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DEVELOPMENTS IN GMDSS SATELLITE SERVICES

Considerations on monitoring MSI broadcasts over satellite systems

Submitted by the International Mobile Satellite Organization (IMSO)

SUMMARY

Executive summary:	This document provides information related to the broadcast and monitoring of Maritime Safety Information (MSI) broadcasts as new communication technologies and service providers are being brought into operation for the provision of recognized mobile satellite communication services in the Global Maritime Distress and Safety System (GMDSS)
Strategic direction, if applicable:	6
Output:	6.2
Action to be taken:	Paragraph 24
Related documents:	Resolution A.706(17); MSC.1/Circ.1364/Rev.1; NCSR 5/14/4 and NCSR 6/9/1

Introduction

1 IMSO advised NCSR 5 of the arrangements for the migration of the recognized GMDSS services provided by Inmarsat from their I-3 to the I-4 satellite constellation (NCSR 5/14/4). During the tenth session of the IHO World-Wide Navigational Warning Service Sub-Committee (WWNWS-SC) it was noted that direct verification of MSI messages will no longer be possible for some MSI providers throughout their service areas following the migration of Inmarsat services from the I-3 to the I-4 constellation.

2 With provision of recognized GMDSS services over the Iridium satellite system now proceeding to the implementation phase, the WWNWS-SC also noted (see NCSR 6/9/1, paragraph 14) that broadcast monitoring in a multi-provider environment is an important item which needs consideration.

3 This submission addresses the MSI monitoring considerations arising from these recent developments in the provision of recognized mobile satellite communication services in GMDSS.

MSI monitoring requirements

4 In accordance to resolution A.706(17), as amended, NAVAREA coordinators, Sub-Area coordinators and National coordinators in the World-Wide Navigational Warning Service are required (see annex 1, provisions 6.2.1.15, 6.4.1.11 and 6.6.1.11) to "monitor the broadcasts which they originate to ensure that the messages have been correctly broadcast".

5 In addition, the SafetyNET Manual (MSC.1/Circ.1364/Rev.1) records that, further to resolution A.706(17), as amended, MSI service providers shall accomplish these monitoring requirements by means of the installation of an Inmarsat C or mini-C terminal with EGC SafetyNET receiver to enable each MSI provider to:

".1 confirm that the message is transmitted and received correctly;

.2 ensure that cancellation messages are properly executed; and

.3 observe any unexplained delay in the messages being broadcast".

6 The immediate problem raised at WWNWS 10 in relation to the migration of Inmarsat services from the I-3 to the I-4 constellation was that direct verification of MSI messages will no longer be possible in some circumstances once the migration is complete (Note: completion is scheduled for 12 December 2018). Means of overcoming the effects of changed coverage areas have since been applied. It is also the case that some of the remote monitoring arrangements needed with the I-3 satellite constellation are no longer needed.

Current working practices for monitoring MSI broadcasts over the Inmarsat network

7 If part of a NAVAREA/METAREA is no longer served by a satellite visible to an originating station, then reception cannot be verified by an on-site Inmarsat C or mini-C terminal. The underlying problem is not in fact new: a similar situation has already been encountered with the present I-3 constellation in a few instances. Since NAVAREA/METAREAs are not aligned with the coverage areas for geostationary satellite networks, a few problems of this sort are bound to emerge with any practical geostationary satellite constellation.

8 Four instances of satellite non-visibility for verifying MSI message reception have been identified for the post migration Inmarsat I-4 constellation, involving NAVAREA/METAREA I (UK), VIII (India), XII (USA) and XIV (New Zealand). Previously, four NAVAREA/METAREAs VII (South Africa), X (Australia), XI (Japan), XII (United States) were split across the coverage of two satellites in the pre-migration situation. Those particular problems will be resolved after migration as a result of the westwards shift in satellite coverage areas. As with those previous problems, one way of resolving these effects is to locate a receiving terminal at a remote location, often in another country, with a clear view of the satellite in question. The remote terminal can then relay the received messages back to the MSI service provider via public or private telecommunication links.

9 Where it has not proved possible to find a suitable location for a remote relay terminal, for example if there is no accessible land within the area to be monitored, Inmarsat can assist with arrangements to install monitoring terminals at a suitable LES or other negotiated sites. Inmarsat has arranged to host monitoring terminals at its Burum facility to operate as remote relays in several cases.

Future arrangements for monitoring MSI broadcasts in a multi-provider environment

10 The present problems to do with the migration from the I-3 to the I-4 Inmarsat constellation are therefore soluble under existing arrangements. However, the implementation of MSI broadcasts over Iridium and other expected satellite systems and networks will, in any event, require a rethink of the present operating practices.

11 In non-geostationary satellite systems there is not necessarily a one-to-one correspondence between the satellite that received an uplinked MSI broadcast and a satellite that downlinks the broadcast to the intended NAVAREA/METAREA. Moreover, the individual satellites involved will change every so often without the MSI providers being aware of the changeover. It will not be possible to implement monitoring arrangements matching those for fixed in space geo-stationary satellites that are currently used for verifying MSI broadcasts over the Inmarsat network.

12 The advent of broadband-based technology for providing Inmarsat services and the imminent introduction of additional providers of recognized satellite communication services in GMDSS means that there is now good reason to examine the present working practices for monitoring, and to see how the use of the latest technology could simplify working practices for MSI service providers, as well as accommodating MSI broadcasts from additional recognized satellite service providers. In particular, measures to deal with non-delivery of messages are required by resolution A.1001(25) (see paragraphs 4.8 and 4.9).

13 The broadband technology now being introduced into GMDSS by Inmarsat gives much more feedback and certainty on the progress of messages throughout the network, such that it is no longer necessary to rely on direct reception of MSI messages in order to verify that broadcasts to the target NAVAREA/METAREA(s) have been successful. Inmarsat has developed tools that can advise authorized users if a message has been successfully broadcast or warn of non-delivery of any safety service messages, in which case appropriate action can be taken. This is facilitated by the functions built into SafetyNET II and RescueNET[1] which already provide for automatic detection of errors and forcing corrective action by resending messages until reception is confirmed through the system. This is a verification of a transmission within the Inmarsat networks and alarms monitored constantly, not simply a message status report of "repeat", "cancelled" or "scheduled". By such means, physical reception of messages is not necessary to verify that the broadcast has taken place when using today's advanced satellite technology.

14 It is expected that Iridium will implement similar functionality as it finalizes the implementation of its MSI broadcast service. The capability to monitor the end-to-end transmission of MSI messages in such a way may therefore be considered to be an effective way of satisfying resolution A.706(17) as part of a review of MSI procedures in order to accommodate multiple providers of satellite communication services in the GMDSS.

15 Another aspect of embracing advanced satellite technologies and diverting from the traditional on-site verification method would be the significant cost savings for MSI providers which would otherwise have to install new terminals operating on new recognized mobile satellite systems, maintain the new equipment, pay for the airtime and organize training for the staff members.

[1] RescueNET is the system provided by Inmarsat to support SAR operations and includes SafetyNET II messages related to SAR.

A future role for IMSO in MSI monitoring

16 There is the possibility of a future role for IMSO to consider on the auditing the MSI messages. MSI message auditing could be carried out as a standalone function or as part of the single point of distribution concept, as explained in document NCSR 6/INF.3. The auditing function could also be extended beyond simply monitoring the end-to-end transmission of MSI messages on to ensuring the quality and consistency of MSI messages – a function that presently falls within the remit of the NAVAREA/METAREA coordinators. Although the NAVAREA/METAREA coordinators provide regular self-assessments to WWNWS, the quality and consistency of MSI messages is not routinely addressed.

17 A Graphical User Interface (GUI) developed by Inmarsat is now available for the sole use of the Chair of the International SafetyNET Panel which can display all MSI messages regardless of origin and could be used for random checks. However, the Chair would not have enough resources available to review all MSI messages as a matter of routine for assessing quality and consistency. With additional dedicated resources, or as the provider of the single point of distribution, IMSO could instead undertake an oversight role regarding the distribution, quality and consistency of MSI messages and report back to the International SafetyNET Panel.

18 Combining MSI quality audits with the single point of distribution would make auditing a lot easier considering Iridium's arrival and the possibility of having additional service providers. However, the means to provide the necessary financial and human resources associated with establishing and running an MSI auditing operation, let alone the more extensive single point of distribution, would have to be agreed and established at an international level, involving IMO, IHO and WMO, before operations could commence.

19 Regarding a possible future role for IMSO in the monitoring or auditing of MSI broadcasts, a further question would be whether IMSO's role could include both operations and oversight or be limited to one or the other.

Conclusions

20 Considerations on the migration from the Inmarsat I3 to I4 satellite constellation, the introduction of the Inmarsat's broadband-based Fleet Safety service and the imminent introduction of additional recognized satellite service providers in GMDSS show that new working practices will be needed for monitoring the broadcasts of MSI messages as MSI broadcasts come to be carried over satellite constellations as a whole, not individual and readily identifiable satellites.

21 A way forward would be to harness the facilities now available through broadband data links carried over satellite and ground-based telecommunication networks to give the necessary confidence for monitoring the end-to-end transmission of MSI without the need for each NAVAREA/METAREA coordinator to have access to physical terminal equipment located within the service areas of all individual satellites providing service.

22 The technology now becoming available for the automated error detection and corrective action may be considered as sufficient for verifying the transmission of MSI messages over the intended target areas. Moving to automated checking of MSI broadcasts will also provide MSI providers with the time and means to turn their attention from simple technical verification to their longer-term duty to carrying out detailed oversight of message consistency and quality.

23 Further discussion is needed on this matter, which should involve raising awareness with MSI providers, satellite service providers and the International SafetyNET Panel and alerting the appropriate international fora to the issue. A short submission can be presented to NCSR 6 as a starting point and also informing about a potential role for IMSO as in monitoring and auditing MSI broadcasts.

Action requested of the Sub-Committee

24 The Sub-Committee is invited to consider the information provided and decide as it deems appropriate.