

24 February 2021

Kaisa Laitinen
Ministry of Transport and Communications
Eteläesplanadi 16
Helsinki

RE: Public Consultation on VN/1484/2021

Dear Ms. Laitinen:

Inmarsat hereby respectfully submits the attached response to LVM's consultation No. VN/1484/2021, which we understand includes plans for current and future operations in the 1.5 GHz band. We appreciate LVM distributing this draft decree for comment, and Inmarsat welcomes the chance to participate in the review process. Consultations are an important opportunity for operators to contribute, and LVM has taken a thoughtful and considered approach to sharing its latest frequency plans.

There are several discussion points outlined in the draft decree, including LVM's future vision for the 1.5 GHz band, and plans to introduce shared access to the frequencies by military and wireless broadband operators. We do not specifically comment on the "dynamic sharing" feature in this response; as we understand it, this functionality would be limited to the lower portions of the L-band and should not negatively affect or restrict future network implementation for Inmarsat.

Inmarsat's primary concern with the draft decree relates to the upper portions of the L-band (1492-1517 MHz), which are directly adjacent to the frequencies we rely on for many key networks and services for our customers. Accordingly, we share with you the following response, and our recommendation that LVM avoids licensing for mobile systems in the upper portion of the L-band – in line with the approach taken by other countries. If it is however decided to proceed with licensing in the upper portion of the L-band, LVM would need to establish necessary measures to protect existing services. Inmarsat operates critical communications networks in the adjacent band in Finland, and these services could be negatively affected by harmful interference from adjacent operations absent suitable protective measures.

Inmarsat appreciates this opportunity to contribute to LVM's consultation on the draft decree and share our views on future L-band operations. We look forward to further discussing these points, as necessary, and participating in future phases of LVM's important spectrum management activities.

Respectfully submitted,



Donna Bethea-Murphy
Sr. Vice President Global Regulatory

I. Introduction

As a global provider of wireless broadband communications, Inmarsat understands the importance of adopting appropriate policies, and making sufficient spectrum available to enable the full benefits of broadband connectivity. Inmarsat is the leader in mobile satellite communications, and currently operates a global system of 13 satellites and associated ground infrastructure that offers a wide range of communications solutions to customers on land, in the air, and at sea in L-band, S-band and Ka-band spectrum.

Inmarsat comments here to emphasize the importance of its Mobile Satellite Services (MSS) operating in the L-band (1518-1559 MHz band, space-to-earth), which is directly adjacent to the frequencies referenced in the current consultation, 1427-1518 MHz (1.5 GHz band). While we appreciate LVM sharing its plans for these frequencies, it is important to note the potential for interference to services operating in adjacent bands. Inmarsat's MSS operations – on land, in air, and at sea – could be subject to substantial harmful interference from adjacent terrestrial wireless broadband communications, if such operations are introduced without necessary protective measures.

As further detailed in the following response, we ask LVM to consider two actions as part of this review: (i) refraining from new licensing or authorisation in the upper portions of the 1.5 GHz band (1492-1518 MHz), or (ii) implementing protective measures to guard Mobile Satellite Services currently operating in the 1518-1559 MHz band. We offer additional background and detail on these suggestions in the following comments.

II. MSS operations

Inmarsat's L-band MSS network operates in the 1518-1559 MHz (space-to-Earth) and 1626.5-1660.5 and 1668-1675 MHz (Earth-to-space) frequency bands, and is used for safety-of-life communications and mission-critical voice and data services around the globe.

Geographically, key L-band MSS applications are deployed throughout the land, skies, and seas. Land-based mobile earth terminals are relied upon all over the territory of Finland by emergency responders, military users, and diverse industries including the transportation, energy, and agriculture sectors for mission-critical voice and data applications. These terminals are used for essential public protection and disaster response coordination and communications. Where terrestrial infrastructure is overloaded, unreliable, or is simply not available, these terminals ensure that life-saving services are delivered when and where they are needed.

Additionally, land-based MSS services are key to important economic sectors on a daily basis. Energy production and distribution, transportation, construction, and other industries use MSS terminals to provide mobile communications with a level of reliability and ubiquity not delivered over terrestrial networks.

Inmarsat's MSS operations also support essential maritime and aeronautical communications. The provision of both aviation and maritime safety services are mandated to Inmarsat by the

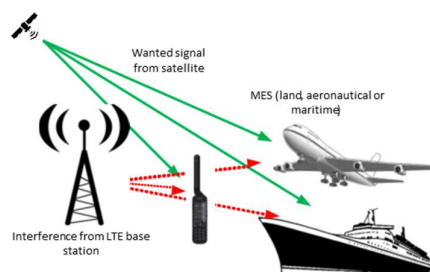
International Maritime Organisation (IMO) and International Civil Aviation Organization (ICAO), and therefore safety has always been at the core of Inmarsat services and user equipment.

L-Band MSS terminals enable those in the maritime industry to comply with IMO Safety-of-Life At Sea (SOLAS) communications equipment requirements (including Global Maritime Distress and Safety System (GMDSS) requirements), which are mandatory in some areas. The industry also relies on MSS terminals for compliance with EU-specific monitoring and reporting requirements, such as Consolidated European Reporting System (CERS) and Vessel Monitoring System (VMS) requirements. Ships from around the world rely upon MSS terminals to meet these obligations, including ships and foreign commercial vessels that come to Finland. Inmarsat communications services such as Fleet Broadband and Swift Broadband provide broadband connectivity to ships and aircraft wherever they operate.

Additionally, satellite communications in this band support the Aeronautical Mobile Satellite (Route) Service (AMS(R)S), and are important for ensuring flight safety. A satellite communications terminal is required to fly in high-capacity oceanic airspace such as the North Atlantic organised tracks, and operators must ensure the equipment is operable prior to dispatching the flight. Airlines are also expecting to make greater use of L-band MSS in the future to support the “GADSS”, and the MSS in this frequency band is a key component of the “Iris” next generation air traffic management system being developed by the European Space Agency.

III. Potential interference to L-Band MSS operations

Regarding interference, studies conducted at the ITU and CEPT have demonstrated that mobile broadband systems in the band 1492-1517 MHz pose a serious risk to MSS operations above 1518 MHz because of the susceptibility of MSS terminals to harmful interference from out-of-band emissions and receiver overload. 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 mobile broadband base stations are deployed geographically much closer to these terminals in adjacent spectrum, the MSS terminals can receive two different types of interference. First, out-of-band emissions from mobile broadband base stations into the MSS band can cause harmful interference to MSS terminals at power levels that are much lower than would typically cause interference to terrestrial mobile broadband terminals. Second, high-powered mobile broadband transmissions from just outside the MSS band can overload MSS terminal receivers, blocking the terminals from being able to connect to the satellite network, irrespective of the frequency of the desired MSS signal.



The distance within which interference occurs varies depending on system characteristics, but can be as much as 20 km from the mobile broadband base station. If deployed without mitigations, interference from mobile broadband transmissions in the 1427-1518 MHz spectrum could cause substantial disruption to MSS operations in Finland. Without appropriate conditions in place to protect the MSS, base stations deployed near to ports, coastlines, and inland waterways could prevent ships from using their satellite terminals, including the mandatory testing of terminals before departure. If the terminal is unable to pass a required systems test, the ship cannot legally sail. Similarly, mobile base stations deployed near to airports could prevent aircraft from being able to perform vital equipment checks before take-off. If the terminal is not able to be successfully tested at the airport prior to takeoff, a plane will have to adjust its route, resulting in travel delays and unknown economic impacts.

IV. Regulatory measures to protect MSS operations

As noted in the draft decree, we understand LVM is considering possible additional licensing in the 1.5 GHz band – depending on future demand for these frequencies. While we have already outlined the significant interference concerns posed by allowing further licensing in the upper portions of the band, we also reviewed which MSS terminals are currently in use in Finland, and are thereby most likely to be impacted by authorizing additional use in the upper L-band.

As displayed in the enclosed coverage map, Inmarsat relies on several key ports and airports across Finland to support our MSS operations. It is critical that these locations remain fully protected from interference from proposed mobile base stations or other operations in the 1427-1518 MHz band. Moreover, Inmarsat has identified several areas of use, including for mission-critical situations, of land-based MSS terminals. These additional areas should be protected as well, to ensure compatibility with current and future MSS operations in Finland.

Given the above background and analysis, Inmarsat recommends that LVM avoid authorizing terrestrial mobile systems in the upper part of the 1.5 GHz band (1492-1517 MHz) at this point in time. This approach allows for the protection of critical MSS services and enables LVM to tailor their approach to when a concrete demand to use the upper part of the band 1492-1517 MHz emerges. As the draft decree explicitly references, there has not been any significant demand for licensing in the band to this point, and it is not clear what future demand will look like for these frequencies in Finland going forward.¹ Inmarsat is aware that Norway has recently decided to defer licensing of the 1.5 GHz band, citing limited demand, and several European countries (e.g. the Netherlands, Germany, Malta) have committed to authorize only the central part of the 1.5 GHz band (1452-1492 MHz).

Consequently, Inmarsat proposes that LVM avoids licensing operations for these channels until future demand is demonstrated, and later generations of MSS terminals have been more widely deployed. Furthermore, if future demand ultimately dictates a need for licensing in additional

¹ *RADIOTAAJUUKSIEN KÄYTÖSTÄ JA TAAJUUSSUUNNITELMASTA ANNETUN VALTIONEUVOSTON ASETUKSEN MUUTTAMINEN* (“Suomessa langattomien laajakaistaverkkojen rakentamiseen on tällä hetkellä saatavilla runsaasti taajuuksia eikä kyseiselle taajuusalueelle ole ilmennyt toistaiseksi suurta kysyntää. Lisäksi taajuusalueesta ei ole vielä koordinointisopimusta Venäjän kanssa, mikä rajoittaa taajuuksien käyttöä Itä-Suomessa. Edellä mainituista syistä taajuusaluetta ei ole vielä otettu langattoman laajakaistan käyttöön.”)

1.5 GHz band spectrum, we recommend that LVM conduct a separate consultation to evaluate the measures necessary to ensure compatibility with adjacent band services. In this case, we would recommend that LVM looks to adopt robust protection measures to guard against potential interference, including PFD limits to protect the various airports, ports, coastal areas, and inland waterways. CEPT ECC Report 299 provides guidance to administrations on the PFD limit values that would need to be implemented. Prior to instituting any of the aforementioned protective measures, it would be useful to further engage on potential solutions to ensure the right mechanisms are in place to guard critical networks and services and Inmarsat could provide more detailed information regarding the protection measures and critical locations of use.

V. Summary comments

Inmarsat thanks LVM for the opportunity to comment on the draft decree, and we would appreciate LVM considering the above-proposed recommendations on the 1.5 GHz band. Operations in this band are key for Inmarsat, and used to support many critical land, air, and maritime operations throughout Finland. We would thus suggest LVM:

- Avoid additional licensing in the upper part of the 1.5 GHz band – particularly given current limited demand.
- Institute any necessary airport and port protection measures, if LVM ultimately permits further licensing in 1.5 GHz.

Inmarsat appreciates LVM's consideration of these measures and we would be pleased to engage with the administration further to answer questions, discuss the details of these proposals, and share any further relevant information that may develop.