



May 10 2023

**Nasjonal Communications Authority (Nkom)
Nygård 1, Lillesand,
Aust-Agder 4790,
NORWAY**

VIA EMAIL: firmapost@nkom.no
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RE: Written comments from Inmarsat to the “Initial hearing for allocation of the 1500 MHz and 26 GHz bands” in Norway

Dear Ladies and Gentlemen:

Pursuant to the aforementioned public consultation, Inmarsat submits written comments on the *Initial Hearing for the Allocation of the 1500 MHz and 26 GHz bands* in Norway. In order to support an optimum use of the spectrum, it is important to ensure the protection of current mobile satellite services (“MSS”) L band service and terminal use from future IMT deployments, and Inmarsat welcomes the opportunity to comment on this matter.

Inmarsat. Innovative developments and applications.

Inmarsat is the leader in global mobile satellite communications, operating a system of 14 satellites that provide communications solutions to customers on land, in the air and at sea. The company has a long history of operating reliable global mobile satellite telecommunications networks, supporting business applications and mission-critical security and operational applications for more than 40 years.

Inmarsat continues to innovate as the need for ubiquitous and secure connectivity grows. This includes our recently announced the launch of Orchestra, a multidimensional, global, dynamic mesh network that will support the growing Internet of Things at scale with high mobility capacity around the world with high speeds and low average latency. It will provide seamless mesh configuration of Inmarsat's ELERA (L-band) and Global Xpress (Ka-band) networks with terrestrial mobile and Low Earth Orbit ("LEO") capability creating a single advanced communications solution.

Additionally, there is a strong and growing demand for MSS in the 1.5 GHz band, in both the 1518-1525 MHz and 1668-1675 MHz band segments (the "Extended L-band") and in the "standard L-band" 1525-1559 MHz and 1626.5-1660.5 MHz segments. Inmarsat L-band satellite terminals are also used on-board vessels, bringing constant all-weather data connectivity across oceans and seas. In addition, Inmarsat L-band satellite terminals operate on-board aircraft, and provide real-time information relating to flight progress, weather, and engine and aircraft performance. Both Air Traffic Control and Airline Operational Communications benefit from the Inmarsat's ELERA network for more efficient routing, improving the communications between aircraft and their airline operations center.

To support the growing demand for L-band MSS, Inmarsat launched its Inmarsat-6 ("I-6") F1 satellite in December 2021 and its Inmarsat-6 ("I-6") F2 satellite in February 2023. I-6 is the first hybrid MSS satellite operating in the L-band (1525-1559 MHz and 1626.5-1660.5 MHz), Extended L-band (1518-1525 MHz and 1668-1675 MHz), and Ka-band (GX).

The significant risk of harmful interference

The use of the 1492-1517 MHz band by Terrestrial Mobile LTE systems poses a significant risk of harmful interference to MSS operations from out-of-band emissions and receiver overload in the MSS terminals, which is recognised by NKOM in the consultation document. MSS terminals receive signals in the band 1518-1559 MHz transmitted from geostationary satellites, 36000 km from Earth. They require sensitive receivers that can be harmed by much higher power signals from IMT systems in the adjacent frequency band.

Inmarsat, respectfully emphasizes, the need to establish mandatory (and enforceable) technical rules to ensure operational compatibility between the terrestrial and satellite services before any IMT/LTE system is authorized in the band 1492-1517 MHz. In particular, power flux density limits will need to be established to protect MSS operations at ports/waterways and airports where MSS terminals are in regular use. Additional protections could include frequency separation below 1518 MHz, i.e., enforcement of a formal frequency guard band together with LTE base station deployment restrictions in critical areas like airports and harbors. Without such protections, the introduction of IMT/LTE networks into the 1492-1518 MHz band could disrupt critical land based, maritime and aeronautical safety operations in Norway.

With reference to studies conducted at the International Telecommunication Union ("ITU"), the European Conference of Postal and Telecommunications Administrations ("CEPT"), and elsewhere demonstrated that the deployment of IMT/LTE networks in the 1427-1518 GHz band will pose a significant risk of harmful interference to MSS operations due to out-of-band emissions and receiver overload at MSS terminals. Therefore, without adequate protections, such as frequency separation below 1518 GHz, power limits imposed on IMT/LTE networks, and IMT/LTE base station deployment restrictions in critical areas of airports and ports, the

introduction of IMT/LTE networks in the 1492-1518 GHz band could jeopardize the continued reliability of these essential satellite communications systems. This new harmful interference could disrupt critical operations, prevent the achievement of government objectives, require an untimely and costly upgrade of government communications equipment, and ultimately cause substantial damage to socioeconomic development.

The protection of ports and airports is crucial not only because of Norwegian ships and aircrafts but also due to ships and airplanes coming from other countries that use Inmarsat services to provide critical services, including safety services mandated by IMO and ICAO (GMDSS and AMS(R)S). The non-protection of the terminals could impact the connectivity needed in most of the main trade ports for Norway. Operations at major airports in Norway could be disrupted if aircraft are unable to operate their Inmarsat Satcom terminals before take-off.

It is equally important to protect land-based terminals, including those that are used for military, government, mining, transport, agriculture, tourism and humanitarian purposes. There is extensive use of land MSS services in Norway, which are used in rural and urban areas. To provide compatibility with those services the most practical solution is to reassess assigning the band to IMT at this time, as it this has been done in many European countries due to the lack of demand. Alternatively, Nkom could consider limiting the use of the upper band - 1492-1518 MHz - to allow indoor use only or very low power devices that could be compatible with land-based MSS operations.

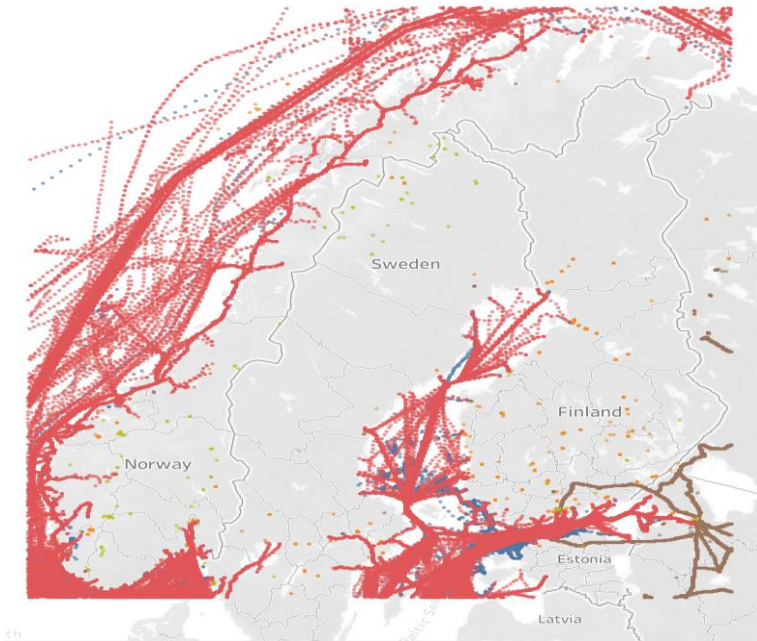
If Nkom authorizes IMT/LTE networks in the upper part of the 1500 MHz band (1492-1517 MHz), it would need to establish mandatory and enforceable technical rules to ensure operational compatibility between the terrestrial and satellite services. In particular, power flux density limits would need to be established to protect MSS operations at ports/waterways and

airports where MSS terminals are in regular use in Norway. Additional protections could include unwanted emission limits for SDL base stations and frequency separation below 1517 MHz, i.e., enforcement of a guard bands. Even with these measures, land MSS operations would remain at significant risk of interference.

Inmarsat has previously worked with spectrum regulators including in Belgium, Brazil and Slovenia to help establish the critical locations needing protection measures – ports, waterways, airports as well as land-based terminals at determined locations – using our terminal position data. The figure below gives the position reports provided by some Inmarsat maritime and terminals in and around Norway over a period of time. (Aircraft use is extensive but is not shown, to avoid obscuring the map). Inmarsat's L-band MSS services are used extensively across Norway's territory and its coastline.

In a preliminary analysis, we have identified the use of Inmarsat L band terminals in:

- well over 200 ports (maritime)
- over 35 airports (aeronautical)
- several locations across the country (land).



Given the above and within this consultation process, Inmarsat recommends carrying out all the necessary procedures for the protection of the MSS, taking into account that the 1492-1518 GHz band for future IMT/LTE networks deployments could jeopardize the continued reliability of these essential satellite communications systems. This new harmful interference could disrupt critical operations in the Norwegian economy and maritime, aeronautical, and land mobile industries and prevent the achievement of government objectives and public policies.

Conclusion.

In question 6 of the consultation document, Nkom asks about other considerations that should be taken in relation to other frequency uses. As has been analyzed in this document, current MSS services in the 1518-1559 MHz frequency band provide critical communications for public institutions and industrial users. The band is used to comply with public security and safety services and support social and productive sectors in Norway, especially in operations related to

maritime, aeronautical and land mobile, as well as those for humanitarian aid and disaster operations. There is also a growing demand for L Band MSS and therefore it is important to protect current and growing MSS services.

There are a lot of technical details to be resolved to ensure adequate compatibility measures between IMT/LTE networks and MSS, and those details partly depend on the choices of IMT/LTE technology and frequency arrangements. Inmarsat is keen to engage further dialogue with Nkom to assist in defining the compatibility measures suitable to enable both IMT/LTE and MSS to flourish in Norway.

Inmarsat appreciates this opportunity to contribute to the public consultation in Norway. Given the significant challenges with IMT/LTE deployment into the 1427-1518 GHz band, Inmarsat respectfully suggests that competent authorities ensure viability, continued growth and the protection of L-band MSS services above 1518 GHz before any IMT/LTE system is authorized.

Respectfully submitted,

INMARSAT, INC.

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