Analysis and assessment of the GMDSS performance of Inmarsat Global Limited

Submitted by IHB

SUMMARY

Executive Summary: This document provides details of the analysis and assessment of the performance by Inmarsat Global Limited of the Company's obligations for the provision of maritime services within the GMDSS, as overseen by IMSO, which are relevant to WWNWS-SC

Action to be taken: Paragraph 2.

Related documents: NCSR 2/14/1 dated 5 December 2014

1. See attached document.

2. The Sub-Committee is invited to note the information provided and take action as appropriate.

INTERNATIONAL MARITIME ORGANIZATION

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SUB-COMMITTEE ON NAVIGATION, COMMUNICATIONS AND SEARCH AND RESCUE
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ANALYSIS OF INFORMATION ON DEVELOPMENTS IN INMARSAT AND COSPAS-SARSAT

Analysis and assessment of the GMDSS performance of Inmarsat Global Ltd

Submitted by the International Mobile Satellite Organization (IMSO)

SUMMARY

Executive summary:	This document provides analysis and assessment of the performance by Inmarsat Global Ltd (Inmarsat) of the Company's obligations for the provision of maritime services within the GMDSS, as overseen by IMSO. The information covers the period from 1 November 2013 to 31 October 2014.
Strategic direction:	5.2
High-level action:	5.2.5
Planned output:	5.2.5.4
Action to be taken:	Paragraph 29
Related documents:	NSCR 1/18, NSCR 1/18/1; COMSAR 15/16 and resolution A.1001(25)

Introduction

1 This document is the formal report to IMO by the International Mobile Satellite Organization (IMSO) on the performance by Inmarsat Global Limited (Inmarsat) of that Company's public service obligations in respect to the GMDSS, as established in articles 3(1) and 5 of the Convention on the International Mobile Satellite Organization, and Clause 2.1.2 of the Public Services Agreement (PSA) between IMSO and Inmarsat, submitted in accordance with the requirement of section 2.5 of IMO Assembly resolution A.1001(25). This report covers the period from 1 November 2013 to 31 October 2014. The previous report to IMO, covering the period 1 November 2012 to 31 October 2013, was made to the first session of the NCSR Sub-Committee in document NCSR 1/18.

Status of the Inmarsat space segment

2 Inmarsat-C continues to be the base satellite communications service for the GMDSS which is used for distress alerting, broadcast of Maritime Safety Information (MSI) and Search and Rescue (SAR) coordination communications as well as Ship Security Alerting System (SSAS), Long Range Identification and Tracking (LRIT) and general communications.

3 Inmarsat-B and Fleet F77 systems can still be used in the GMDSS for distress voice calling (F77 for urgency and safety priority communications as well) and general communications. As previously announced by IMSO (NCSR 1/18/1), Inmarsat-B will be withdrawn from service on 31 December 2016.

4 Inmarsat GMDSS services are managed through four prime and one spare operational I-3 (Inmarsat third generation) satellites in the primary locations over four ocean regions as summarized in the following table:

AOR-W	AOR-E	IOR	POR	Spare/Lease
Inmarsat-3F4 54°W	Inmarsat-3F2 15.5°W	Inmarsat-3F1 64.5°E	Inmarsat-3F3 178°E	Inmarsat-3F5 25°E

Table 1: Inmarsat-3 satellites

5 Inmarsat also operates I-4 (Inmarsat fourth generation) satellites to provide non-GMDSS FleetBroadband (FB) maritime services, for example FB distress and urgency priority voice services in three ocean regions as illustrated in the table below. Some of the I-4 satellites can act as contingencies for the rapid restoration of essential GMDSS services in the unexpected event of a prime satellite failure.

AMER (Americas)	EMEA (Europe, Middle East and Africa)	IPAC (Indian and Pacific)
Inmarsat-4F3 98°W	2 satellites - Inmarsat-4F2 and 4F4A (Alphasat satellite) - 25°E	Inmarsat-4F1 143.5°E

Table 2: Inmarsat-4 satellites

6 The last of Inmarsat's second generation satellites, Inmarsat-2F2, is at 142° West and continues to provide commercial leased services and also remains available to back up the AOR-W and POR I-3 satellites, if needed. This satellite is planned to be decommissioned at the end of 2014 after 23 years in service, which is far longer than the originally envisioned service time of 10 years. Inmarsat has informed IMSO that the next generation of L-band satellite constellation, which will be called Inmarsat-6, is being developed and the Company is looking at a schedule where the first satellite would be launched before the end of the decade.

7 Inmarsat operational procedures are in place to ensure that full sparing capability is retained throughout the whole Inmarsat constellation (figure 1), and are regularly exercised to demonstrate and maintain their effectiveness.

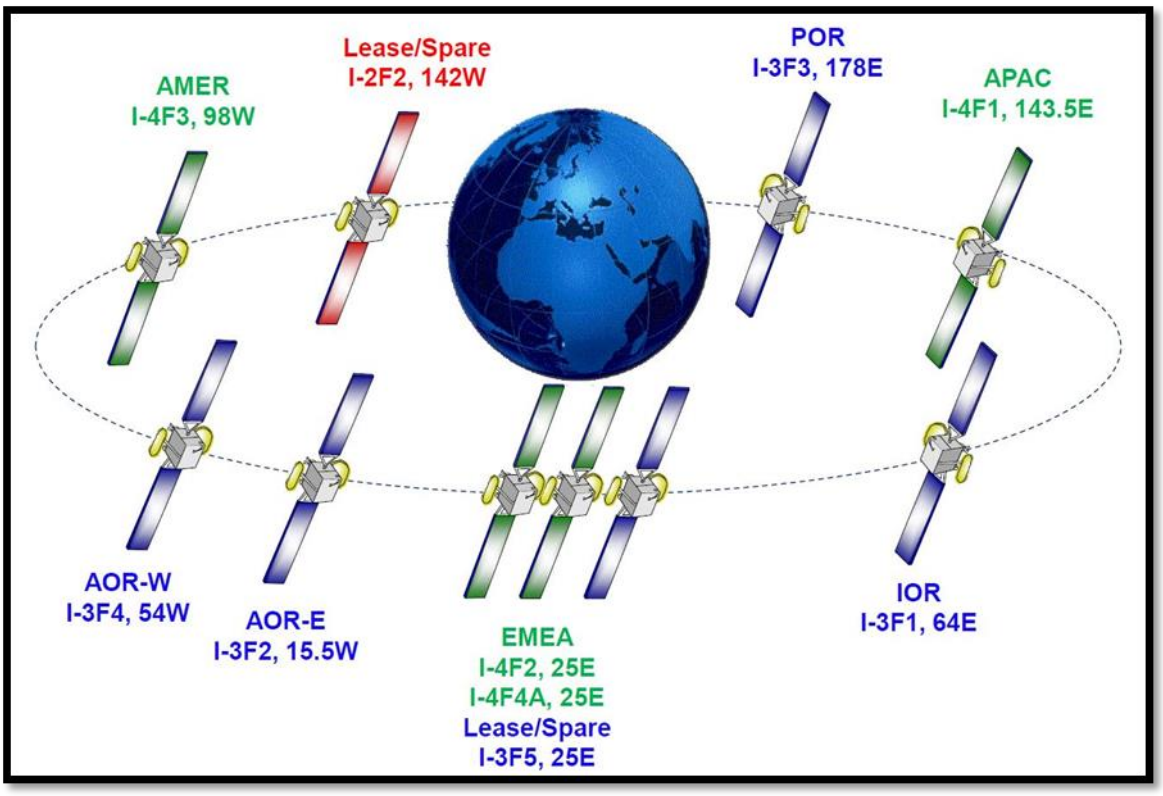

Figure 1: Inmarsat's satellite constellation – November 2014

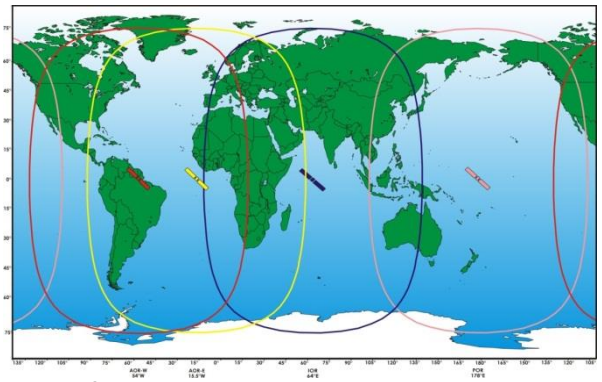

Figure 2: Inmarsat I-3 coverage

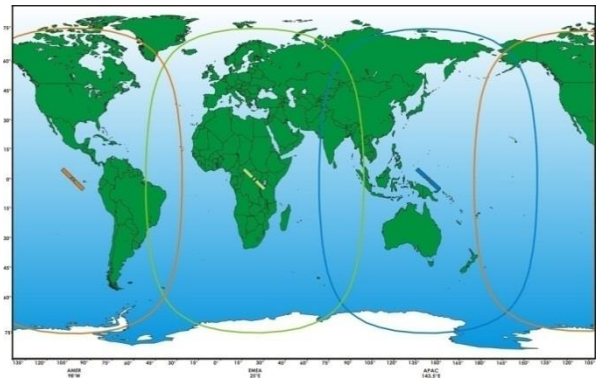

Figure 3: Inmarsat I-4 coverage

Closure of Inmarsat-B Services

8 Following Inmarsat's five years' notice in 2010 of the intended closure of Inmarsat-B service, the Company, given the significant numbers of ships still continuing to utilize the Inmarsat-B service, reviewed its decision in 2013 and postponed the closure date by two years to 30 December 2016. IMSO has not been informed of any further changes in the scheduled closure date of Inmarsat-B service and has been working with Inmarsat to ensure that a sufficient programme of public information is conducted in relation to the eventual closure of the Inmarsat-B services. Inmarsat had previously followed the same procedure for the closure of Inmarsat-E EPIRB and Inmarsat-A services on 1 December 2006 and 31 December 2007, respectively.

Performance of the Inmarsat network

9 *Availability figures for each service and ocean region*

9.1 The availability of all GMDSS components, including distress alerting, SAR Coordination, MSI broadcast and general communications within the Inmarsat system during the 12-month period from 1 November 2013 to 31 October 2014 is shown in the following table:

	IOR	POR	AOR-E	AOR-W
Space Segment	100.00%	99.96%	100.00%	100.00%
Inmarsat-B/F77	100.00%	99.93%	100.00%	100.00%
Inmarsat-C	100.00%	99.93%	100.00%	100.00%

Table 3: Availability of Inmarsat-3 satellites for the GMDSS services

The definition of availability and methods of calculation are based on the approach adopted in section 3.5 of ITU-R Report M.918-1 (1990) "Availability of Communications Circuits in the Maritime Mobile Satellite Service", dated 15 December 1989.

9.2 These figures illustrate the effective reliability of the core GMDSS components, and may be taken as a measure of the availability of the GMDSS services which rely on those components, including those providing general communications.

9.3 The figures tabulated in table 3 above indicate that the mobile satellite communication network of Inmarsat was higher than 99.9%, the minimum availability level required by resolution A.1001(25), during the reporting period. Detailed information about the reduction of availability in the POR is provided in paragraphs 10.1 to 10.5.

9.4 It should be noted that the availability figures do not include any element of the communication links from any Land Earth Station (LES) to the associated Maritime Rescue Coordination Centre (MRCC) or other national agencies, which are entirely a national matter for the country concerned.

10 *Satellite anomaly in POR on 23 September 2014 and 25 October 2014*

10.1 On Tuesday, 23 September 2014 at 19:10 UTC a payload anomaly, which affected maritime distress and safety services, occurred on the Inmarsat-3F3 prime POR satellite. Contingency procedures were invoked immediately and maritime distress and safety services were successfully transferred to Inmarsat-2F2 (142W) (one of the contingency satellites) at 21:08 UTC thus restoring the vast majority of the safety services. One-off technical problems with Perth LES hindered the transfer of safety services to Inmarsat-4F1 (143.5E) (the other contingency satellite). However, this had a minimal impact on global coverage since the coverage gap between the Inmarsat-3F1 (Indian Ocean Region) and Inmarsat-2F2 satellites was very small.

10.2 Inmarsat-3F3 functionality was recovered and all services over the POR were restored to their normal availability at 22:56 UTC, three hours and forty-six minutes after the failure occurred.

10.3 Another outage occurred on Saturday, 25 October 2014 at 02:05 UTC and all services, including maritime distress and safety, on the Inmarsat-3F3 prime POR satellite were interrupted. Contingency Procedures were instantly initiated to transfer services to the two contingency satellites Inmarsat-2F2 (142W) and Inmarsat-4F1 (143.5E). The transfer of

maritime distress and safety communication services to Inmarsat 2F2 was successfully completed at 04:01 UTC thus restoring the vast majority of the safety services globally. A technical problem together with other issues encountered by the LESs involved hindered the transfer of safety services to Inmarsat-4F1. As before, this had a minimal impact on global coverage since the coverage gap between the Inmarsat-3F1 (Indian Ocean Region) and Inmarsat-2F2 satellites was very small.

10.4 Normal levels of availability was restored on Inmarsat-3F3 after two hours and five minutes since the start of the outage, at 04:10 UTC.

10.5 Inmarsat informed the Director General of IMSO about both of the incidents as soon as they were detected and kept the Director General up to date with relevant information at every stage of the recovery and restoration process. Inmarsat also reported that it was not made aware of any ship-to-shore or shore-to-ship distress and safety communication that was affected during the outages.

10.6 Both incidents, including the difficulties encountered for the restoration of service in less than one hour as required by resolution A.1001(25), were lengthily discussed between IMSO and Inmarsat during the subsequent session of the Public Services Committee. IMSO was assured that Inmarsat technical and operational staff noted the lessons learned from these two recent incidents, took necessary measures to minimize the potential of such incidents again in the future and was closely monitoring the health of Inmarsat 3F3 satellite.

10.7 Furthermore, a formal report was submitted to IMSO by Inmarsat identifying the root causes of the incidents, lessons learned and proposed actions to prevent and respond to satellite outages affecting safety services. IMSO is satisfied with the outcome of this report and will follow its implementation.

Number of Land Earth Stations providing GMDSS Services

11 At present, there are 80 Inmarsat-B/F77 and 35 Inmarsat-C LESs located at various sites worldwide that provide the essential ground-based gateways for GMDSS related communications using messaging, voice and data/IP services. Some countries may still use telex communication. The figures include virtual/shared as well as real LESs and illustrate the total number of points of access to the Inmarsat network. The number of LES in each system is sufficient to ensure robust operation and provide alternatives in the event of local failure. These LESs also operate the Inmarsat space and ground segments for distress alerting and calling, follow-up distress communications and promulgation of MSI (only by Inmarsat-C LESs).

12 Table 4 below gives a list of Inmarsat-C LESs with their operators, locations, names, IDs and associated MRCCs to where ship-to-shore distress alerts and distress priority messages are automatically routed.

LES Operator	LES Name*	Country**	AOR-E	AOR-W	IOR	POR
KDDI	Yamaguchi	Japan			303 – Operations Centre, Tokyo	203 – Operations Centre, Tokyo
	Yamaguchi at Aussaguel	France	103 – Operations Centre, Tokyo	003 – Operations Centre, Tokyo		
MCN	Beijing	China			311 – Beijing MRCC	211 – Beijing MRCC
Morsviazsputnik	Nudol	Russian Federation	117 – State MRCC, Moscow		317 – State MRCC, Moscow	
	Nakhodka					217 – Vladivostok MRCC
Singapore Telecom	Sentosa	Singapore			328 – Port Operations Control Centre	210 – Port Operations Control Centre
Stratos Global	Burum	Netherlands	102 – Falmouth MRCC	002 – Falmouth MRCC		
			112 – JRCC Den Helder	012 – JRCC Den Helder		
	Perth	Australia			302 – Falmouth MRCC	202 – Falmouth MRCC
					312 – RCC Australia	212 - RCC Australia
Telecom Italia	Fucino	Italy	105 – CG Rome		335 – CG Rome	
Vizada	Aussaguel	France	121 – CROSS Gris-Nez	021 – CROSS Gris-Nez	321 – CROSS Gris-Nez	
	Aussaguel at Yamaguchi	Japan				221 – CROSS Gris-Nez
	Eik	Norway	104 – Stavanger JRCC	004 – Stavanger JRCC	304 – Stavanger JRCC	
			101 – USCG Norfolk	001 – USCG Norfolk	301 – Stavanger JRCC	
	Eik at Santa Paula	USA				201 – USCG Alameda
						204 – Stavanger JRCC
Vishipel	Hai Phong	Viet Nam			330 – Viet Nam MRCC	
TATA Comm	Pune	India			306 – MRCC Mumbai	

Table 4: Inmarsat-C Land Earth Stations and associated MRCCs

Notes:

* *Information on LES names is correct as at November 2014. They may change from time to time without Inmarsat being informed of such changes and therefore Inmarsat cannot be held responsible for the accuracy of the information.*

** *Country column shows location of Inmarsat-C LES antennas where initial ship-to-shore distress alerts are received.*

Number of Ship Earth Stations

13 Inmarsat had more than 175,000 registered GMDSS-capable mobile terminals at the end of October 2014, of which more than 154,000 were Inmarsat C and mini-C terminals.

Number of Distress Priority Calls/Alerts through the system

14 Ship-to-Shore Distress alerting is one of the core GMDSS functions and Inmarsat monitors performance of the Inmarsat-C distress alerting service through the Distress Alert Quality Control System (DAQCS).

15 All distress alerts and calls through the Inmarsat systems during the period between 1 November 2013 and 31 October 2014 were handled correctly and delivered promptly.

16 The numbers of **ship-to-shore Inmarsat-C** distress alerts received were as follows:

	AOR-E	AOR-W	IOR	POR	Total (previous year)
Nov 13 - Oct 14	215	143	280	139	777 (900)

Table 5: Ship-to-shore Inmarsat-C Distress calls

17 The numbers of **ship-to-shore Inmarsat Fleet F77** priority voice calls were as follows:

	Priority	AOR-E	AOR-W	IOR	POR	Total (previous year)
Nov 13- Oct 14	**Safety**	17	20	23	21	81 (100)
	Urgency	59	28	68	39	194 (313)
	Distress	18	17	26	32	93 (95)

Table 6: Ship-to-shore Inmarsat-F77 priority voice calls

18 There was only one **ship-to-shore Inmarsat-B** distress voice call and it reflects the diminishing use of this legacy system, which is due for closure at the end of 2016.

19 In general, the use on Inmarsat-C and F77 systems for ship-to-shore priority distress messaging and calling in all ocean regions was not widely different from that of the previous years and total number of alerts and calls was a little lower than seen in previous years.

Action to reduce false alerts

20 Inmarsat continues to contact those ships concerned with the transmission of multiple distress alerts and, where the alerts have apparently been false, seeks to assist the ship to improve its procedures to avoid such occurrences in future. Where ships respond to such approaches by Inmarsat, the reasons given for initiating false distress alerts are invariably attributed to human error, equipment test or equipment fault. However, many vessels do not respond to these contacts and no further action by Inmarsat is possible.

21 Following the request by COMSAR 15 (COMSAR 15/16, paragraph 5.4), IMSO has now agreed with Inmarsat a procedure whereby the Director General of IMSO will write to the flag State of any vessel that does not respond to the approach by Inmarsat after she has initiated apparent multiple false distress alerts. There have been no such cases during the last year.

EGC SafetyNET Service

22 SafetyNET is an international service for the broadcasting and automatic reception of navigational and meteorological maritime safety information (MSI) and search and rescue (SAR) related messages via Inmarsat-C Enhanced Group Call (EGC) system. SafetyNET receiving capability is part of the mandatory equipment which is required to be carried by certain ships in accordance with the provisions of SOLAS, Chapter IV.

23 SafetyNET messages are originated by authorized Information Providers, which include, but are not limited to, NAVAREA Coordinators, METARA Issuing Services and Rescue Coordination Centres. The standards against which most of these broadcasts are issued and coordinated have been established by the International Hydrographic Organization (IHO) and the World Meteorological Organization (WMO). SafetyNET messages are also promulgated to Arctic areas XVII-XXI within Inmarsat-I3 coverage.

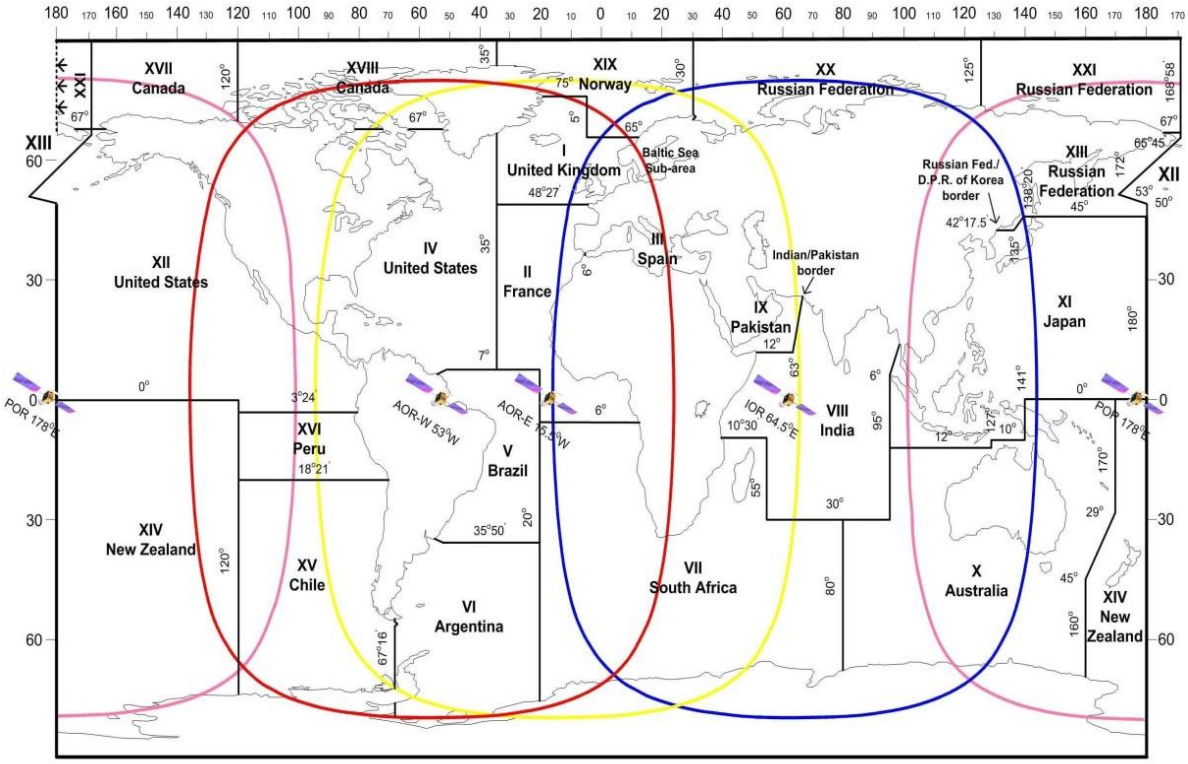

Figure 4: IMO defined NAVAREAs/METAREAs for promulgation of maritime safety information with Inmarsat I-3 coverage

24 A number of SafetyNET calls worldwide fluctuates according to the season and is also driven by events but has been generally stable in all ocean regions at a slightly lower level of usage than in the previous reporting period. On average there were about 30,000 EGC messages per month including repeated messages or 1,000 messages per day, illustrated in the following table 7:

	AOR-E	AOR-W	IOR	POR	Total
Nov'13	7160	5183	13922	7603	**33868**
Dec'13	8051	4648	13948	7280	**33927**
Jan'14	7396	4164	15323	6911	**33794**
Feb'14	7232	3976	9349	6313	**26870**
Mar'14	7708	4003	6978	7343	**26032**
Apr'14	8050	3997	6424	8387	**26858**
May'14	7879	4454	6298	8470	**27101**
Jun'14	6944	5382	5651	8571	**26548**
Jul'14	7406	5247	6162	9306	**28121**
Aug'14	7044	6732	5705	9991	**29472**
Sep'14	7491	6675	5314	8826	**28306**
Oct'14	8433	7525	6538	9540	**32036**

Table 7: Number of SafetyNET messages per month in all ocean regions

Satellite failure contingency exercises

25 The satellite failure contingency exercises are carried out by Inmarsat at the request of IMSO to ensure Inmarsat is able to restore the essential maritime distress and safety services within one hour after a confirmed satellite failure, as required by resolution A.1001(25). Exercises are attended by IMSO and include participation by Inmarsat's satellite control centre, network operations centre, management and as well as relevant Land Earth Station Operators (LESOs).

26 IMSO and Inmarsat endeavour to conduct satellite failure contingency exercises on a quarterly basis unless there is an operational reason to cancel or postpone the exercise. IMSO participates actively in the planning, execution and review of all satellite failure contingency exercises and continues to work with Inmarsat to broaden the scope of these events.

27 An exercise planned in April 2014 was cancelled due to Inmarsat operations staff's busy schedule for the launch of Inmarsat Global Xpress satellite – I-5 F1 on 1 July 2014. Contingency exercises for the reporting period were performed in November 2013 (IOR satellite) and July 2014 (AOR-W satellite). The latter was performed at the Operational Backup Centre at Burum in the Netherlands in order to exercise the staff, communications and decision-making at the standby facility. The last exercise for 2014 had been postponed to December due to the IMSO Assembly which was held in November 2014 and was recently conducted on 3 December for the IOR satellite.

Conclusions

28 In view of the foregoing review of the status and performance of the relevant Inmarsat systems, it is IMSO's overall assessment that, during the period covered by this report, Inmarsat Global Ltd has continued to provide fully operational maritime mobile satellite distress and safety communication services for the GMDSS and fulfil the Company's public service obligation as stated in the PSA.

Action requested of the Sub-Committee

29 The Sub-Committee is invited to note:

.1 the information provided on the status and performance of the Inmarsat network for the GMDSS (paragraphs 2 to 7);

.2 the closure of Inmarsat-B services by 30 December 2016 (paragraph 8);

.3 the performance and availability of the GMDSS service provided by Inmarsat for the period 1 November 2013 to 31 October 2014 (paragraph 9 and 10);

.4 that a formal report was submitted to IMSO by Inmarsat identifying the root causes of the incidents reflected in paragraph 10, lessons learned and proposed actions to prevent and respond to satellite outages affecting safety services, and that IMSO is satisfied with the outcome of this report and will follow its implementation (paragraph 10.7);

.5 the ongoing to reduce false alerts (paragraphs 20 and 21);

.6 the ongoing programme of satellite failure contingency exercises (paragraphs 25 to 27); and

.7 the information contained in this report on the status and performance of the relevant Inmarsat systems in general, and in particular the IMSO's overall assessment that Inmarsat Global Ltd has continued to provide a sufficient quality of service to meet its obligations under the GMDSS in compliance of the Company's public service obligation as per the current Public Services Agreement between Inmarsat and IMSO (paragraph 28).