

DEVELOPMENTS IN GMDSS SATELLITE SERVICES

Submitted by International Mobile Satellite Organization

SUMMARY

Executive Summary: This document provides updated information on mobile satellite communication systems recognized for the provision of services in the GMDSS, as overseen by IMSO, and on the assessment of potential service providers.

References: NCSR 7/INF.16 and NCSR 7/14/2

Action to be taken: Paragraph 48

Introduction

1. This document contains updates since the annual report to IMO by the International Mobile Satellite Organization (IMSO) on the performance of the Inmarsat Global Limited (Inmarsat), as a mobile-satellite communication system recognised to operate in the GMDSS. In addition, this document provides information on Iridium Satellite LCC, which has come under IMSO oversight since 19 December 2019, and also an update on the technical and operational assessment of BeiDou Message Service System (BDMSS).
2. This report covers the period from 15 November 2019 to 30 July 2020, with a focus on the provision of enhanced group call (EGC) services. The previous periods are covered by documents NCSR 7/INF.16 and NCSR 7/14/2.
3. Inmarsat offers a range of communication services to fulfil the functional requirements listed in resolution A.1001(25) on Criteria for the Provision of Mobile Satellite Communications Systems in the Global Maritime Distress and Safety System (GMDSS), in particular the maritime distress, urgency, safety and routine communications, including the broadcast of maritime safety information (MSI) and Search and Rescue (SAR) related information. The GMDSS compliant communication systems currently supported and provided by Inmarsat, are listed as follows:

Inmarsat

4. Inmarsat provides a range of recognised services to the GMDSS, including Inmarsat-C, Fleet-77 and FleetSafety services.
5. Inmarsat C is the base satellite communications system primarily used for distress alerting and reception of MSI, including shore-to-ship distress relay messages. It is a two-way store and forward system that can handle data and messages up to 32KB. Inmarsat C is also utilised for other IMO systems such as Ship Security Alerting System (SSAS) and

Long-Range Identification and Tracking of ships (LRIT). The coverage area for Inmarsat C is presented in figure 1.

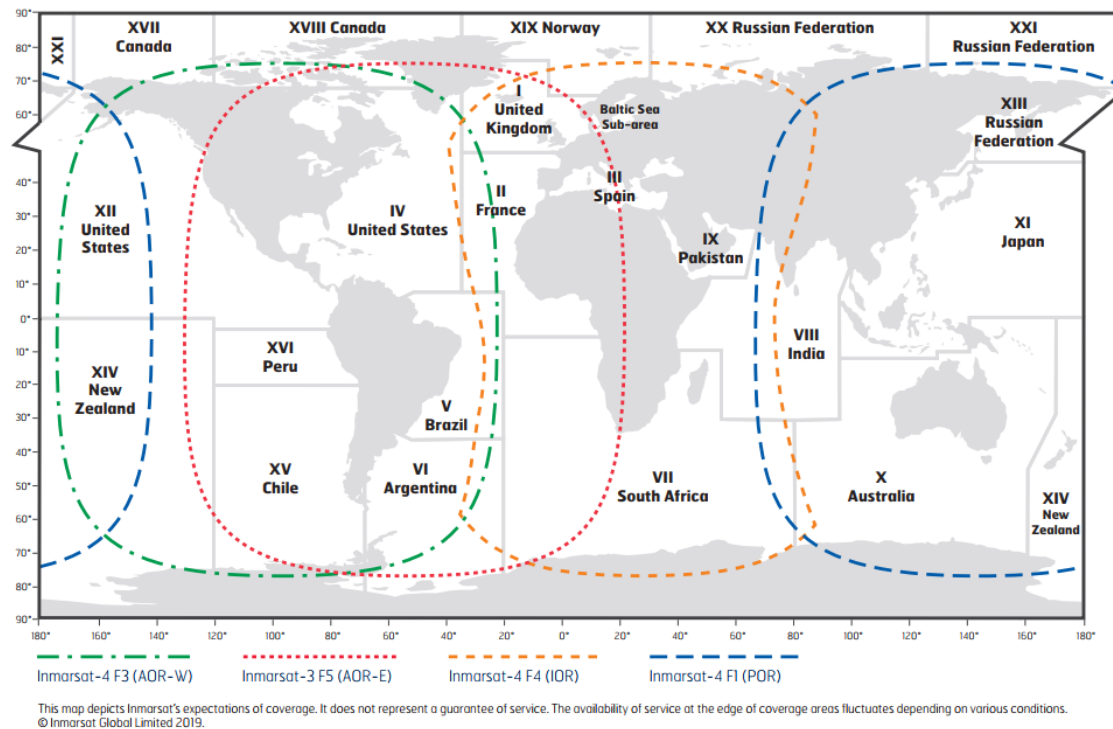


Figure 1: Inmarsat C coverage map

6. Inmarsat-F/77 provides two-way distress voice communication service for the GMDSS. It also supports urgency and safety priority communications in ship-to-shore and shore-to-ship direction. The F/77 will be closed on 1 December 2020, following a five-year notice (NCSR 3/19/1) and subsequent updates.
7. Inmarsat Fleet Safety Service is intended to support distress and safety communications as well as the broadcast of MSI and SAR information with the required priority levels. MSC adopted resolution MSC.450(99) on Statement of Recognition of Maritime Satellite Services provided by Inmarsat Global Ltd in respect to the Fleet Safety service noting that the service is recognised in the area that is under the Inmarsat-4 Middle East and Asia (MEAS) region satellite. Fleet Safety service has not been operational in the GMDSS as the Maritime Safety Terminal (MST), which provides the user interface for the service, is not yet available in the market. The coverage area for Fleet Safety Service is presented in figure 2.
8. Inmarsat's ground segment comprises a network of Land Earth Stations (LESs), Network Coordination Stations (NCSs) and the Network Operations Centre (NOC).
9. Inmarsat LESs provide the essential interface between the space segment and the terrestrial networks using data, messaging, voice and IP services. At present, there are 43 Inmarsat F77 and 33 Inmarsat C LESs located at various sites worldwide. These figures also include virtual LESs (hosted services) and illustrate the total number of points of access to the Inmarsat network. The number of LESs for each system is enough to ensure robust operation and provide redundancy in the event of local LES failures. These LESs support distress and priority traffic, follow-up distress communications for search and

rescue purposes. Inmarsat C LES are also used for the promulgation of MSI messages through the SafetyNET system, while the SafetyNET II enhancement utilises Inmarsat's purpose-built Maritime Safety Servers (MSS) and is not reliant on LES.

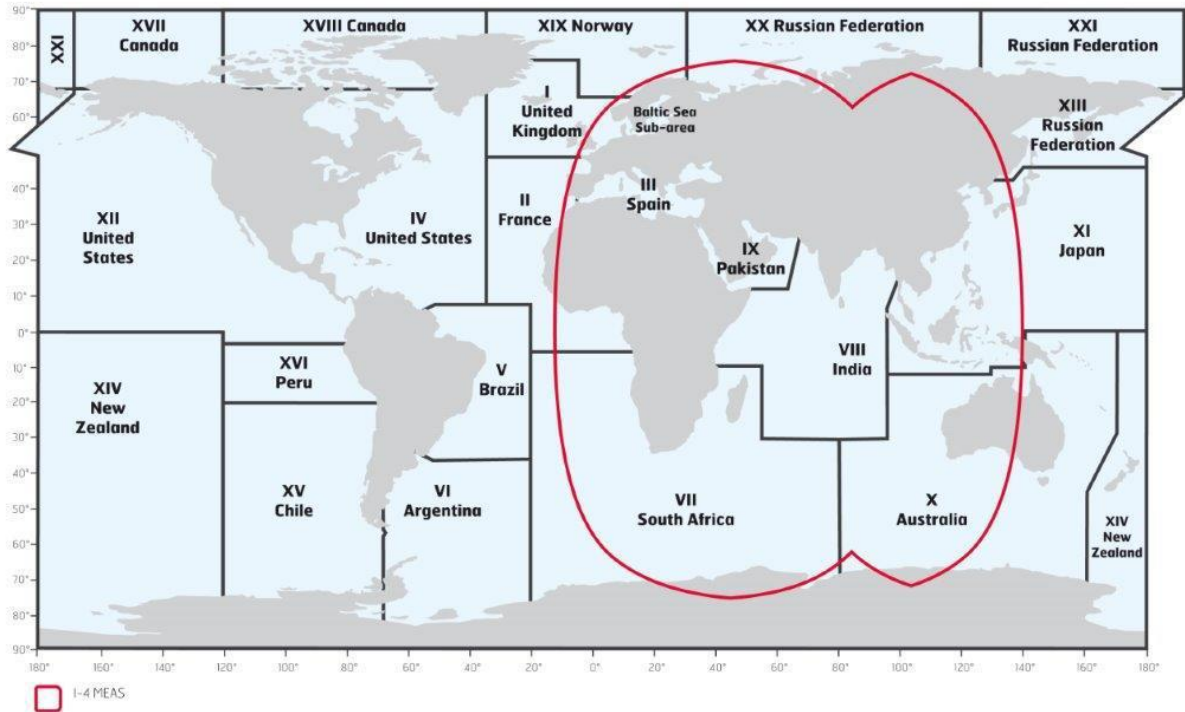


Figure 2: Inmarsat Fleet Safety coverage map

Inmarsat ground segment

10. Inmarsat operates an NCS in each ocean region to monitor and control the recognised services communications traffic in that region. Each NCS communicates with the LESs in its ocean region, the other NCSs and the NOC.
11. The Inmarsat NOC is located in London at the Inmarsat headquarters and functions around the clock to monitor and coordinate the activities of the NCSs and the LESs in each ocean region with an Operations Backup Centre (OBC) in the Burum, the Netherlands providing geographical redundancy.

Maritime mobile terminal

12. According to the reports received from Inmarsat, more than 190,000 Inmarsat C, Mini-C and Inmarsat-F77 terminals were registered with Inmarsat at the end of September 2019. These terminals include around 93,000 Inmarsat C, 90,000 mini-C and 8,600 Inmarsat-F77 terminals.
13. The number of Inmarsat-F77 terminals in use has continued to decline since IMSO notified the NSCR Sub-Committee of Inmarsat's intention to close the Inmarsat-F77 service by 1 December 2020 (NCSR 3/19/1). In IMSO's report to NCSR 6, the number of Inmarsat-F77 terminals in use was reported as 10,000.

Terrestrial networks

14. Inmarsat's network is connected to RCCs, NAVAREA Coordinators and METAREA Issuing Services in order to facilitate distress priority traffic, follow-up distress communications and promulgation of MSI. The means of interconnection between Inmarsat network and RCCs or MSI providers varies from country to country and in some cases, including the use of dedicated lines or public switched telephone networks (PSTN).
15. For instance, some LESs provide email, or internet (direct) drop access to the SafetyNET service that allows registered MSI providers to send Enhanced Group Call (EGC) messages using email from any computer with access to the internet. Each user interface has its own access procedure and syntax command, which should be checked with the Inmarsat C LES operator or service provider.
16. In accordance with resolution A.801(19) on the *Provision of radio Services for the Global Maritime Distress and Safety System (GMDSS)*, the availability and robustness of the communication links between LESs and the associated RCCs, or other shore-based national agencies, are under the responsibility of the Government(s) in whose territory the LES is located. Nevertheless, at least two LESs are located in each ocean region under Inmarsat's coverage area in order to provide a sufficient level of robustness as well as redundancy.

Availability

17. An event with degradation of services was reported on Burum LES on 6 April 2020. Inmarsat diverted the traffic to alternative LES and communicated the involved MSI providers, following the standards procedures. The GMDSS traffic and the provisioning of MSI were not affected.

Contingency exercises

18. In accordance with section 3.6.2 of resolution A.1001(25), IMSO and Inmarsat conduct contingency exercises to prove efficiency and effectiveness of the arrangements put in place by Inmarsat to restore the essential GMDSS services within one hour in case of a prime satellite failure. These exercises are performed according to the contingency change-over procedures prepared by Inmarsat and agreed by IMSO, for each of the primary satellites.
19. IMSO and Inmarsat have agreed, in principle, to perform one exercise for each ocean region per year, of which two exercises are conducted at the NOC in London and other two exercises at the OBC in Burum in The Netherlands. These exercises are usually performed with the active participation of staff from the Inmarsat Satellite Control Centre (SCC), NOC, OBC company management as well as operators from the relevant LESs.
20. The exercises at OBC at Burum in the Netherlands are conducted in order to test the operational capacity and communication links there as well as to familiarise the NOC staff with the arrangements available at OBC. This was not possible for the exercises already conducted in 2020 because of the constraints imposed by the COVID-19 mitigations actions.

21. IMSO oversees the planning, execution and review of all satellite contingency exercises and works with Inmarsat to broaden the scope of these events. The Contingency exercises in 2020 were conducted according to the new procedures developed after the successful migration of the recognised services from the I3 to the I4 satellites, finalised in 2019. At the time of this submission, three contingency exercises (as mentioned below) had been conducted, and the fourth one was scheduled to take place on 30 September 2020 for AOR-W:
- AOR-E, on 19 February 2020 (NOC),
 - POR, on 8 April 2020 (NOC), and
 - IOR, on 10 June 2020 (NOC).
22. All exercises successfully met the criteria from the Resolution A.1001(25), demonstrating *Broadcasting Maritime Safety Information*
23. Inmarsat manages and operates the SafetyNET service to facilitate the broadcast of MSI from registered information providers to ships at sea. SafetyNET receiving capability is part of the Inmarsat C and Mini-C shipborne equipment.
24. Certified SafetyNET users (NAVAREA Coordinators, METAREA Issuing Services and RCCs) submit their MSI messages, with the appropriate priority, i.e. distress, urgency or safety, to LESs providing Inmarsat C services for further broadcasting of their messages to the intended geographical area. The International SafetyNET Coordinating Panel, in co-operation with IHO and WMO, undertakes the coordination of times for scheduled transmissions.
25. In accordance with resolution A.707(17) on *Charges for Distress, Urgency and Safety Messages Through the Inmarsat System*, there are no charges to the mariners for transmission or reception of Inmarsat GMDSS services. MSI broadcast through the EGC SafetyNET (II) system is charged to the originator at a discounted rate for safety and urgency priority messages. *Shore to ship distress and urgency communications, used for distress alert relays and SAR coordination are free of charge to the originator and the vessel.*
26. As informed through document NCSR 5/14/5, Inmarsat has developed and launched its SafetyNET II service for use by all certified SafetyNET users. SafetyNET II runs in parallel to the existing SafetyNET service and does not require installation of new shipborne terminals. The new service is seamless to all seafarers.
27. With SafetyNET II, MSI providers and SAR services can create their messages using an interactive web-based interface and submit them directly to Inmarsat for simultaneous broadcasting over the Inmarsat C and FleetBroadband networks. The service offers some new features such as broadcasts scheduling, message cancellation and multiple text input methods

Iridium

28. The WWNWS Sub_committee may recall, IMO Maritime Safety Committee (MSC), at its ninety-ninth session, adopted resolution MSC.451(99) on Statement of Recognition of

Maritime Mobile Satellite Services provided by Iridium Satellite LLC and invited IMSO to monitor the implementation of the recognised services by Iridium, issue the Letter of Compliance and inform the MSC.

29. Having monitored the implementation items, IMSO issued the Letter of Compliance to Iridium on 19 December 2019, which authorises the new provider (Iridium) to provide services to the GMDSS service since then. However, there are no terminals in line-production, and the company is preparing to launch the services in the second semester of 2020.
30. Iridium satellite constellation comprises 66 low-earth-orbit (LEO) primary satellites of the Next generation, distributed in six orbital planes in a quasi-polar orbit, benefiting of inter-satellite links (figure 3). Iridium's constellation provides global coverage to its communication system, including the polar regions.
31. Iridium's ground segment comprises a network of teleports, Satellite Network Operations Centre (SNOC) and Network Gateway. All components have redundancies providing the required resilience for the system.



Figure 3: Iridium constellation

Terrestrial networks

32. Iridium's network has the capability to be connected to RCCs, NAVAREA Coordinators and METAREA Issuing Services in order to facilitate distress priority traffic, follow-up distress communications and promulgation of MSI. The company is implementing the necessary agreements and contracts with other stakeholders.
33. The SafetyCast system will provide web-based interfaces both for RCCs and MSI providers.

Availability

34. IMSO was not informed about any outage of degradation of services in the Iridium system since its integration into GMDSS on 19 December 2019, when the oversight started.

Contingency exercises

35. In accordance with section 3.6.2 of resolution A.1001(25), IMSO and Iridium conducted contingency exercises to prove efficiency and effectiveness of the arrangements put in place by satellite providers to restore the essential GMDSS services within one hour in case of a failure.
36. During the Iridium assessment, it was noted that in the face of the technical characteristics of the Iridium system, a failure in the primary gateway would compromise all global provision of GMDSS services at once. Considering this piece of information, Iridium was required to provide a secondary gateway with a contingency solution able to meet the requirement of recovering services in less than one hour.
37. In order to confirm the compliance with this requirement, Iridium's contingency exercises are designed to verify the efficacy of these operational procedures. Two contingency exercises have been executed with Iridium until now:
 - 11 June 2020 (Gateway), and
 - 13 July 2020 (Gateway).
38. The two exercises conducted met the criterium of 60 minutes for recovering after a service outage. Two more exercises have been planned to be undertaken on 1 October and 16 December 2020.

Broadcasting Maritime Safety Information

39. Iridium implemented the SafetyCast service and technology to facilitate the broadcast of MSI from registered information providers to ships at sea. SafetyCast receiving capability is part of the Iridium shipborne equipment.
40. Certified SafetyNET users (NAVAREA Coordinators, METAREA Issuing Services and RCCs) will submit their MSI messages, with the appropriate priority, i.e. distress, urgency or safety, through a web-based interface for further broadcasting of their messages to the intended geographical area. The International EGC Coordinating Panel, in co-operation with IHO and WMO, are responsible by the coordination of times for scheduled transmissions.

Assessment of BeiDou Message Service System (BDMSS).

41. The application of Beidou System for recognition as a mobile satellite service provider in the GMDSS was presented to the IMO Maritime Safety Committee through the document MSC 99/12/1, submitted by China. Furthermore, China submitted document NCSR 6/14/3 to the IMO NCSR Sub-Committee at its 6th session with an update and informed the intention of submitting a report to the NCSR 7.

42. At the NCSR 7, China submitted the document NCSR 7/14, providing information on Pre-assessment for Recognition of BeiDou Message Service System as a GMDSS Service Provider. This report describes the BeiDou system and also reiterated its intention to be recognised for providing GMDSS services in a limited geographic area.
43. The BDMSS service covers Asia and Western Pacific Ocean region, and it is capable of providing reliable satellite messaging and continuous alerting in areas of 75°E to 135°E longitude and 10°N to 55°N latitude (shown in figure 4).

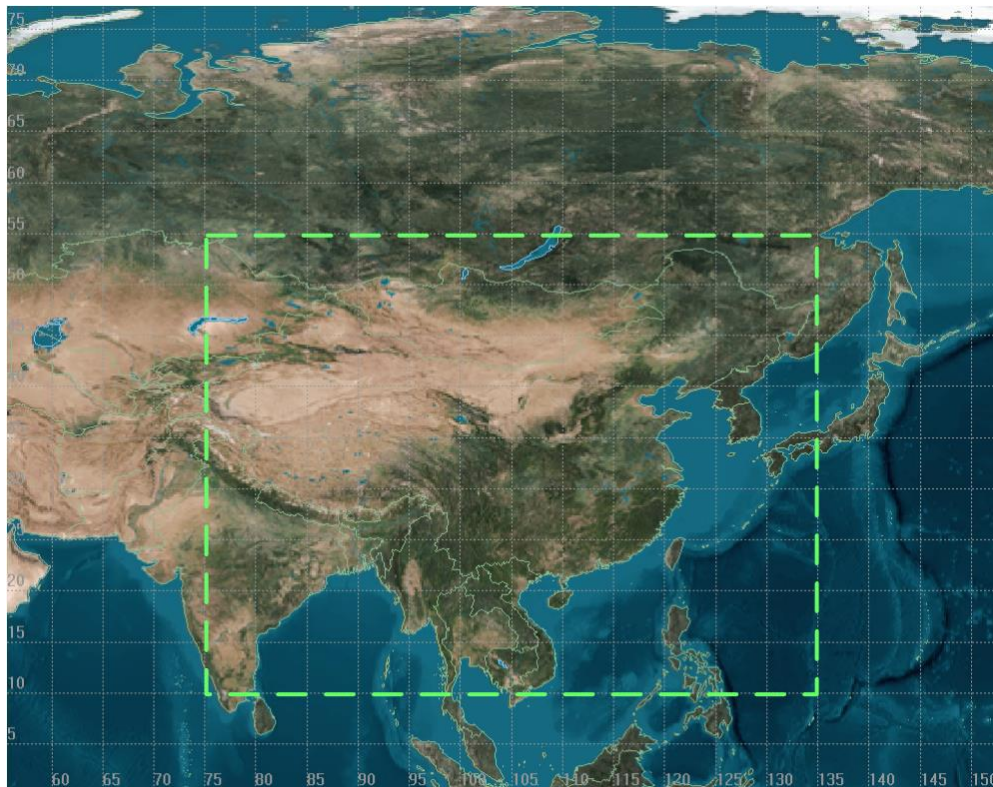


Figure 4: BeiDou service coverage area

44. It is noted that the area indicated by BeiDou overlaps with a small portion of the current NAVAREA and METAREA.
45. IMSO was invited by the NCSR 7 in January 2020 to conduct the BeiDou assessment. Subsequently, IMSO had a preliminary discussion with the Chinese delegation for the preparation of a technical and operational assessment of BDMSS. However, the COVID-19 outbreak affected the planned schedule.
46. While the preparatory works for the aforementioned assessment are ongoing since January 2020, the Agreement for the assessment between IMSO and CTTIC¹, the provider of the BDMSS, was also prepared in parallel and signed on 2 July 2020.

Quarterly briefings

47. In the period between 14 and 17 July 2020, IMSO delivery updated information regarding its activities, including the oversight of mobile satellite systems recognized to provide

¹ China Transport Telecommunications and Information Group Co., Ltd

services in the GMDSS. These briefings were attended in a virtual environment by several stakeholders, including MSI providers and RCCs.

Action to be taken

48. The Sub-Committee is invited to note the information provided and provide any comment as it deems appropriate.
