Inmarsat response to

ACMA DRAFT FIVE YEAR SPECTRUM OUTLOOK 2023-28

12 May 2023

Inmarsat welcomes the opportunity to comment on the Australian Communications and Media Authority (**ACMA**)'s draft Five Year Spectrum Outlook (**FYSO**) 2023-28 and is pleased to provide comments particularly for the Q/V-band, L-band, 6 GHz and Drone spectrum regulation.

Inmarsat looks forward to engaging with the ACMA in more detail on these bands and other issues in the coming months as consultations are issued by the ACMA.

General Comments

Inmarsat launched in 2021 the first Inmarsat-6 satellite (**I6 F1**), covering the Asia Pacific region, including Australia. I6 F1 operates in the L-band, C-band and Ka-band, to provide connectivity to a wide range of applications including the Broadband Global Area Network (**BGAN**), Internet of Things (**IoT**), unmanned aircraft system (**UAS**) and earth stations in motion (**ESIM**).

Inmarsat plans to further expand its Global Xpress (**GX**) network with additional Ka-band satellites, known as GX-7, GX-8 and GX-9, which are planned to be launched in the 2025 – 2026 timeframe. These satellites have an improved fully reconfigurable Ka-band payload for the GX services, with the ability to adjust their coverage, capacity and frequency to address the high demands of the mobility market, in particular for broadband connectivity to ships and aircraft.

Q/V band (40 GHz, 46 GHz and 47 GHz)

The ACMA indicates that it will continue to monitor the domestic and international developments in the Q/V bands:

- 40 GHz (37 – 43.5 GHz)
- 46 GHz (45.5 – 47 GHz)
- 47 GHz (47.2 – 48.2 GHz)

Inmarsat is disappointed in the ACMA's plans, which go no further than monitoring the situation. As highlighted in our past responses to the ACMA on its FYSO 2020-24, FYSO 2021-26, FYSO 2022-27 and other correspondence with ACMA, the above frequency bands and the band 48.2 – 52.4 GHz (referred to in the current FYSO) are important to the satellite community generally and to Inmarsat in particular.

Examples of allocating the bands 37.5 – 40.5 GHz, 47.2 – 50.2 GHz and 50.4 – 51.4 GHz for fixed satellite service (**FSS**):

- In Europe, the Electronic Communications Committee (**ECC**) has published its decision for the use of bands 47.2 – 50.2 GHz and 50.4 – 52.4 GHz by the FSS (Earth-to-space)[1], and bands 37.5 – 39.5 GHz and 39.5 – 40.5 GHz by FSS (space-to-Earth)[2]. This is to facilitate the high-density fixed satellite service (**HDFSS**) intended to be deployed on an uncoordinated basis for direct customer access within the frequency range 37.5 – 40.5 GHz, 47.2 – 50.2 GHz and 50.4 – 52.4 GHz, for very high data throughput on satellite systems to provide necessary backhaul capabilities for broadband connectivity for aircraft and vessels. The FSS gateway stations also utilise these frequency bands for feeder links. There is also a new ECC decision currently being developed for the use of band 40.5 – 43.5 GHz, for mobile/fixed communication networks (**MFCN**) and coordinated earth stations.
- In the United States, the Federal Communications Commission (**FCC**) has adopted rules permitting exclusive FSS use of the distinct HDFSS identifications in ITU Region 2 (48.2 – 50.2 GHz Earth-to-space and 40.0 – 42.0 GHz space-to-Earth).[3] In the remaining segments of the above bands, FSS use is permitted on a shared basis with terrestrial users, subject to interference protections (to terrestrial stations in the Earth-to-space bands, and to FSS earth stations in the space-to-Earth bands) set forth in the FCC's rules.[4]

Since the ACMA is aiming to support opportunities for better telecommunications services in regional and remote Australia through the spectrum and licensing allocation processes, including by the rapidly growing satellite sector, Inmarsat urges the ACMA to ensure there is no impediment to licensing of earth stations in the Q/V bands.

1.5 GHz (1427–1518 MHz) and Extended MSS L-band (1518-1525 MHz and 1668-1675 MHz)

Inmarsat notes that the ACMA has decided to release an options paper for the extended L-band (1518 – 1525 MHz and 1668 – 1675 MHz) for mobile satellite service (**MSS**) in Q2 2023. Inmarsat looks forward to the consultation paper and will provide our feedback.

Inmarsat-6 F1 satellite which launched in December 2021 provides L-band MSS capability in the frequency bands 1518 – 1559 MHz (space-to-Earth), and 1626.5 – 1660.5 and 1668 – 1675 MHz (Earth-to-space). Access to the extended L-band in Australia is important to Inmarsat, to address the growing demands on capacity and applications from emergency responders, military users and diverse industries, including the transportation, energy, and agriculture sectors.

Regarding plans for consideration of the 1.5 GHz band (1427 – 1518 MHz), Inmarsat concurs with the suggestion for an options paper in Q2 2024, noting that in general there remains little demand from the mobile industry for use of this band.

[1] CEPT ECC Decision (21)01, https://docdb.cept.org/download/3733.
[2] CEPT ERC Decision (00)02, https://docdb.cept.org/download/3724.
[3] 47 CFR §2.106 (United States Table columns).
[4] *Id.*; *see also* 47 CFR §25.136(b, c) (37.5-40 GHz), (d) (47.2-48.2 GHz), and (e) (50.4-51.4 GHz).

6 GHz (5925 – 7125 MHz)

The frequency band 6425 – 7025 MHz is allocated to several services, including the FSS. MSS systems use part of this band for their feeder links, which is an application of the FSS. There are existing operational FSS and MSS networks using this frequency band with coverage over Asia Pacific region, which require protection from interference from terrestrial services.

Inmarsat uses part of the frequency band to provide feeder uplinks from gateway stations in Australia and elsewhere. These feeder uplinks support the L-band MSS service which are used for safety and critical communications on land, on ships and on aircraft. The introduction of new mobile systems into the upper 6 GHz band could therefore cause interference to the Inmarsat satellites, disrupting important L-band services, used throughout Australia and the wider region.

Inmarsat does not oppose the consideration of use of the 6425 – 7125 MHz (upper 6 GHz band) for Radio Local Area Networks (**RLANs**). In the lower 6 GHz band (5925 – 6425 MHz), RLAN systems have been authorised in Australia and elsewhere with power limits intended to ensure compatibility with FSS uplinks. A similar approach could be taken with the upper 6 GHz band, and this may offer an efficient solution to supporting the needs for wireless broadband in a manner compatible with existing uses (FSS and FS). We note that the ACMA seeks to consider use of the band 6425 – 7025 MHz for high-power RLAN devices, potentially under the control of an automatic frequency coordination (**AFC**). High-power RLAN use of this band may result in interference into FSS uplinks, even with use of an AFC system, and hence this use would need to be carefully assessed, taking into account that a GSO satellite receiver may receive interference from terrestrial systems deployed across about one third of the Earth's surface.

Considering that Australia and several other countries have already adopted technical conditions for use of the lower 6 GHz band for RLAN that enable its use while remaining compatible with FSS uplinks, Inmarsat urges the ACMA to adopt similar technical conditions for the *upper* 6 GHz band: i.e. maximum 24 dBm EIRP, 11 dBm/MHz EIRP density for low power indoor (**LPI**) and lower limits for very low power (**VLP**) outdoor deployments.

Regarding the potential use of upper 6 GHz band for IMT systems, several studies have been carried out in the scope of WRC-23 agenda item 1.2. Studies conducted by Inmarsat and several other ITU members show that IMT use would cause harmful interference to FSS uplinks. While there are other studies which claim to show that IMT would not cause harmful interference, they are based on flawed assumptions and in some cases on technical analyses that appear to be incorrect.

Considering the quantity of spectrum, the ACMA plans to make available for IMT systems in the C-band downlink spectrum (3400 – 4000 MHz), and the availability of the 26 GHz band (currently barely used), there does not seem to be a good case for considering the upper 6 GHz band for IMT further.

Taking account of the risk of interference to satellite uplinks, and the available alternative bands for IMT, the ACMA should not consider use of the upper 6 GHz band for IMT systems.

Drone spectrum regulation

Inmarsat concurs with the ACMA that there is increasing interest in the use of drones and that spectrum is likely to be needed for both payload communications, and Control and Non-Payload Communications (**CNPC**). Any work to develop new regulatory framework for drones may need to take account of the potential use of L-band MSS and Ka-band ESIM for some applications.