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Dear Xavier

RE: Exploring RLAN use in the 5 GHz and 6 GHz bands

The Communications Alliance Satellite Services Working Group (SSWG) welcomes the opportunity to comment on the ACMA's *Exploring RLAN use in the 5 GHz and 6 GHz bands* consultation.

Under the Australian Radiofrequency Spectrum Plan, the 5925-7075 MHz band is allocated on a primary basis to the Fixed Satellite Service ("FSS"), and many SSWG members have valuable operations and commercial satellite services in this band in Australia. Any proposed introduction of class-licensed radio local area network (RLAN) devices in this band must therefore be subject to appropriate measures to ensure that they will in fact have a "low interference potential" for the primary services in the band, such as the FSS.

In the SSWG's view, as discussed further below, the risk of aggregate interference into FSS uplinks in 5925-7075 MHz (including FSS feeder uplinks for the Mobile Satellite System ("MSS")) may be acceptably low for class-licensed RLAN operations if the RLAN devices are limited to low power indoor operations and very low power outdoor operations, similar to the parameters proposed by the ACMA in its preliminary views. In addition, if RLANs are allowed in 6425-7075 MHz, appropriate measures may also be required to protect non-GSO MSS feeder downlinks in a portion of this band, as several ground stations for the Globalstar and Omnispace NGSO MSS systems are situated in Australia. The SSWG would not oppose an ACMA consultation to consider such issues in greater detail.

Our responses to the questions posed in the Consultation paper follow.

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

The SSWG expresses no view on the demand for spectrum for RLAN use in the 6 GHz band. SSWG simply notes that the case for more Wi-Fi spectrum is based on "congestion" in existing Wi-Fi bands, which is driven in large part by the sheer number of Wi-Fi devices that have been deployed under the Class Licence to the point where interference among many Wi-Fi devices is limiting the achievable throughputs.[1] Analogously, as RLAN deployments increase in the 6 GHz band, this same aggregate interference will pose a threat to primary FSS uplinks, and adequate measures are required ahead of time to limit the potential for such impacts (as discussed below).

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?

The SSWG does not oppose a consultation to consider a variation the LIPD class licence to add the frequency range 5925-6425 MHz for RLAN based on the parameters in the ACMA's preliminary view.

[1] *See* https://spectrum.ieee.org/telecom/wireless/why-wifi-stinksand-how-to-fix-it.

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?**

   If class licensing arrangements are to be made in the lower 6 GHz band (5925-6425 MHz), the SSWG would support only low power indoor (LPI) and very low power (VLP) outdoor deployments of RLANs based on the parameters expressed in the ACMA's preliminary views.

   The ACMA's proposal – maximum 24 dBm EIRP, 11 dBm/MHz EIRP density for LPI, and 14 dBm EIRP, 1 dBm/MHz EIRP density for VLP – is generally consistent with those studied and adopted in the UK, Europe and South Korea. For example, after extensive study, the European Communications Committee (ECC) adopted nearly identical power levels for licence-exempt RLANs in 5925-6425 MHz as levels that are appropriate for the protection of FSS uplinks in the band. Korea similarly imposed an EIRP limit of 24 dBm, but required a lower EIRP density of 2 dBm/MHz. Such levels would be an appropriate baseline for the consideration of rules for LPI and VLP RLANs in this band. Consistent with class licensing principles, the SSWG expects that RLAN operations in this band would be a non-protected basis vis-a-vis primary services such as the FSS. In addition, the ACMA may also want to consider whether out-of-band emission limits (which were adopted by the ECC) are also appropriate.

   As explained in response to Q5 below, the SSWG does not support "standard power" (i.e. higher powered) outdoor deployments of RLANs in this band, whether under the control of an automatic frequency coordination (AFC) system or not.

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.**

   The SSWG would not oppose consideration of the upper 6 GHz band for RLANs in the LIPD class licence, subject to the same technical constraints as the lower 6 GHz for the protection of FSS uplinks (and subject to the caveat re the very upper part of the band, noted below). FSS systems operate across the full upper 6 GHz band and satellite operators have long term plans for the use of the band. For example, the band 6425-6575 MHz is used for feeder uplinks for MSS systems, which support safety of life services such as GMDSS and AMS(R)S. Additional constraints may also be required in the 6700-7075 MHz band used for non-GSO MSS feeder downlinks by the Globalstar and Omnispace NGSO MSS systems. A reliable means of protecting primary receiving earth stations from class licensed RLANs in the relevant parts of the band will be required.

   We do not support any consideration of the use of the 6 GHz band for IMT, as it implies exclusive, primary use of the band for mobile services. Compatibility between high-powered outdoor IMT deployments and both FSS uplinks and downlinks in the same band will be difficult to achieve and impractical - refer to ITU-R Report S.2367 and ITU-R Report S.2368. Aggregate interference from high-powered IMT devices into FSS uplinks would be even worse than the "standard power" RLANs allowed by the FCC (see below).

   Referring to ITU-R Report S.2367, below are the conclusions on the sharing and compatibility studies between IMT systems and FSS networks in the band 5850 – 6425 MHz:

   1) GSO FSS networks operating in the band 5850 – 6425 MHz would be subjected to excessive levels of interference from the aggregate operation of IMT (small cell) base stations, irrespective of whether they are deployed outdoors or indoors.

   2) A separation distance is required between an FSS earth station and an IMT base station in order to protect the IMT station from interference from FSS transmissions. The studies concluded that separation distances up to many tens of kilometres would be required between a single transmitting FSS earth station and a single outdoor IMT receiving base station in order to protect the IMT station from co-

frequency interference. For indoor deployed IMT stations, a separation distance ranging from several hundred metres up to several kilometres would be required.

In any event, as noted by the ACMA, IMT now has a large amount of spectrum available with more coming soon (*e.g.*, 3.6 GHz, 26 GHz, 850 MHz expansion). WRC-19 also identified over 17 GHz of high-band spectrum for IMT. In addition, a total of 470 MHz (i.e. 1800 MHz, 2 GHz, 2.3 GHz, 3.4 GHz, and 3.6 GHz) [2] of mid-band spectrum have been made available for the deployment of terrestrial 5G services in Australia. There is thus no indication that additional spectrum is required for IMT and the current spectrum available for 5G services should be more than enough to accommodate the 5G demand in Australia. Based on these facts, the ACMA should make a thorough review to the outcome paper on the replanning of 3700 – 4200 MHz band and therefore, the ACMA should postpone releasing the decision paper on the replanning of the band 3700 – 4200 MHz.

The ACMA should also recall that the FSS allocation in the 6725-7025 MHz band has a special status under the ITU Radio Regulations. As the uplink band (Earth-to-space) for the ITU Appendix 30B Allotment Plan, this spectrum allocation is intended to ensure that all countries have access to spectrum and orbital resources for satellites. Deploying IMT in this band would likely undermine the future use of the band for FSS under the Allotment Plan.

We note that some members do not support the reallocation of the very upper parts of the 6 GHZ band identified in Figure 1 of ACMAs paper as “block C” for use by either RLAN equipment or future IMT use. The band 6.875 GHz to 7.055 GHz is currently being used to support earth receive facilities for the Globalstar Low Earth Orbit constellation, for example. Being a non-geo stationary constellation, these receivers utilise tracking antennas that operate from near horizon to horizon during each satellite pass, making them particularly susceptible to interference from other sources, particularly at low elevation angles.

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.**

The SSWG does not support “standard power” (i.e. higher power devices) for outdoor use under a dynamic spectrum access system such as the automatic frequency coordination (AFC) system adopted in the U.S.

Unlimited deployment of RLANs, especially outdoors and at high power, poses a long-term threat of aggregate interference to FSS uplinks in the 6 GHz band. While no single RLAN transmitter is expected to cause interference, an FSS uplink beam on a satellite will “see” all RLAN transmitters within its coverage area. At large enough levels of RLAN deployment within such coverage area, especially outdoors, aggregate interference into FSS uplinks will be observed and lead to degradation of link performance.

The ECC studied aggregate interference from RLANs into FSS uplinks in the 6 GHz band. It found that by 2025, at high levels of outdoor RLAN deployment (5% outdoors), aggregate interference from RLANs would cause FSS uplinks to experience an I/N approaching or even exceeding the I/N allowed to be caused by a co-primary service in the same band under ITU-R Recommendation S.1432 (i.e. an I/N of -10 dB, apportioned between the FS and RLANs).[3] In principle, however, class-licensed “low interference potential” devices should not be allowed to cause as much interference into primary FSS as a co-primary service. Following this study, the ECC established LPI

[2] See, 5G spectrum in Australia, available online at https://www.communications.gov.au/what-we-do/spectrum/spectrum-allocations

[3] *See* ECC Report 302, at 3-4.

and VLP limits to "help ensur[e] long term protection of FSS space stations from aggregate interference from WAS/RLAN devices."[4]

In the SSWG's view, the U.S. approach of allowing much higher powered "standard power" RLAN devices to be deployed outdoors (at up to 36 dBm EIRP and 23 dBm/MHz EIRP density for access points)[5] discounts the risks of aggregate interference into FSS uplinks. In effect, this approach assumes that levels of outdoor deployments would be similar to historical levels of outdoor RLAN deployment (i.e. lower than 5%) and would never be so great as to ever pose an aggregate interference problem for FSS space stations. This is an odd assumption, as one would expect that the creation of a special class of unlicensed high-powered device for outdoor usage would result in much higher than historical levels of outdoor RLAN deployments. In turn, the deployment of more outdoor RLAN access points will likely lead to greater outdoor use of client RLAN devices (operating at up to 30 dBm EIRP and 17 dBm/MHz EIRP density).

The U.S. did impose an EIRP limit (21 dBm) in the skyward direction (at more than 30 degrees elevation) on unlicensed outdoor RLAN access points to provide some protection for the FSS against aggregate interference. However, this reduced EIRP limit is no substitute for the attenuation that would be expected from an indoor use requirement. This skyward EIRP limit also does not apply to outdoor client devices (which may continue to operate at up to 30 dBm), and remains much higher than the outdoor VLP EIRP limit (14 dBm) adopted by the ECC for the long-term protection of the FSS.

The AFC system adopted by the US to manage standard power outdoor RLAN access point devices is specifically not intended to provide protection against aggregate interference into the FSS. Instead, it is intended only to ensure that RLAN devices protect primary FS receivers operating in the same band using a database of licensed FS locations and frequencies. Even then, AFC-controlled standard power outdoor devices were not considered by the FCC to be adequate for the protection of Broadcast Auxiliary Service in the 6425-6525 MHz band (known as TV Outdoor Broadcast in Australia, which overlaps with the upper 6 GHz band at 7100-7125 MHz). The SSWG notes, however, that an AFC system *could* (in theory) be designed to control aggregate interference into FSS uplinks by, for example, enforcing a nationwide limit on the total number of emitters operating at a given time.

In the SSWG's view, there can be no assurance that RLANs operating under the LIPD class licence would remain "low interference potential" with respect to the primary FSS without indoor restrictions and low- or very low- power limits, especially when there is no reliable means of capping the aggregate emissions from the RLANs.

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?

Provided there is no degradation to FSS space borne receivers, most SSWG members believe this can be considered. The SSWG notes that portions of the 5 GHz band are used as feeder uplinks for the Globalstar and Omnispace NGSO systems, and that there are several of their earth stations located in Australia that use these uplink frequencies.

We note that SSWG member, Pivotel, does not support any changes to the existing LIPD class licensing arrangements currently in place for the 5150 to 5350 MHz portions of the 5 GHz band. It believes that existing arrangements have served both the satellite and RLAN user communities well to date, so we see no justification in modifying these arrangements to suit a small number of potential RLAN users, at the risk of causing significant interference to the large number of incumbent satellite users using this portion of the band.

[4] ECC Report 302, at 4. *See* ECC Decision 20(01) at Table 1 and Table 2.

[5] *In the Matter of Unlicensed Use of the 6 GHz Band*, FCC 20-51, Report and Order and Further Notice of Proposed Rulemaking, at Table 3.

If you have any questions with respect to this submission, please contact John Stanton at Communications Alliance on 0434 318 777.

Yours sincerely,

John Stanton

Chief Executive Officer

About Communications Alliance

Communications Alliance is the primary telecommunications industry body in Australia. Its membership is drawn from a wide cross-section of the communications industry, including carriers, carriage and internet service providers, content providers, equipment vendors, IT companies, consultants and business groups. Its vision is to provide a unified voice for the telecommunications industry and to lead it into the next generation of converging networks, technologies and services. The prime mission of Communications Alliance is to promote the growth of the Australian communications industry and the protection of consumer interests by fostering the highest standards of business ethics and behaviour through industry self-governance.

For more details about Communications Alliance, see:

http://www.commsalliance.com.au/