# Combined Industry Response to The ACMA’s Proposed updates to the LIPD Class Licence for 6 GHz RLANs Consultation paper.

October 2021

## Introduction and Opening Remarks

Apple, Inc., Broadcom, Inc., Cisco Systems, Inc., Google, LLC, Hewlett Packard Enterprise, Intel Corporation, Meta Platforms Inc. (formerly Facebook, Inc.), Microsoft Corporation and Qualcomm Incorporated (“the supporting companies”) thank the ACMA for the opportunity to provide further comment to ACMA’s second paper “Proposed updates to the LIPD Class License for 6 GHz RLANs” on potential RLAN use in the 5925-7125 MHz band (the 6 GHz band).

Unfortunately, as experienced in many large conventions and [even in populated urban areas](https://www.smh.com.au/technology/super-wifi-could-ease-spectrum-congestion-20140630-zsqpz.html), the existing 2.4 and 5 GHz bands are fast becoming congested, impacting the ability to offer broadband and automation solutions effectively. We therefore welcome the ACMA’s decision to proceed with updating the LIPD Class Licence to include the lower portion of the 6 GHz band (5925-6425 MHz), as this will contribute towards meeting the immediate needs of industry and consumers.

The supporting companies particularly welcome the ACMA’s fresh look at the upper 700 MHz (6425-7125 MHz) because the opportunity for 1200 MHz of new harmonised[[1]](#footnote-1) RLAN (LIPD) spectrum is unlikely to present itself again. The greatest economic value to the Australian community would be maximised via a contiguous 1200 MHz allocation at 6 GHz to RLANs by way of the LIPD Class Licence as evidenced in “The Economic Value of Wi-Fi: a global view (2021-2025) economic [study](https://www.wi-fi.org/download.php?file=/sites/default/files/private/The_Economic_Value_of_Wi-Fi-A_Global_View_2021-2025_202109.pdf).” Assuming the entire 6 GHz band is made available by way of the LIPD Class Licence, the Wi-Fi Alliance calculates the economic value of Wi-Fi to the Australian economy will be $35 Billion in 2021 and $42 Billion by 2025.

The availability of spectrum is an economic enabler that opens the door to local manufacturing, monitoring and control devices that would benefit industry, mining, agriculture, and transport, and would help to break down the digital divide, especially at a time when many Australians seek alternatives to living and working in large population centres.

At a household level, with broad availability of Fibre-to-the-Home (FTTH), Fibre-to-the-Node (FTTN), as well as Geostationary Satellite Orbit (GSO) and Non-GSO (NGSO) High Throughput Satellite (HTS), the availability of licence-exempt mid-band spectrum has become a bottleneck for connected devices using the Class Licenced bands for broadband consumers. At an enterprise level this congestion is exacerbated by the large number of devices vying for channels and their individual bandwidth demands.

Imagine a ‘work from home’ household with multiple intensive users of the Internet for video conferencing, online research, entertainment, and remote learning; the limited channels available in the 2.4 and 5 GHz bands can soon become overwhelmed. These are just the ‘visible’ connections in this scenario. By adding smart appliances, a smart home with a Wi-Fi enabled security system, and various other devices, it is easy to see how the traditional bands are no longer sufficient to meet the needs of a connected society.

With HD and UHD television, games consoles, smart appliances, and AR/VR, the need for bandwidth will continue to grow. In dense urban and suburban settings, contention for channels will quickly lead to an unsatisfactory experience. The release of the full 1200 MHz of 6 GHz spectrum for RLANs (LIPD) is the solution to this bottleneck.

In regional and remote Australia, where it is not practical to haul a fibre connection, the availability of Class Licenced broadband channels will enable broadband from a fibre point-of-presence to be ‘trunked’ using high-power, point-to-point systems within the RLAN bands and then reticulated using a high-power point-to-multipoint system. Updating the LIPD Class Licence to include the entire 6 GHz band will deliver the spectrum and channels needed to distribute broadband data and significantly help break down the digital divide between city and country. Such systems could be coordinated with legacy fixed services and other systems using Automated Frequency Control (AFC) delivering significant improvement to the economic benefit of the spectrum without disrupting existing or new services in the band.

Allowing the use of the entire 6 GHz band for Class Licenced use will address a critical need for spectrum for connected devices, ‘smart’ farms and mines, ‘smart’ industry, and the connected home. Making the entire 5925-7125 MHz band available will enable several 160 MHz channels, as well as future 320 MHz channels, which can support current and emerging high-bandwidth applications and cost-effective enhanced broadband connectivity.

5G and advanced Wi-Fi technologies also are complementary, allowing for significant offload capability and thus significant benefit to commercial mobile carriers. As an example, in a recent trial by three South Korean mobile carriers, KT Corp., SK Telecom, and LG U+, a peak speed of 1.8 Gbps was achieved in Seoul Metro subway system using Wi-Fi 6E routers using 28 GHz 5G mmWave backhaul[[2]](#footnote-2). Current typical average speeds on subways in the capital of Seoul, over Wi-Fi 4/5 using LTE backhaul, is around 71 Mbps.

## Responses to Questions.

## Lower 6 GHz band/proposed update to the LIPD Class Licence

1. Are the proposed out-of-band emission limits of -37 dBm/MHz for outdoor very low power (VLP) devices and -27 dBm/MHz for low power indoor devices suitable, both in terms of protecting intelligent transport systems (ITS) services and their effect on the operation of RLAN devices near/adjacent to the 5925 MHz boundary?

Both Very Low Power (VLP) and Low Power Indoor (LPI) are important use cases for RLAN devices. The supporting companies support the decisions by the US FCC and other administrations to limit out-of-band emission for LPI to -27 dBm at 5925 MHz.

1. Is the specification of contention management protocols in the LIPD Class Licence necessary to enable equitable access between potentially competing technologies such as RLANs and 5G new radio-unlicenced (NR-U) services? If so, is the proposed condition, and the language used to express it, appropriate?

The supporting companies believe both the proposed protocols and the descriptive language are acceptable and appropriate.

1. Are there any broader comments on the proposed update to the LIPD Class Licence?

The update to the LIPD Class Licence with only the lower 500 MHz will bring welcome relief to users experiencing congestion and a data bottleneck but will only offer a modest increase in throughput via 80 MHz channels. To increase the quality of service and open up the full range of opportunity provided by FTTH and FTTN, 160 MHz (and in the future 320 MHz as being provisioned for Wi-Fi 7 based on IEEE 802.11be) channels are needed. Thus, we believe that the full 1200 MHz at 6 GHz (5925-7125 MHz) should be made available as soon as possible.

## Upper 6 GHz band/higher power RLAN devices

1. Should the ACMA make arrangements that permit high-gain directional antennas (for example, for wireless internet service providers in remote areas) under a class licensing regime?

Yes, provided that existing incumbent services are protected. High-gain point-to-point systems feeding lower-gain cellular systems have been supporting WISP and Internet connections in the 2.4 GHz and 5.8 GHz bands for many years. The ability to utilise legacy ISM bands combined with the new 5925-7125 MHz band would enable WISPs and communities to transmit and reticulate data from a fibre point-of-presence (PoP), emulating ‘city-like’ broadband and making significant progress towards closing the city/country digital divide.

Automated Frequency Coordination (AFC) systems when adopted will mean such systems can protect existing and new assignments recorded in the ACMA database. With a moderate number of assignments recorded (14,623 of which the majority are terrestrial Fixed Services (FS)) over the entire Australian landmass, AFC will significantly increase the benefit derived from the use of the spectrum without any detrimental impact on current users. The ability to use the spectrum for both feeder links and data reticulation will provide a means to significantly reduce the city/country digital divide.

Given the band is currently used by point to point fixed services which are similar to proposed standard power p-p RLAN systems and as there are limited C Band FSS services in Australia the release of the full 1200 MHz of RLAN spectrum will not adversely affect FSS space receivers.

1. If ‘high power’ class-licensed devices were to be introduced under an AFC system, what aspects of the system would need to be considered in setting it up? Is there interest from industry in administering such a system?

The supporting companies suggest the ACMA adopt the AFC model recently authorised in the US.

In the US, the FCC requires the AFC to use a centralised model where each high-power (referred to as Standard Power in US) access point remotely accesses an AFC System to obtain a list of available frequency ranges in which it is permitted to operate and the maximum permissible power in each frequency range. This is similar to other models the FCC has approved for other systems. Adopting an industry-led model similar to the US AFC model will facilitate ACMA oversight of AFC System operations, reduce development costs and accelerate adoption and use of such systems in Australia.

1. If ‘high power’ class-licensed devices were to be introduced under an AFC system:

* Is there interest from industry in administering such a system?

One Australian WISP organisation previously suggested to the ACMA that it would be prepared to operate an AFC-like system on behalf of industry in another band. We believe it is likely other industry associations and/or individual companies would be interested in doing so in the 6 GHz band.

* Are there any impediments to developing and/or operating a system in Australia? What could be done to help enable, or otherwise encourage, the development and/or operation of a system in Australia?

The supporting companies are not aware of any impediments. To further encourage the implementation of AFC for Australia, we encourage the ACMA to provide as much clarity as possible on rules and required operating procedures and strive for a timely and efficient path for AFC operator certification.

* To what extent would an Australian system need to be aligned with those to be implemented elsewhere? What scope could there be for customisation in an Australian system?

The FCC has the most experience and is farthest along on implementing AFC. We encourage the ACMA to adopt rules and procedures similar to the FCC’s for AFC System implementation. Doing so will lower barriers to adoption and scale. Other than customizing the AFC system implementation to accommodate the specifics of the ACMA database of licensed FS, we do not see any reason for the ACMA not to follow the FCC approach.

* What aspects of an AFC system would need to be considered in the design, establishment, and ongoing operation, of such a system, including:
* regulator and industry commitments

Industry would need to ensure the system is open access, while the regulator would need to ensure ongoing access to, and accuracy of, the database.

* technical spectrum coordination and coexistence rules – for example, a tiered hierarchy framework for spectrum uses

Future tiered access would enable better access to the spectrum for users. Currently, FS is protected by way of RALI-FX3, but these levels of protection may not lead to the best use of the spectrum. While existing systems may need to be grandfathered for a defined period, an increase in required design fade margin for future systems would improve FS resilience and allow greater and more flexible use of the spectrum in regional and remote areas of Australia.

UK Ofcom have changed the fade margin requirement for new FS in the upper 6 GHz band (35 dB as opposed to 10 dB), which also provides greater protection against a raised noise floor due to other licensed users. This has the side benefit of making these links more robust in the unlikely event that an RLAN is somehow in a location where its transmissions temporarily reduce the fade margin of a given FS receiver. The ACMA could adopt similar provisions in regional areas over the entire 6 GHz RLAN band, perhaps based on a reduced system availability for future FS. Given that, other than some long hauls systems in Queensland and western Australia, the majority of FS are deployed within a few 100km of the coast along the population ‘J Curve’, making the spectrum available to ‘open’ systems by way of AFC would remove significant regulatory burden and reduce the cost of deploying both feeder and reticulation systems in regional and remote areas.

Other systems using the band are small in number, comprising mostly Earth Receive stations and TV Outside Broadcast (TVOB). As the Earth Station assignments are limited in number, the current internationally recognised protection levels continue to apply. TVOB is a light use of the band and is not generally fixed in nature.

Earth Receive stations would receive the required protection via the AFC system.

Other systems in the band including transportable Earth stations are transmitters; because RLAN would be secondary, this should not pose a problem.

Mobile Satellite Services (MSS) feeder link and Fixed satellite Service (FSS) receivers (space receive) systems also require consideration. These systems are applications of the FSS (Earth-to-space), operating under RR No. 5.458B, and were ‘dimensioned’ considering large numbers of existing and planned fixed service assignments common in (most countries). Australian RLAN distribution will mirror Australia’s population distribution which coupled with RLAN operational characteristics indicates that they will produce no greater interference than FS links to a spaceborne MSS/FSS receiver in orbit.

* IT infrastructure and system design, including security and system reliability issues
* communication interfaces between an AFC system, the ACMA’s Register of Radiocommunications Licences (RRL) and devices
* ongoing interaction between the ACMA and system operators

The Wi-Fi Alliance formed its AFC Task Group in July 2019 to develop recommendations on the AFC System and Device compliance test specification for consideration by the FCC and other regulatory bodies as input for their certification processes. Specifically, the Wi-Fi Alliance has developed compliance specifications for the AFC Reference Model, AFC System, AFC Device and the Interface between AFC System and AFC Device. The specifications are flexible and scalable in manner and can be revised and customized to address region- specific AFC requirements such as those presented by the ACMA. The Wi-Fi Alliance specifications can be found [here](https://www.wi-fi.org/downloads-registered-guest/AFC_Specifications_and_Test_Plans.zip/38132).

Building upon the Wi-Fi Alliance AFC model, and to drive the global 6 GHz standard power Wi-Fi market forward, [Broadcom, Cisco, and Meta Platforms have created an open-source project](https://telecominfraproject.com/broadcom-cisco-facebook-bring-software-group-together-under-tip-to-expand-6ghz-wifi/) in the Telecom Infra Project (TIP) called Open AFC Software Group. Open AFC will allow the Wi-Fi industry to collaborate on an AFC system, share knowledge and learnings, and reduce costs. This will allow non-profit organizations and trade associations to provide service for their members, operators to cost-effectively enable AFC based standard power Wi-Fi for their subscribers, and/or device makers to enable standard power Wi-Fi for their customers.

In summary, Open AFC will ensure a robust market, allowing anyone wanting to provision standard power Wi-Fi to be able to do so, and thereby catalysing a new era for the Wi-Fi industry.

1. If ‘high power’ devices were to be introduced under a manual registration process, what might those arrangements look like? Would the introduction of apparatus licensing for such devices be an appropriate option?

This would appear to be identical to the current FX-3 process already available for point-to-point systems. For these deployments, AFC is a far more flexible option that places less burden on the user and will deliver optimum use of the spectrum, especially in regional Australia.

In the case of point-to-multipoint, high-power RLAN AFC combined with channel agility provides a viable tool for coordinating these systems with legacy fixed links and other services. Light-touch regulation will be key to maximising the benefit derived from the spectrum, especially for regional areas.

Given the accuracy of the ACMA database and ease of access, maximum benefit from the use of the spectrum would be delivered by an open, but AFC-coordinated, use of the band by RLAN devices and other LIPD.

1. Would there be advantages in implementing different licensing and/or access management arrangements in different geographic areas for the use of high power RLAN devices?

Having different access management arrangements in different parts of the country raises costs and complexity and destroys the opportunity for national enterprises to utilise consistent standard power arrangements. Australia’s economy is best served by having one consistent approach, ideally utilising AFC technology. It should be noted that adopting a common technology such as AFC for coordinating spectrum access for higher power operation could maximize spectrum utilization and could deliver significant benefit to people in remote areas and to the Australian economy in general. A geolocation awareness and reporting capability on the high-power RLAN devices, in conjunction with the AFC authorization of the spectrum access, makes this possible. Even with such a differentiated spectrum management regime, it would all be enabled by a single, consistent AFC approach for high-power devices in the 6 GHz band across the continent.

As discussed above, an ‘open’ licensing system based on AFC will have the greatest benefit to Australians in regional and remote areas by helping to significantly narrow the digital divide.

1. Are there additional sharing scenarios and/or studies relevant to this band that have not been identified in this paper?

The supporting companies are not aware of any additional relevant materials .

## Conclusion

The supporting companies commend the ACMA decision to add the lower 500 MHz of the 6 GHz band to the LIPD Class Licence. We applaud the ACMA’s decision to consult on the whole band and suggest that the ACMA open the entire 1200 MHz of the 6 GHz band to RLAN devices (via the LIPD Class Licence) as soon as possible.

The needs of the Australian community, combined with the need to close the digital divide, point to an urgent and immediate need for the full 6 GHz band to support RLAN and other LIPD devices.

1. In the majority of ITU Region 2, Saudi Arabia, Japan and South Korea with potentially more to follow.

   [↑](#footnote-ref-1)
2. <https://www.fiercewireless.com/5g/samsung-5g-mmwave-trial-clocks-1-8-gbps-wi-fi-speeds-seoul-subway> [↑](#footnote-ref-2)