DEVELOPMENTS IN GMDSS SERVICES, INCLUDING GUIDELINES ON MARITIME SAFETY INFORMATION (MSI)

MSI automatic self-confirmation broadcast functionality and monitoring capability

Submitted by IMSO

SUMMARY	
Executive summary:	This document contains information on MSI automatic self-confirmation broadcast functionality and monitoring capability by the satellite service providers
Strategic direction, if applicable:	6
Output:	6.2
Action to be taken:	Paragraph 16
Related documents:	MSC 102/24; resolutions A.705(17), A.706(17); A.1051(27); MSC.1/Circ.1613, MSC.1/Circ.1364/Rev.2 and COMSAR/Circ.37

Introduction

1   MSC 102 invited IMSO to liaise with GMDSS recognized mobile satellite service providers regarding the implementation of an automatic self-confirmation broadcast functionality and monitoring capability by the satellite service providers, and advise the NCSR Sub-Committee, as appropriate, and instructed the NCSR Sub-Committee to consider:

.1   technical solutions for the dissemination of MSI and SAR-related information, such as the implementation of a single web interface being considered by IHO and interested Member States; and

.2   the need for amendments to resolutions A.706(17), as amended, and A.1051(27), as amended, and other resolutions, to address broadcast monitoring requirements,

and advise the Committee, as appropriate (MSC 102/24, paragraphs 16.10.2 and 16.10.3).

2   IMSO liaised with Inmarsat and Iridium in response to this invitation from MSC 102 and the outcome of this liaison is provided in this document.

Monitoring of broadcasts under the multi-provider environment

3   Resolution A.706(17), as amended, requires NAVAREA coordinators, sub-area coordinators and national coordinators to monitor the broadcasts which they originate, to ensure that the warnings have been correctly broadcast (resolution A.706(17), paragraphs 6.2.1.15, 6.4.1.11 and 6.6.1.11). Resolution A.1051(27), as amended, requires METAREA coordinators to monitor the SafetyNET transmissions of their bulletins (resolution A.1051(27), paragraph 6.2.2). COMSAR/Circ.37 provides that MRCCs should monitor the broadcasts they originate to confirm that the messages are transmitted and received correctly (COMSAR/Circ.37, paragraph 3.2). MSI providers and MRCCs have been monitoring their broadcasts over the satellites by Inmarsat EGC receivers to meet such requirements.

4   As a consequence of the recognition of Iridium as a GMDSS mobile satellite service provider, the broadcasts through Iridium also need to be monitored to meet the requirements. However, there exist substantial concerns on the suitability of the current procedure for Iridium's low-earth orbit (LEO) constellation. The issue of monitoring MSI and SAR broadcasts in a multi-provider environment was presented in document NCSR 4/29, annex 11, paragraph 31, on the GMDSS modernization scope. IMSO also highlighted this issue in its document NCSR 6/INF.3, describing financial, operational and administrative impacts to MSI providers and MRCCs.[1] This issue was also considered during IHO's WWNWS11.

5   Both the International SafetyNET services manual (MSC.1/Circ.1364/Rev.2) and the Interim Iridium SafetyCast service manual (MSC.1/Circ.1613)[2] describe the process for monitoring broadcasts as follows:

        .1   Confirm that the message is transmitted and received correctly.

        .2   Ensure that cancellation messages are properly executed.

        .3   Observe any unexplained delay in the message being broadcast.

Information provided by each provider

6   Inmarsat and Iridium are currently exploring automatic self-confirmation broadcast functionality and monitoring capability. The information provided by each provider is as follows:

Inmarsat

-        IMO has required the EGC broadcasts, including navigational, meteorological and search and rescue, be monitored to ensure their success by means of reception on a ship earth station, this provides the level of assurance agreed to ensure these safety of life broadcasts are transmitted and received as the broadcaster requested. This procedure has been reviewed regularly by the IHO WWNWS, WMO WWMIWS, IMSO and the IMO EGC Coordinating Panel.

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[1]   Currently, the SafetyCast provided by Iridium, and SafetyNET, including SafetyNET II/RescueNET provided by Inmarsat, are the services used in the GMDSS for the broadcast of MSI and SAR related information.

[2]   The Iridium SafetyCast service manual does not clearly indicate how MSI providers/MRCCs should monitor their EGC broadcasts.

- Historically, MSI providers and MRCCs have monitored their broadcasts through the means of reception over the broadcasting satellite they requested using SafetyNET. Thus, the monitoring has been performed with the support of Inmarsat terminals. This has been a proven and trusted solution meeting the current regulations. In order to increase the assurance and user experience of this service, Inmarsat has developed additional integrated broadcast monitoring systems for the MSI providers and MRCCs at no extra cost to the broadcaster.

- Inmarsat has continued to develop and implement GMDSS services that meet the IMO requirements as well as providing additional Inmarsat Safety Services. The SafetyNET II and RescueNET services provide MSI providers and RCCs the capability to submit messages for broadcast as well as view their current, past, scheduled and cancelled EGC broadcasts in one place through a secure web interface. This interface displays the message text, reference number, type of message, area of broadcast, coordinates, priority, repetition code, size, start/end date and time, EGC ID, the message status and the broadcast transmission status. Users can also cancel active messages, export reports and broadcasts to PDF.

- In addition to the IMO requirement to monitor broadcasts by reception on a ship earth station, Inmarsat created these additional services to provide its global EGC customers the ability to view the date and time each broadcast was delivered to the satellite for broadcasting.

- Inmarsat has been working with the IHO EGC API CG on the recommended API standard for EGC broadcasts. All EGC certified users, including MSI providers and RCCs, are given automatic access to the secure web interface as well as the API connection. The API connection will also return results for the status of the message reception at the satellite.

Iridium

- Iridium can support the automatic confirmation of broadcast and monitoring (in addition to terminal-based monitoring) through its SafetyCast system, which is available to MSI providers and MRCCs, and it allows users to confirm which individual Iridium GMDSS terminals have received an EGC message.

- The successful delivery of a message to a terminal provides proof that the Iridium system has successfully transmitted the message from a satellite. Besides, additional features enable further access to the available information.

- MSI providers and MRCC access SafetyCast through a web interface, which displays all information and allows operations concerning the handling of EGC. The system does not require specific equipment or operational training.

- Considering the technical characteristics of SafetyCast, the system interface translates every rebroadcast instruction received from MSI providers or MRCCs into an expiry for the said message, and the system will ensure all vessels remain up to date (updating within minutes), for all MSI, until messages expire. The SafetyCast web interface then provides updated information on the transmission status for every message during the expiry period.

- Iridium is willing to support machine-to-machine integration for monitoring MSI in the future and believes that if this is required, it should be integrated into the standard API and therefore used by all providers.

- Iridium has set up a purchase programme where MSI providers could purchase a monitoring terminal at 30% of the commercial price to allow them to monitor their MSI in the traditional way if they choose.

IMSO observations

7   Both Inmarsat and Iridium confirmed that SafetyNETII/RescueNet and SafetyCast systems, respectively, have a web-based user interface for MSI providers and MRCCs users to:

       .1   confirm that the EGC system received the message from senders;

       .2   confirm that the message is ready to be broadcast according to the sender instructions;

       .3   confirm that the message was broadcast according to the sender instructions; and

       .4   allow querying past broadcast.

8   The use of web-based interfaces does not require specific training to operate mobile satellite terminals for monitoring. It is emphasized that the use of automatic self-confirmation broadcast functionality and monitoring capability does not require MSI providers and MRCCs to have mobile satellite terminals to confirm their broadcast.

9   MSI providers/MRCCs that have opted not to migrate from SafetyNET to SafetyNET II and RescueNet would not benefit from Inmarsat's new monitoring features.

10   Machine-to-machine (M2M) data interface may provide better support for some MSI providers, such as those involved in the provision of meteorological information. The EGC API CG established by the IHO WWNWS-SC has been working to develop a standard data interface to be implemented by MSI providers and satellite service providers. However, the group's priority is to develop an API that implements the "C" codes. Features for monitoring MSI transmission status are currently considered as optional requirements.

11   Table 1 summarizes the pros and cons of each technical solution for monitoring as well as characteristics of the services provided by Inmarsat and Iridium.

Technical solution	Characteristics	Remarks	
		Inmarsat	Iridium
Monitoring broadcast of MSI using a local ship-earth-station (SES).	- Provides users with certainty that the message was broadcast by the satellite covering the area in which the SES is placed. - Requires using separate SES for each satellite provider.	- Geostationary satellites have a vast footprint, and four prime satellites can provide global coverage to Inmarsat-C.	- An Iridium satellite covers around 4,500 km of diameter. The covered region changes continuously. - The reception by a SES only indicates that broadcast from a specific satellite in the space segment was successful.
Monitoring broadcast of MSI through a web user interface (UI) using the information provided by the satellite service providers.	- Relies on the monitoring capacity of the service providers. - Requires users to operate different UI for each satellite service providers, using standard computers.	- The UI provides information on the MSI broadcasts over the requested area.	- The UI provides information confirming the reception by individual SES in the requested area.
Monitoring broadcast of MSI through a machine-to-machine interface (M2M) that implements an API, using the satellite service providers' information.	- Relies on the traffic monitoring capacity of the service providers. - Allows users to monitor broadcast from a single local system. - Requires users to implement the software interface.	- The current API includes features for provision of information on the MSI broadcasts over the requested area.	- API not available. - Iridium declared willingness to implement a standard API covering such requirement.

Table 1: Technical solutions for monitoring

12   The technical solutions described in table 1 provide a level of assurance that MSI messages were broadcast according to the MSI providers' instructions. It is also noted that no monitoring method can ensure that all SES in a sea area received the broadcast since local meteorological interference and terminal issues can influence such reception. Each technical solution has pros and cons depending on MSI provider characteristics, such as MSI traffic volume, staffing including IT personnel and budget availability.

13   There exist concerns in using an SES to monitor MSI broadcast for LEO constellations, due to the limited satellite footprint and the non-stationary nature of its orbit; even so, the use of an SES can provide a limited assurance that the MSI was broadcast.

14   Pending the MSI automatic self-confirmation broadcast functionality and monitoring capability by the satellite service providers being accepted by NCSR and other appropriate forums, a possible approach for the current scenario may be to delegate to each MSI provider and MRCCs the choice of which technical solutions for monitoring would be more appropriate for themself. This approach would not affect the MSI provider responsibility for monitoring its broadcast but would allow them to assess the best option considering specific operational and financial impacts.

15   Considering the information available and the fact that all monitoring methods described are reliable to a certain extent, IMSO would advise in favour of considering the usage of MSI automatic self-confirmation broadcast functionality and monitoring capability provided by the satellite service providers. Furthermore, it is worth mentioning that cases of difficulty affecting the EGC services, which the MSI providers/MRCCs could observe when monitoring their broadcasts, should be reported to IMSO, and considered for the technical oversight activities (resolution A.705(17), as amended, paragraph 7.2).

Action requested of the Sub-Committee

16   The Sub-Committee is invited to consider the information provided in general, and in particular:

.1   the reliability of the automatic self-confirmation of MSI broadcast by the satellite service providers;

.2   technical solutions for MSI broadcast monitoring and decide on its suitability;

.3   the approach described in paragraph 14; and

.4   the need for amendments to resolutions A.706(17), as amended, and A.1051(27), as amended, and other resolutions, to address broadcast monitoring requirements,

and decide, as it deems appropriate.

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