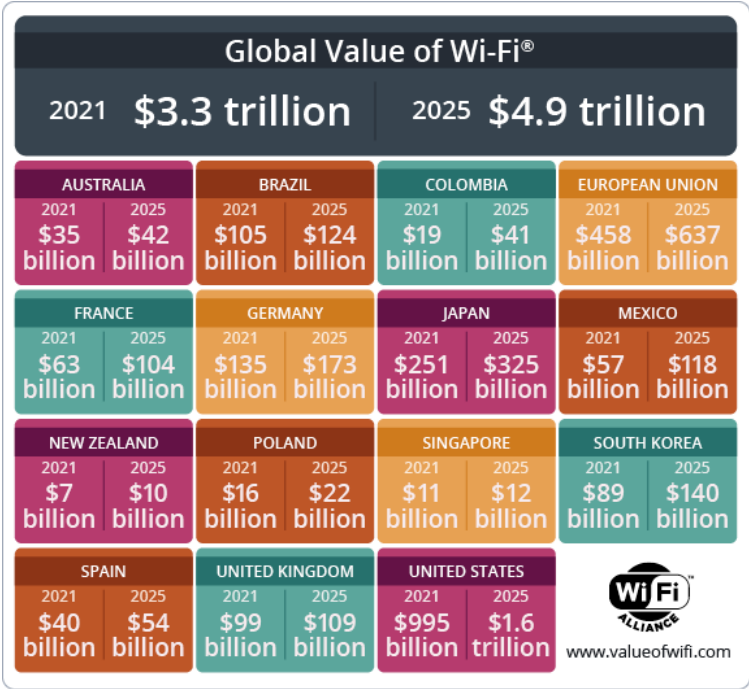
Use Case	Equipment	Operation Band	Maximum Power	Power Spectral Density Limited to EIRP	Restrictions
Standard Power Outdoor	Access Points	5925-7125 MHz	36 dBm EIRP	23 dBm / MHz	Access points can only operate under an automated frequency coordination (AFC) system to avoid interference with the services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

Q2. What are your views on the potential future use of 6425 - 7125 MHz for new applications (e.g. Wi-Fi or IMT)?

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). 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 New Zealand 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 New Zealand’s digital economy. Specifically, the recent revision to a 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 New Zealand it could be as much as \$10 billion by 2025, but realisation will require access to appropriate spectrum, i.e., 5925-7125 MHz.



Apple would like to highlight, 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 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), 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. 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 licence-exempt mid-band 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 should Administrations wish to do so. It is Apple’s opinion that an IMT identification is **not** appropriate in any part of the 5925-7125 MHz frequency range.

Apple suggest it is 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 Question 1.

Q3. Do you agree that RSM should include 5925 - 6425 MHz in the GURL-SRD for WLAN low power indoor and very low power use?

As mentioned in our response to Question 1, Apple recommends RSM consider GURL-SRD 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. 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.

¹ A Quantification of 5 GHz Unlicensed Band Spectrum Needs, 2016

Q4. Do you agree that RSM should mandate ETSI EN 303 687 as the radio standard for WLAN use in the 6 GHz band? Is there any other regulatory compliance standard we should consider?

Apple believes there are benefits from recognizing deliverables, including harmonised standards, from Standardisation Development Organisations, i.e., draft EN 303 687 being developed by ETSI. It is however important to note that draft EN 303 687 only considers the lower 6 GHz band (5945-6425 MHz) and not the full 6 GHz band, but the scope could be expanded to cover the full range.

We also wish to highlight that the draft EN 303 687 will implement the regulatory conditions approved by CEPT and European Commission which include Low Power Indoor (LPI), Very Low Power (VLP) portable indoor and outdoor. That said, Standard Power outdoor with Automated Frequency Coordination (AFC) with appropriate regulatory conditions, is not covered under the draft EN 303 687. Standard power was not considered by CEPT when coexistence studies were undertaken because it was clear that it would be difficult to share with incumbents (Fixed Service, and Fixed Satellite Service). This might be something that could be studied in the future noting Standard Power might require a more innovative way to access the spectrum, e.g., using some form of database, but we would not want to see this delaying opportunities for Low Power Indoor (LPI), Very Low Power (VLP) portable indoor and outdoor.

Q5. What are your views on using a licensing approach to support 30 dBm EIRP WLAN devices?

As previously stated, 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 but for Standard Power outdoor access points, we prefer 36 dBm EIRP rather than 30 dBm. Please see our response to Question 1 and Question 3 for our recommendations for the technical / regulatory conditions.

Q6. What are your views on supporting 36 dBm EIRP standard power devices using Automatic Frequency Coordination (AFC) system? Do you have any proposals to provide AFC systems to New Zealand?

For Standard Power outdoor, Apple recommends RSM 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	

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.

Q7. Any other comments?

Opening 6 GHz for Very Low Power (indoor and outdoor, licence-exempt) allows a wealth of new innovative use cases. While Low Power Indoor (licence-exempt) operations are foreseen at a PSD level of 10 dBm/MHz, the same PSD level should be allowed for Very Low Power operations. Apple would like to emphasise that Very Low Power low latency applications will benefit significantly from a PSD level of 10 dBm/MHz. It will enable revolutionary use cases that are not possible today.