

**IMDA “Public Consultation on Proposed Allocation of 6 GHz Band in Singapore”
14 February 2023**

AVIA expresses its appreciation to IMDA for the consultation on the proposed allocation for WiFi (RLAN) in the frequency band 5925 – 6425 MHz in Singapore and is pleased to submit comments to the Consultation Paper published on 14th February 2023.

The frequency band 5925 - 6425 MHz is the key frequency band for uplinks to fixed-satellite service (FSS) “C-band” satellites and is often referred to as the “standard C” uplink band. The band is the most used C-band uplink band and is heavily used throughout the Asia Pacific region. Due to its unique resilience to rain fade, the band is crucial for a multitude of applications including feeder links for direct-to-home and cable-TV reception, distribution of TV content between studios, satellite news gathering, and distribution of non-linear video content through VSAT networks. These satellite uplinks are also used for a multitude of other applications such as corporate networks, data distribution, mobile backhaul, broadband connections to ships and other mobile terminals, disaster relief operation etc.

When considering how to allocate the frequency band 5925 – 6425 MHz for WiFi use in Singapore, AVIA believes that the appropriate technical measures to ensure co-existence between WiFi and FSS uplinks need to be applied. AVIA welcomes IMDA’s statement that there should be protection to the incumbent services when opening up this band for WiFi use. In this regard, AVIA would like to point out the following important factors regarding possible impacts to existing C-band uplink FSS operations:

- Possible interference into receiving satellites must be at an acceptable level; and
- The continuity of current operations of transmitting FSS earth stations and deployment of new transmitting FSS earth stations should be ensured.

Interference into Receiving Satellites

The frequency band 5925 - 6425 MHz used by receiving satellites and emissions from other transmitting sources than just the desired FSS earth stations (e.g. WiFi transmitters) could, without specific technical measures, create interference. It is understood that the emissions from one single WiFi transmitter might not create any noticeable interference into a receiving satellite, and even the aggregation of the emissions of all WiFi transmitters in Singapore might not create significant interference into a receiving satellite. However, as pointed out in the Consultation Paper, the use of the frequency band 5925 – 6425 MHz for WiFi would be a part of a global trend. Noting that C-band satellites in the Asia Pacific region traditionally have landmass coverage, therefore they have coverage over about 2/3 of the world’s population. The aggregation of interference from a vast number of WiFi transmitters over this entire area, without the right precautions, could create significant interference to the receiving satellite. Since the interference to the receiving satellite will be an aggregation of contributions originating from a large number of countries, it is not possible to hold one country responsible if interference should occur. Therefore, It is important that all countries abide by regionally/internationally recognized technical measures applied to RLAN equipment.

AVIA notes that IMDA is referring to studies conducted by CEPT and Ofcom. Such CEPT studies are referring to ECC Decision 20(01)¹ regarding the harmonized use of frequency band 5945 – 6425 MHz for Wireless Access Systems including Radio Local Area Networks (WAS/RLAN) which have been approved on 20th November 2020. Referring to ECC Decision 20(01), the following considerations need to be taken into account:

- 1) The WAS/RLAN devices shall comply with the technical conditions described in Annex-1 of ECC Decision 20(01).
- 2) The use of frequency band 5945-6425 MHz by WAS/RLAN equipment is on a non-exclusive, non-interference, and non-protected basis.
- 3) Allow free circulation and use of Very Low Power (VLP) portable equipment, which may also operate outdoor (in accordance with Annex 1 of ECC Decision 20(01)), and Low Power Indoor (LPI) equipment (in accordance with Annex 1 of ECC Decision 20(01)).

It is important that the above considerations should be incorporated into IMDA's decisions to assign the frequency band 5925 – 6425 MHz for WiFi use in Singapore.

Regarding Low Power Indoor (LPI) devices contained in Table 1 of Annex A of the Consultation Paper, AVIA notes that IMDA plans to allow 50 mW higher compared to the LPI devices limit contained in Annex 1 of ECC Decision 20(01). AVIA suggests that IMDA should be open to review such a higher maximum EIRP limit in the future, if the higher maximum EIRP limit is demonstrably creating interference problems to the receiving satellite that use the frequency band 5945-6425 MHz by RLAN equipment on a non-exclusive, non-interference, and non-protected basis.

AVIA would recommend that WiFi use in Singapore predominantly is for indoor deployment with certain power limits not exceeding those in Table 1 of Annex A to the Consultation Paper.

AVIA also notes that IMDA might later consider more widespread outdoor Wifi deployment at higher power levels in Singapore. We note that due to the lack of building penetration losses, the interference potential from an outdoor deployed WiFi transmitter into receiving satellites is far higher than that from indoor deployed WiFi transmitters. We therefore recommend that should there be any outdoor WiFi deployment, it is important that RLAN/WiFi equipment should be restricted to very low power complying with the limit contained in Table 1 of Annex A with maximum EIRP limit of 14 dBm.

Should there be any interference issues to the receiving satellite in the future due to WiFi deployment, IMDA should still be able to reconsider its decision in the future to review the technical measures which applied to LPI and VLP devices in the frequency band 5925 – 6425 MHz. In addition, AVIA would recommend IMDA to appoint an entity within IMDA which will be responsible to resolve interference problems to the receiving satellite in the frequency band 5925 – 6425 MHz due to WiFi deployment.

¹ Please see <https://docdb.cept.org/download/1448>

Deployment of Transmitting FSS earth stations

Regarding transmitting FSS earth stations in relation to WiFi deployment in Singapore, AVIA suggests that the following considerations need to be taken into account:

- Considering that RLAN equipment will be operated on a non-exclusive, non-interference, and non-protected basis, it is important that current transmitting FSS earth stations and its future development in the frequency band 5925 – 6425 MHz can continue to operate without additional constraints due to WiFi deployment in those bands. This also applies in respect of mobile and transportable earth stations, e.g. satellite news gathering stations, VSATs and ESVs, along with other types of earth stations located outside the main teleports. Transmitting FSS earth stations might cause interference to WiFi receivers operating at the same frequency in the vicinity. Therefore, WiFi receivers must expect that interference might occur if a transmitting earth station is operating at the same frequency band in the vicinity. This is aligned with the above considerations that RLAN equipments operate on a non-protected basis.
- Since Singapore is located close to the equator, transmitting FSS earth stations will usually operate with very high elevation angles. Therefore, only the far out sidelobes will be pointed in the direction of the ground. Consequently, the interfering levels produced by transmitting earth stations in the direction of WiFi receivers in Singapore will be significantly lower than in territories where typical elevation angles of transmitting earth stations are lower.
- Even though emissions from transmitting FSS earth stations could be at any frequency within the 5925-6425 MHz band, most transmitting earth stations, especially with the exception of large teleports, will individually only transmit a portion of the 5925-6425 MHz band, normally only up to some few Megahertz and rarely ever more than the bandwidth of one satellite transponder which normally is 36 MHz. This means that if the WiFi transmitter/receiver changes frequency to have no frequency overlap with the transmitting earth station, interference is avoided. AVIA therefore would recommend that IMDA encourage use of WiFi equipment that can dynamically change frequency if and when required noting that WiFi equipment that can even operate at WiFi bands other than 5925-6425 MHz, e.g. 2.4 and/or 5 GHz, would be in particular resilient to interference.
- Due to building penetration losses, WiFi receivers deployed indoor will be much less prone to interference from transmitting FSS earth stations than WiFi receivers deployed outdoor. Therefore, AVIA recommends that IMDA focus predominantly on indoor deployment of WiFi equipment.

Conclusions and, Recommendations

AVIA expresses its gratitude to IMDA, for providing its assurance that there shall be no impact to incumbent services operating in the 6 GHz band, such as fixed and fixed satellite services if the frequency band 5925 – 6425 MHz will be assigned for RLAN use in Singapore.

In order to ensure the continuity of the current FSS services in the frequency band 5925 – 6425 MHz, the following important considerations need to be taken into account:

- Aggregation of interference from all transmitting WiFi equipment within the coverage area of the receiving satellite must be at an acceptable level.
- Operation of current and future transmitting earth stations must not be hindered.

AVIA supports the technical measures contained in Table 1 of Annex A of the Consultation Paper to ensure the coexistence between RLAN and FSS in the frequency band 5925 – 6425 MHz for indoor and outdoor WiFi deployment. However, ideally, IMDA should still be able to reconsider its decision in the future to review technical measures contained in Table 1 of Annex A of the Consultation Paper should there be interference problems for the receiving satellite due to RLAN deployment in Singapore.

AVIA recommends to appoint an entity within IMDA which is responsible to resolve any interference problems to the receiving satellite in the frequency band 5925 – 6425 MHz due to RLAN deployment in Singapore.

AVIA recommends IMDA publish its decision regarding WiFi deployment in the frequency band 5925 – 6425 MHz, including the technical measures applied to WiFi equipment, to ensure coexistence between WiFi and FSS.

While AVIA would support predominantly indoor WiFi deployment in the frequency band 5925 – 6425 MHz, with certain technical measures as contained in Table 1 of Annex A of the Consultation Paper, AVIA would advise that any WiFi outdoor deployment should comply with the very low power limits as contained in Table 1 of Annex A of the Consultation Paper

The use frequency band 5925-6425 MHz by RLAN equipment on a non-exclusive, non-interference, and non-protected basis should be incorporated in IMDA decision regarding RLAN deployment in the frequency band 5925 – 6425 MHz.

AVIA hopes IMDA finds these comments useful and would welcome any questions or clarifications from IMDA.

About the Asia Video Industry Association (AVIA)

AVIA is the non-profit trade association for the video industry and ecosystem in Asia-Pacific. Our members include major program content providers, broadcasters and operators distributing video content in the Asia Pacific region. It serves to make the video industry stronger and healthier through promoting the common interests of its members. AVIA is the interlocutor for the industry with governments across the region, leads the fight against video piracy and provides insight into the video industry to support a vibrant industry ecosystem.