GVF AND ESOA RESPONSE TO

WLAN use in the 6 GHz band
Discussion document June 2021

The GVF[1] and ESOA[2] (the "Commenters") welcome the opportunity to jointly respond to the *WLAN use in the 6 GHz band Discussion document* ("Discussion document") issued by the Radio Spectrum Management (RSM) unit of the Ministry of Business, Innovation and Employment of the New Zealand Government.[3] The GVF and ESOA are satellite associations that represent much of the global satellite industry.

The Commenters make this submission to highlight views and proposals in response to the above captioned Discussion document, particularly regarding the operation of satellite feeder link services in the frequencies between 5925-7125 MHz ("6 GHz band") in New Zealand. As RSM is aware, the 6 GHz band is critical for the operations of many satellite systems that rely on this band for their Telemetry, Tracking and Command (TT&C). The Commenters offer responses to the specific questions in the Discussion document below.

Responses to Specific Discussion Document Questions

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

Under the New Zealand table of frequency allocations – PIB 21, the 5925-6700 MHz band is allocated on a primary basis to the Fixed Satellite Service ("FSS" – Earth-to-space), and many satellite operators have valuable operations and commercial satellite services in this band in New Zealand. Any proposed introduction of Wireless Local Area Network (WLAN) 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 Commenters' view, as discussed further below, the risk of aggregate interference into FSS uplinks in 5925-6425 MHz may be acceptably low for WLAN operations if the WLAN devices are limited to low power indoor operations and very low power outdoor operations, similar to the

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[1] GVF is the only global non-profit association of the satellite industry. Founded in 1997 and headquartered in London, it brings together organizations from around the world representing the satellite ecosystem that are engaged in the development and delivery of satellite technologies and services for consumers, commercial and government organizations worldwide. www.gvf.org.
[2] ESOA is a CEO-driven association representing 22 global and regional satellite operators that drives thought-leadership & advocacy for its members in front of regulators, policymakers, international bodies, and standards-setting organizations such as 3GPP, the ITU and the World Economic Forum. www.esoa.net.
[3] RSM, *WLAN use in the 6 GHz band Discussion document* (Apr. 2021) ("Discussion document"), *at* https://www.rsm.govt.nz/assets/Uploads/documents/consultations/2021-wlan/wlan-use-in-the-6-ghz-band-discussion-document.pdf.

parameters proposed by the RSM. The Commenters would not oppose the RSM's proposal on making 5925-6425 MHz available for WLAN use.

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

The Commenters do not oppose potential future use of 6425-7125 MHz for WLANs, provided that primary services in the band such as the FSS are protected and can be deployed in the future. 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. A number of existing and planned NGSO MSS systems (e.g. Globalstar, Omnispace, EchoStar Global) also use portions of the 6700-7075 MHz band for feeder downlinks. While no feeder link earth stations are currently in this band in New Zealand, there may be interest from these systems in locating new gateways in New Zealand in this band.

The Commenters oppose 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" WLAN allowed by the FCC negatively impacting satellite users in New Zealand.

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, IMT now has a large amount of spectrum available with more coming soon (*e.g.*, 3.6 GHz, 26 GHz). WRC-19 also identified over 17 GHz of high-band spectrum for IMT. 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 New Zealand.

The RSM should also note 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. For example, New Zealand has its national allotment at the orbital position of 152E in the Appendix 30B Allotment Plan. Deploying IMT in this band would likely undermine the future use of the band for FSS under the Allotment Plan.

In addition, the introduction of IMT in this band would also preclude opportunities for NGSO MSS systems (such as the new OmniSpace and EchoStar Global systems) to deploy feeder downlinks in this band in New Zealand in the future. Being a NGSO systems, feeder link earth stations would 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.

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?

The Commenters would agree to the inclusion of the 5925-6425 MHz band in the GURL-SRD for low power indoor and very low power outdoor deployments of WLANs based on the parameters expressed in the RSM's Discussion Document. The RSM proposal – maximum 24 dBm EIRP, 11 dBm/MHz EIRP density for low power indoor, and 14 dBm EIRP, 1 dBm/MHz EIRP density for very low power – 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 WLANs 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 spreading over the maximum WLAN channel bandwidth of 160 MHz. Such levels would be an appropriate baseline for the consideration of rules for low power indoor and very low power WLANs in this band. Consistent with the GURL-SRD framework, the Commenters expect that WLAN operations in this band would be a non-protected basis vis-a-vis primary services such as the FSS. In addition, the RSM may also want to consider whether out-of-band emission limits (which were adopted by the ECC) are also appropriate.

As explained below, the Commenters do not support "standard power" (i.e. higher powered) outdoor deployments of WLAN in this band, whether under the control of an automatic frequency coordination (AFC) system or not.

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?

Harmonizing New Zealand's 6 GHz WLAN standards with the ETSI EN 303 687 standard (once finalized) would enable New Zealand to take advantage of greater economies of scale in the production of WLAN devices. To fully take advantage of those economies of scale, however, New Zealand may also want to consider harmonizing its 6 GHz WLAN power levels with ones in ECC Decision (20)01 (see Response to Q3).

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

It is unclear whether there is demand for individually licensed 30-dBm WLAN devices. The Commenters would suggest that RSM first allow low-power and very-low power WLAN under a GURL-SRD framework, and then see if demand for individually licensed 30-dBm WLAN devices emerge. In such event, RSM will have to consider the status of licensed 30-dBm WLAN devices vis a vis the primary services in the same band, such as the FSS and the Fixed Service. As discussed in greater detail in Response to Q6, the Commenters are concerned that WLAN devices operating at power levels significantly higher than the ECC power levels, will pose a threat of interference into FSS uplinks in the long term.

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?

The Commenters do 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 United States.

Unlimited deployment of WLANs, 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 WLAN transmitter is expected to cause interference, an FSS uplink beam on a satellite will "see" all WLAN transmitters within its coverage area. At large enough levels of WLAN 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 WLANs into FSS uplinks in the 6 GHz band. It found that by 2025, at high levels of outdoor WLAN deployment (5% outdoors), aggregate interference from WLANs 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 WLANs).[4] In principle, however, WLANs operating under GURL-SRD framework are subject to non-interference non-protection condition and should not be allowed to cause as much interference into primary FSS. Following this study, the ECC established low power indoor and very low power limits to "help ensur[e] long term protection of FSS space stations from aggregate interference from WAS/RLAN devices."[5]

In the Commenters' view, the U.S. approach of allowing much higher powered "standard power" WLAN devices to be deployed outdoors (at up to 36 dBm EIRP and 23 dBm/MHz EIRP density for access points)[6] discounts the risks of aggregate interference into FSS uplinks. In effect, this

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

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

[6] *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.

approach assumes that levels of outdoor deployments would be similar to historical levels of outdoor WLAN 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 WLAN deployments. In turn, the deployment of more outdoor WLAN access points will likely lead to greater outdoor use of client WLAN devices (operating at up to 30 dBm EIRP and 17 dBm/MHz EIRP density).

The United States did impose an EIRP limit (21 dBm) in the skyward direction (at more than 30 degrees elevation) on unlicensed outdoor WLAN 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 very low power EIRP limit (14 dBm) adopted by the ECC for the long-term protection of the FSS.

The AFC system adopted by the United States to manage standard power outdoor WLAN access point devices is specifically not intended to provide protection against aggregate interference into the FSS. Instead, it is intended only to ensure that WLAN devices protect primary FS receivers operating in the same band using a database of licensed FS locations and frequencies. The Commenters note, 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 Commenters' view, there can be no assurance that WLANs operating under the GURL-SRD framework 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 WLANs.

Q7. Any other comments?