

7 July 2019

Ms. Aliene Chia,
Director General (Telecom and Post)
Deputy CE (Policy, Regulation and Competition Development)
Infocomm Media Development Authority -IMDA
10 Pasir Panjang Road
#03-01 Mapletree Business City
Singapore 117438

Subject: Second Consultation on 5G Mobile Services and Networks

Dear Ms. Chia,

We refer to the following:

- IMDA's second public consultation on the 5G mobile services and networks issued on 7 May 2019 (Consultation), and
- Inmarsat's response to the first public consultation on 5G mobile services provided to IMDA on 3 July 2017 (First Response).

At the outset, we wish to thank IMDA for giving the opportunity to the industry and members of the public to participate in the Consultation and we are pleased to provide our response herein.

This document is organised in two separate sections covering respectively the L-band and Ka-band (specifically the 28GHz band as referred to in the Consultation), which represent vital spectrum resources used by Inmarsat and other satellite services providers to enable satellite services offering across the globe. For IMDA's ease of reference, Inmarsat will refer to the relevant questions in the Consultation which are associated with each of the sections, whenever applicable.

L-band

Note: The comments in this section partially address Question 4/Part i) of the Consultation, whereby IMDA "*seeks views and comments on whether the industry agrees with the timelines on the expected availability of the next wave of 5G spectrum*".

The 1.4 GHz (L-band) appears in Table 1 of the Consultation as part of the next wave of 5G spectrum identified by IMDA. A portion of the band (i.e. 1452-1492 MHz) is currently available for trials in Singapore.

Inmarsat's L-band MSS, which operates in the 1518-1559 MHz (space-to-earth) and 1626.5-1660.5 and 1668-1675 MHz (earth-to-space) frequency bands, is used for safety of life communications and mission-critical voice and data services in Singapore and around the globe. The 1.4 GHz band under consideration in this Consultation is directly adjacent to the L-Band MSS allocation, and studies done internationally have determined that there is significant risk of harmful interference posed to MSS operations by the introduction of new IMT operations below 1518 MHz.

Inmarsat agrees with IMDA's proposal to delay consideration of introducing 5G in the 1.4 GHz (L-Band) spectrum band at this time. As IMDA notes in the Consultation, studies are underway regarding the coexistence of new IMT operations in 1427-1518 MHz with MSS operations above 1518 MHz. These studies, being conducted at the ITU and in Europe, and being followed closely by APT, have demonstrated that IMT deployment in the band 1492-1518 MHz poses a serious risk to MSS operations above 1518 MHz.

IMDA notes that some approaches to addressing the interference caused to MSS from new IMT below 1518 MHz include implementation of a guard band between IMT and MSS, and limits on the IMT out-of-band emissions into the MSS band. While this is true, the 3 MHz guard band mentioned by IMDA would not be enough to protect current and future MSS terminals operating above 1518 MHz. Indeed, in Europe it has been recognized that the technical parameters contained in the relevant EC Decisions alone will not be sufficient to protect MSS terminals from harmful interference unless additional conditions are applied to the new IMT licenses. EC Decision 2018/661 specifically states that "further measures may be needed at national level to enhance coexistence with services in the adjacent . . . 1518-1559 MHz frequency bands." Such further measures are necessary due to the substantial risk of harmful interference posed to L-Band MSS operations from adjacent IMT deployments. MSS terminals are designed to receive relatively faint signals from geostationary satellites ~36,000 km above earth, while in motion. They must be extremely sensitive in order to receive such a distant signal. When IMT base stations are deployed geographically much closer to these terminals in adjacent spectrum, the MSS terminals are susceptible to harmful interference from IMT out-of-band emissions and receiver overload in the MSS terminal.

Inmarsat understands that IMDA's current proposal does not contemplate action on the 1427-1518 MHz band in the near term. Additionally, current IMT operations in the band are limited only to trials being conducted in the 1452-1492 MHz portion of the 1400 MHz band. For IMT operating in this segment of the band, no special measures are necessary regarding protection of MSS operations. However, if IMDA decides to take future action to make available the 1492-1518 MHz portion of the band—even on a trial basis—these frequencies should be subject to protective measures imposed as conditions on the new IMT authorizations. Prior to authorizing any new IMT operations in the 1492-1518 MHz band segment, IMDA should undertake a further public consultation on the necessary protective measures. Among the measures to be applied to IMT operations in 1492-1518 MHz that should be considered in any future consultation are a combination of frequency separation, in band e.i.r.p. limits, out of block e.i.r.p. limits, PFD limits in critical areas such as ports and airports, and deployment restrictions. IMDA also would need to carefully define the critical areas for protection of MSS operations (including airports, coastal areas, and navigable waterways).

Should IMDA decide to take further action on the 1.4 GHz band in the future, Inmarsat looks forward to the opportunity to participate in a Consultation regarding protective measures for MSS operations, and would present detailed technical information at that time.

Ka-Band (28Ghz Band)

Unlike for the other spectrum bands identified by IMDA for 5G, whether as part of the Initial Wave or the Next Wave, it appears that IDMA did not raise a specific question in relation to the 26GHz and 28GHz bands in the Consultation document. The comments set below reflect Inmarsat's position with regards to the potential identification of the 28 GHz band for Mobile Services.

Inmarsat respectfully reiterates its call for IMDA to drop any intention to use 28GHz band for mobile broadband as expressed previously in the First Response. As IMDA is surely aware, extensive

discussions have already taken place at WRC-15 in order to reach consensus with regards to candidate bands to be studied for IMT identification during WRC-19 in a globally harmonised way. Global, or at least regional, harmonisation reached at ITU throughout WRC cycles is the only viable way to ensure an efficient use of spectrum, a smooth and swift introduction of new services, economy of scale and its benefits to end users and to the others stakeholders in the ecosystem, as well as the protection of existing services and the important investments attached to them. It also ensures regulatory certainty which is much needed to enable innovation and new investments in the medium and long terms, especially by global players in the telecommunications market.

In excluding 28 GHz band from the candidate bands for IMT, the ITU recognised the critical role of this band for the sustainability of satellite services.

Considering the above, and given the large amount of spectrum identified by IMDA in the Initial Wave as well as in the Next Wave, which exceeds IMDA's own estimations of spectrum identification requirements for 5G, Inmarsat has difficulties to understand the need to include the 28 GHz band in the Initial Wave and to change the status of MS to Primary in this band. Inmarsat sees no benefits in bringing back the possible identification of this band for IMT at this stage. To the contrary, this would be considered as a wrong signal that may indicate that all the efforts made so far during the WRC cycle, which are mainly intended to ensure globally harmonised new identifications for IMT, may not be successful.

While the 28 GHz band has not been retained by ITU as a candidate band to be studied for possible identification for IMT-2020/5G during WRC-19, ESIMs will likely be allowed to operate in this band as a result of a new Resolution being developed for the same conference, under Agenda Item 1.5. Accordingly, should IMDA decide to proceed with its plans to make the 28 GHz available for IMT-2020/5G despite what is cited above, IMDA is respectfully requested to ensure that 5G deployment in the 28 GHz band is compatible with the deployment of ESIMs in the same band in Singapore, and that FSS deployments in this band in neighbouring countries are adequately protected.

I trust the above is of assistance. In the meantime, I remain available to provide you with further information or clarification on this submission if required.

Sincerely,

A handwritten signature in blue ink, appearing to be "ZM", written in a cursive style.

Zeina Mokaddem

Director, Regulatory and Market Access