

**Inmarsat response to
RSM 24 – 30 GHz Use in New Zealand Discussion Document**

10 June 2021

Inmarsat welcomes the opportunity to comment on the Radio Spectrum Management (RSM)'s discussion document on 24 – 30 GHz use in New Zealand (the “Discussion Document”).

1. Introduction

Inmarsat New Zealand Ltd operates Global Express (GX) gateways in New Zealand at Warkworth and Albany in the frequency band 27.5 – 30 GHz. The Warkworth and Albany GX gateways both operate to Inmarsat's 5th generation satellite in the Pacific Ocean region (I-5 F3). The gateways represent a considerable infrastructure investment in New Zealand and are used in support of a wider satellite system that provides services to the Pacific. The satellite, ground station and user equipment are designed to operate in some of the frequency bands under consideration, and it is not possible to reconfigure the satellite to operate in a different band.

Inmarsat offers a wide range of solutions, including logistics (rail and road transport) as well as bespoke systems for clients that have specific needs. In addition, we provide aeronautical and maritime solutions for the operation of equipment and cargoes, as well as on-board Wi-Fi systems for increased passenger comfort. Further information in relation to these solutions is presented in relation to the questions below.

2. Inmarsat's comment to specific RSM's questions

Q1. What are the most likely use cases in New Zealand for mmWave based 5G services?

RSM has identified the most likely terrestrial use cases, however, it is pointed out that recent releases from 3GPP include operation of broadband by satellite. At these frequencies, satellite is a more cost-effective mechanism for wide area broadband communications than terrestrial systems. This makes satellite both technically and economically more efficient as a means to provide universal connectivity in New Zealand.

Q2. What are the likely use cases for Ka band satellite services in New Zealand in the short and long term?

Ka-band satellite systems continue to provide services at remote locations, either as a backup to existing wireless or in places without existing wireless coverage. Inmarsat's GX system currently provides Ka-band services almost globally (except poplar regions), primarily to

maritime and aeronautical users. There are currently five GX satellites in operation and an additional seven satellites will deploy in the next 3-4 years. Currently, the Inmarsat-5 F3 (aka GX3) satellite covers New Zealand. Additional capacity will be available over New Zealand through one or two of the forthcoming additional GX satellites. GX3 uses the full 27.5 – 29.5 GHz band for feeder links at Auckland and Warkworth, and part of this band for user terminal operation, while the future GX satellites covering New Zealand will extend user link operations to the full 27.5 – 29.5 GHz band. Please see the Inmarsat website for more information about GX¹.

Maritime services

Communication is crucial to the day-to-day operations of shipping, including voice and data communications and reporting between the ship and its land-based office and between other ships, updating vital navigation and weather charts, remote access to onboard systems for maintenance and problem resolution, the transfer of emails, pictures from any webcams on the ship, position reports from the vessel, as well as daily active directory domain controller synchronisation.

Land services

As RSM mentioned in Discussion Document, the 3GPP has undertaken a study of non-terrestrial networks (NTN) for 5G in the 3GPP release 17, that will expand the reach of 5G networks through satellite connectivity. The satellite links can provide coverage for isolated, remote or moving platform such as oil platforms and trains, and support Machine-to-Machine (M2M) / Internet of Things (IoT) applications. The high-speed Ka-band satellite services offer solutions to mining companies where any data can be transferred rapidly for analysis back to head office.

Q3. What are the spectrum requirements for ESIM use in New Zealand?

Communications on the move is a natural use case for satellite systems. There is increasing spectrum demand to fulfil the need to provide robust high-capacity connections to aircraft, trains, vehicles, working machines and vessels across the globe, including New Zealand. Spectrum is also needed by the satellite systems to provide high-capacity backhauling to small cell networks and IoT traffic from large areas, provide high-speed direct connectivity to remote locations. The frequency ranges 17.7 – 20.2 GHz and 27.5 – 30 GHz are needed to address the current and future demand of Earth Station in Motion (ESIM) and Very Small Aperture Terminal (VSAT) operation.

Q6. Do you agree New Zealand should allocate 24.25 - 27.5 GHz primarily for IMT use?

Q7. How should RSM accommodate other use in this band such as space services?

¹ <https://www.inmarsat.com/en/about/technology/our-roadmap.html>

Yes, New Zealand should allocate 24.25 – 27.5 GHz primarily for International Mobile Telecommunication (IMT) use. Inmarsat notes that there is sufficient spectrum in the band for four national operators (4 x 800 MHz each). On this basis, the current three national mobile operators should be allocated spectrum. The fourth tranche of spectrum can be used to satisfy the needs of Fixed Wireless Access (FWA), private IMT networks and/or indoor Enhanced Mobile Broadband (eMBB) operations.

Inmarsat does not have a view on the provision of spectrum in this band for space services such as Fixed Satellite Service (FSS), Earth Exploration Satellite Service (EESS) and Satellite Remote Sensing (SRS).

Q8. How do you see our proposal of the 28 GHz band allocation?

Inmarsat supports RSM's proposal to allocate the whole 28 GHz band for satellite use. The frequency band 24.25 – 27.5 GHz, will provide sufficient spectrum to address the requirements for private IMT networks and/or indoor eMBB, as mentioned in the above. Accordingly, Inmarsat does not support the licensing or other use of terrestrial services in the band 27.5 – 30 GHz.

Inmarsat also notes that ITU-R WRC-19 meeting has identified 17.25 GHz of spectrum for terrestrial 5G mmWave, including the frequency band 24.25 – 27.5 GHz, as well as 37 – 43.5 GHz and 66 – 71 GHz.

Q9. Which option do you prefer for allocating 28 GHz band? Or is there any other option for managing the shared use of IMT, ESIMs and FSS in the 28 GHz band?

Q10. If you prefer option 1, do you agree with the proposed sharing mechanism (defining satellite coordination zones) between IMT use and FSS ground stations?

Q11. If you prefer option 2, how much spectrum do you think RSM should allocate to ESIM, IMT private network/FWA? And what's the preferred spectrum placement?

Q12. Are there any other issues of sharing use between satellite earth stations and ESIMs that you would like to bring to our attention?

As noted in the response to Question 8 above, Inmarsat does not support the licensing, or other use, of terrestrial services in the band 27.5 – 30 GHz. There is sufficient spectrum for terrestrial operations in the 26 GHz band and, if necessary, additional spectrum can be made available in other mmWave bands identified for IMT by WRC-19.

Q13. Do you agree that the current satellite allocation and licensing regime for 29.5 - 30 GHz should remain?

Inmarsat agrees that the current allocation and licensing regime for the 29.5 – 30 GHz should remain.

Q14. What's your preferred licensing option in 26/28 GHz spectrum?

Q15. Do you see any need for general user licence spectrum for IMT? If so, what use case might there be?

Q16. If there is a need for general use spectrum for IMT and ESIM, how much spectrum should we set aside for it? Should RSM mandate technical conditions on the general use licence?

Q17. Do you agree RSM should adopt 3GPP NR FR2 based channel bandwidth to design a channel plan in the radio licence regime for IMT services?

Inmarsat supports a continuation of the current approach for licensing of satellite services. This provides for individual licensing for gateway FSS systems and General User Radio Licences (GURLs) for all ESIM types and VSAT operation.

Inmarsat does not support allocation, assignment, or licensing of mobile, FWA and/or eMBB systems in the 27.5 – 30.0 GHz band.

Inmarsat does not have a view on the details of licensing arrangements for mobile, FWA and/or eMBB systems in the 24.25 – 27.5 GHz band.

Q31. Do you agree that think RSM should implement ITU Radio Regulations, Resolution 242, resolves 2.1 in the management rights and licences conditions? If not please explain why or propose an alternative?

As a signatory to the Radio Regulations treaty, which includes this Resolution, New Zealand would need to have good reason to depart from the agreed requirements. The Ministry should implement the Radio Regulations, including Resolution 242, resolves 2.1. Terrestrial operators deploying 5G systems in the 26 GHz band should be required to comply with the requirements of Resolution 242, including the deployment related requirements such as those in Resolves 2.2.

Inmarsat does not operate satellite services in the 24.24 to 27.5 GHz band, but notes that there may be satellite systems, current and in the future, that could be affected if the ITU Radio Regulations are not complied with.

Q33. Do you have any comments regarding the spectrum sharing approach proposed by RSM between FSS and IMT FWA in the 28 GHz band?

Q34. If RSM were to apply an EIRP limit on horizontal plane for FSS, what is the maximum EIRP value we should assume?

As noted in the response to Question 8 above, Inmarsat does not support the licensing or other use of terrestrial services in the band 27.5 – 30 GHz. There is sufficient spectrum for terrestrial operations in the 26 GHz band and, if necessary, additional spectrum can be made available in other bands identified for IMT. Accordingly, there is no need for sharing between terrestrial and satellite services and no requirement for an EIRP limit.

Q36. Do you think RSM should mandate the regulatory requirements as laid out in Resolution 169 (WRC-19) for ESIM use if a shared use between 27.5 – 28.35 GHz?

Many of the requirements in Resolution 169 relate to potential interference from ESIMs to terrestrial services. In those parts of the 28 GHz band where terrestrial services are not planned, there is no need to apply some of the provisions, in particular the requirements in Annex 3 of that Resolution, which relate to “maritime and aeronautical earth stations in motion to protect terrestrial services in the frequency band 27.5 – 29.5 GHz”. The power flux-density (PFD) limits, EIRP limit and offshore distance contained in that Annex are a significant constraint on ESIM operations, and should not be applied in any portion of the 28 GHz band where there are no terrestrial services to be protected. As noted above, Inmarsat proposes that no terrestrial services are authorised in New Zealand in any part of this band, which would make the Annex 3 requirements redundant for maritime and aeronautical ESIMs operating in and near to the territory of New Zealand.

New Zealand registered ships and aircraft operating near other countries may need to apply the technical conditions with respect to their territory and hence the proposed exemption to the Annex 3 requirements should apply only with respect to the territory of New Zealand but should apply to all ships and aircraft, whether New Zealand flagged or visiting foreign ships/aircraft.

If however, RSM does authorise terrestrial systems in some part of the 28 GHz band, RSM will need to review the technical measures to ensure they are appropriate for the type of terrestrial systems envisaged.