

Revision of IMO Assembly Resolution A.888(21) - Criteria for the Provision of Mobile
Satellite Communication Systems in the Global Maritime Distress and Safety System
(GMDSS)

Submitted by IHB

SUMMARY

Executive Summary: This document reports on the Adoption of a revised resolution by
IMO on “Criteria for the Provision of Mobile Satellite
Communication Systems in the Global Maritime Distress and
Safety System (GMDSS)”.

Action to be taken: Paragraph 3

Related documents: None

1. As CPRNW members will be aware the IMO has been reviewing its resolution A.888(21) in order to make provision for operators other than Inmarsat to provide services within the GMDSS.
2. At its 25th Assembly in 2007 the IMO adopted the revised resolution A.1001 (25) a copy of which is attached to this document.
3. CPRNW is invited to note the information provided.



ASSEMBLY
25th session
Agenda item 9

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RESOLUTION A.1001(25)

**Adopted on 29 November 2007
(Agenda item 9)**

**CRITERIA FOR THE PROVISION OF MOBILE SATELLITE COMMUNICATION
SYSTEMS IN THE GLOBAL MARITIME DISTRESS AND
SAFETY SYSTEM (GMDSS)**

THE ASSEMBLY,

RECALLING Article 15(j) of the Convention on the International Maritime Organization concerning the functions of the Assembly in relation to regulations and guidelines concerning maritime safety,

RECALLING ALSO that regulation IV/5 of the International Convention for the Safety of Life at Sea (SOLAS), 1974, as amended in 1988, requires each Contracting Government to undertake to make available, either individually or in co-operation with other Contracting Governments, as they may deem practical and necessary, appropriate shore-based facilities for space and terrestrial radiocommunication services, having due regard to the recommendations of the Organization,

TAKING INTO ACCOUNT resolution 322(Rev.Mob-87) of the World Administrative Radio Conference, 1987, relating to coast stations and coast earth stations assuming watchkeeping responsibilities on certain frequencies in connection with the implementation of distress and safety communications for the Global Maritime Distress and Safety System (GMDSS),

TAKING INTO ACCOUNT ALSO resolution 3, "Recommendation on the early introduction of the Global Maritime Distress and Safety System (GMDSS) elements", adopted by the 1988 SOLAS Conference introducing the system,

NOTING the Provision of radio services for the GMDSS (resolution A.801(19)), as amended,

NOTING ALSO that future mobile satellite communication systems might have the potential to offer maritime distress and safety communications,

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NOTING FURTHER the decision of the Maritime Safety Committee, at its eighty-second session, that the oversight of future satellite providers in the GMDSS should be undertaken by the International Mobile Satellite Organization (IMSO),

RECOGNIZING that mobile satellite communication systems for use in the GMDSS should fulfil performance criteria adopted by the Organization,

RECOGNIZING ALSO the need for the Organization to have in place criteria against which the capabilities and performance of mobile satellite communication systems for use in the GMDSS may be verified and evaluated,

1. ADOPTS the “Criteria for the provision of mobile satellite communication systems in the Global Maritime Distress and Safety System (GMDSS)”, set out in the annex to the present resolution;
2. INVITES Governments, when permitting ships entitled to fly the flag of their State to carry maritime mobile satellite equipment for use in the GMDSS, to require those ships to carry equipment which can utilize only those satellite systems that have been recognized by IMO and conform to the performance standards adopted by the Organization for use in the GMDSS, in accordance with the criteria set out in sections 2 to 5 of the annex;
3. REQUESTS the Maritime Safety Committee to:
 - (a) apply the criteria set out in the annex to the present resolution, through the procedure set out in section 2 of the annex, to evaluate satellite systems notified by Governments for possible recognition for use in the GMDSS, within the context of the relevant regulations of SOLAS chapter IV; and
 - (b) ensure that mobile satellite communication systems recognized by the Organization for use in the GMDSS are compatible with all appropriate SOLAS requirements, and also that such recognition takes into account existing operational procedures and equipment performance standards;
4. REQUESTS ALSO the Maritime Safety Committee to keep this resolution under review and take appropriate action as necessary to secure the long-term integrity of the GMDSS;
5. REVOKES resolution A.888(21) and MSC/Circ.1077.

ANNEX

CRITERIA FOR THE PROVISION OF MOBILE SATELLITE COMMUNICATION SYSTEMS IN THE GLOBAL MARITIME DISTRESS AND SAFETY SYSTEM (GMDSS)

1 DEFINITIONS

1.1 Mobile Satellite Communication System

The mobile satellite communication system (satellite system) means the space segment, the arrangements for controlling the space segment, the network control facilities controlling the access to the space segment, the earth stations and maritime mobile terminals operating in the system. The satellite system will include, or interface with, the following elements:

- .1 **Earth station** – any fixed satellite communication station acting as a gateway between the space segment and the terrestrial networks.
- .2 **Maritime mobile terminal** – any radiocommunication equipment working through a satellite communication system recognized for use in the GMDSS on board a ship.
- .3 **Space segment** – satellites and the radiocommunication facilities they carry both for control and to provide GMDSS services, including the forward and return communication links with the earth.
- .4 **Terrestrial networks** – the communication networks providing land-based subscriber communication facilities such as telephone, facsimile or data communications.

1.2 Mobile Satellite Communication Service means any service which operates through a satellite system and is recognized by the Organization for use in the GMDSS.

1.3 Coverage area

The Coverage Area of the satellite system is the geographical area within which the satellite system provides an availability in accordance with the criteria stated in section 3.5 in the ship-to-shore and shore-to-ship directions, and within which continuous alerting is available.

1.4 Availability

The availability of any mobile satellite communication system or service is defined as the percentage of time in which the system or service as a whole is available for access to and communications through the system, calculated according to the following formula:

$$A = \frac{(\text{scheduled operating time}) - (\text{downtime})}{(\text{scheduled operating time})} \times 100\%$$

where:

Scheduled operating time = 100% of the time period being reported on; and
Downtime = the total time during the period for which the recognized GMDSS system or service was not operationally available.

Note: Definitions and calculations of availabilities of communications circuits in the Maritime Mobile-Satellite Service are given in ITU-R M.828-1.

2 RECOGNITION OF MOBILE SATELLITE COMMUNICATION SYSTEMS FOR USE IN THE GMDSS

2.1 The evaluation and recognition of satellite systems participating, or wishing to participate in the GMDSS are undertaken by the Organization.

2.2 Application for Recognition

2.2.1 Satellite system providers wishing to participate in the GMDSS should apply to the Organization, through a Member State, for recognition as a radio system providing maritime distress and safety satellite communication capabilities for use in the GMDSS. Such applications should be notified to the Organization by Governments, either individually or in co-operation with other Governments. The application will be reviewed by the Maritime Safety Committee (MSC) in relation to its policy for the expansion of satellite services in the GMDSS. If the MSC decides that there are no objections in principle to the application, it will forward the application to the COMSAR Sub-Committee for evaluation. Recognition of the satellite provider to operate in the GMDSS will be undertaken by the committee on the basis of the evaluation report.

2.2.2 The Governments concerned should make available to the Organization all necessary information to enable it to evaluate the satellite system in relation to the criteria indicated below.

In particular, Governments proposing such satellite systems for possible recognition and use in the GMDSS should provide evidence to show that:

- .1 the satellite system conforms with all the criteria specified in this annex;
- .2 the charging policies and provisions of resolution A.707(17), as amended, on *Charges for distress, urgency and safety messages through the Inmarsat system*, are complied with;
- .3 there is a well-founded confidence that the company concerned will remain viable for the foreseeable future and will remain in a position to deliver the required services over an extended period, in keeping with the expectations of the Organization and the maritime industry as to the continuity, durability and reliability of the service; and
- .4 the provider of the satellite system is ready to submit any recognized services to oversight by IMSO and sign the required Public Services Agreement (PSA) with that organization.

2.3 Verification and Evaluation

2.3.1 The COMSAR Sub-Committee should verify and evaluate the information, seeking clarification as required direct from the service provider concerned, and decide whether the satellite system meets the criteria established by this resolution. In reaching its decision, the COMSAR Sub-Committee should take into account the provisions of the relevant regulations of chapter IV of the 1974 SOLAS Convention, as amended and the criteria established by this resolution.

2.3.2 Recognition by the Organization should be recorded in an MSC resolution entitled *Statement of Recognition of Maritime Mobile Satellite Services provided by [Company Name]*, detailing the specific services provided by the company which have been recognized by the Organization. A copy of the statement of recognition should be provided to IMSO.

2.3.3 If, following evaluation, the Organization is unable to recognize the company or the service(s) offered for the GMDSS, the Organization should communicate this decision to the company and IMSO in writing, setting out the reasons for the decision and any actions the company may take to achieve recognition in the future.

2.4 The Public Services Agreement

2.4.1 Recognized services are subject to oversight by IMSO according to the rules and arrangements set out in the public services agreement (PSA) concluded between the service provider and IMSO. No maritime satellite system should be used in the GMDSS unless it has first been recognized by the Organization in accordance with the above procedure and the service provider has signed a PSA with IMSO.

2.4.2 IMSO should conduct its oversight of the recognized services on a continuing basis.

2.4.3 Responsibility for ensuring compliance with the standards established by this annex, other relevant mandatory international instruments and, to the extent necessary, those recommendations, resolutions and procedures of IMO and ITU which are of a recommendatory nature insofar as they relate to the provision of GMDSS services, rests with IMSO under the terms of the Public Services Agreement.

2.5 Reports

At least once a year, IMSO should make available to the Organization a report on availability, performance and other relevant information in respect of each recognized service, for the period since the preceding report, in accordance with section 3.5.2 of the criteria indicated below.

3 CRITERIA AND REQUIREMENTS FOR THE RECOGNIZED MOBILE SATELLITE COMMUNICATION SYSTEM

3.1 Functional requirements*

Satellite systems for maritime distress and safety communication services and forming part of the GMDSS radio systems specified in chapter IV, regulation 5 of the 1974 SOLAS Convention, as amended, should provide capabilities for at least the following maritime distress and safety communications:

- .1 ship-to-shore distress alerts/calls;
- .2 shore-to-ship distress relay alerts/calls;
- .3 ship-to-shore, shore-to-ship and ship-to-ship search and rescue co-ordinating communications;
- .4 ship-to-shore transmissions of Maritime Safety Information;
- .5 shore-to-ship broadcasting of Maritime Safety Information; and
- .6 ship-to-shore, shore-to-ship, and ship-to-ship general communications.

3.2 Capacity

The satellite system should be designed to provide sufficient channel and power capacity to process effectively, with the availability stated in section 3.5, the maritime distress, urgency, safety and general communication traffic estimated to be required by the ships using the system.

3.3 Priority access

3.3.1 Satellite systems in the GMDSS should be capable of processing maritime distress, urgency, safety and routine communications in accordance with the message priority as defined by the ITU Radio Regulations. The order of processing these communications should be:

- .1 distress;
- .2 urgency;

* – Resolution A.801(19) “Provision of Radio Services for the Global Maritime Distress and Safety System (GMDSS)”, Annex 5 “Criteria for use when providing Inmarsat shore-based facilities for use in the GMDSS”;

– Resolution A.887(21) “Establishment, Updating and Retrieval of the Information Contained in the Registration Databases for the Global Maritime Distress and Safety System (GMDSS)”;

– Resolution A.694(17) “General requirements for Shipborne Radio Equipment forming Part of the Global Maritime Distress and Safety System (GMDSS) and for Electronic Navigational Aids”;

– IMO International SafetyNET Manual;

– Resolution A.664(16) “Performance Standards for Enhanced Group Call Equipment”; and

– Appropriate IEC Standards and ITU Recommendations.

- .3 safety; and
- .4 routine (general communications).

3.3.2 In implementing these four levels of priority:

- .1 Distress alerts and distress calls (level 1) should be given priority treatment by providing immediate access to satellite channels. For store and forward systems, distress alerts and calls should be placed ahead of all other traffic.
- .2 Satellite systems used for providing other mobile satellite communications in addition to maritime communications should be capable of automatically recognizing requests for maritime communications from:
 - maritime mobile terminals; and
 - recognized entities of critical importance for safety at sea, such as MRCCs, hydrographic and meteorological offices, medical centres, etc., registered with the earth station.

The system should process such maritime communications in the ship-to-shore and shore-to-ship directions for levels 1 to 3 with priority over other communications.

- .3 In processing maritime distress, urgency, safety and routine communications, the satellite system and the earth station should be capable of:
 - .1 automatically recognizing the message or access priority for ship-to-shore communications;
 - .2 automatically recognizing the message or access priority for shore-to-ship communications, if any are provided, from, as a minimum, recognized entities of importance for safety at sea, registered by the earth station;
 - .3 preserving and transferring the priority;
 - .4 giving distress alerts and distress calls immediate access, if necessary by pre-empting ongoing communications of routine priority;
 - .5 automatically recognizing maritime distress communications and automatically routing maritime distress alerts and distress calls directly to an associated MRCC, or responsible RCC if this capability exists; and
 - .6 processing maritime urgency and safety communications in the ship-to-shore and shore-to-ship directions with the required priority, for example by allocating the first vacant channel, if no channel is immediately available.
- .4 Selection and use of message or access priority for urgency and safety transmissions by maritime mobile terminals should preferably be automatic and should be restricted to calls to special, recognized entities such as medical centres, maritime assistance, hydrographic and meteorological offices, etc., registered with

the earth station. The earth station should automatically route such calls directly to the relevant entity.

3.4 Coverage area

3.4.1 The definition of the coverage area is given in section 1.3.

3.4.2 The coverage area is to be delineated on a map and also described in relation to the sea areas defined in Chapter IV, regulation 2 of the SOLAS Convention. Documentation on the coverage area of the satellite system, as defined in section 1.3, should be forwarded to the Organization.

3.4.3 Information on coverage areas for satellite systems forming part of the GMDSS should be published by the Organization in the GMDSS Master Plan.

3.5 Availability

3.5.1 The satellite system should provide continuous availability for maritime distress and safety communications in the ship-to-shore and shore-to-ship directions.

3.5.2 The availability of the space segment, provision of spare satellite capacity and the network control function (i.e. the network availability), as defined in section 1.4 above, should be monitored by IMSO, which should report on the recorded availability of the system to the Organization at least once every year.

3.5.3 Service providers should advise their associated RCCs and IMSO of planned outages of recognized services and advise ships of scheduled downtime and known interruptions in service, and supply any other relevant network information. Service providers should also advise IMSO of unscheduled interruptions in any recognized services, as soon after the commencement of the interruption as possible, and when the recognized services have been restored.

3.5.4 Network availability. The complete mobile satellite communication network, including earth stations for the recognized services, is expected to achieve at least 99.9% availability (equivalent to a total of 8.8 hours down time per year).

3.6 Restoration and spare satellites

3.6.1 Spare satellite capacity and arrangements prepared in advance should be provided to ensure that, in the event of a partial or total satellite failure, the recognized maritime distress and safety communication services in the area concerned can be restored to their normal availability, not more than one hour after the failure occurs.

3.6.2 Full information on the means and arrangements prepared for restoration of the maritime distress and safety communication services in the event of a satellite failure should be notified to IMSO. IMSO and the service provider should conduct exercises from time to time to prove the efficiency and effectiveness of these planned arrangements.

3.7 Identification

The satellite system should be capable of automatically recognizing and preserving the identification of maritime mobile earth stations.

3.8 Information to be made available to SAR authorities

For all distress urgency and safety communications, the maritime mobile terminal identification number or Maritime Mobile Service Identity (MMSI) should be an integral part of the distress alert and be provided to the RCC with the alert. When available, all additional registration, commissioning or other data relevant to the search and rescue or prosecution of a false alert should be referenced to this number and made available to the proper SAR authority or RCC upon request.

3.9 Reception of distress alerts

The satellite system should allow for addressing a maritime distress alert to a specific MRCC chosen by the ship's operator and covering the area concerned, but should also provide for automatic routing of manually initiated maritime distress alerts. Means should be provided to allow the MRCC to easily identify the system and specific mobile station from which an alert or other priority message has been received, to enable the MRCC to establish shore-to-ship communications with the ship concerned.

3.10 Control of maritime mobile terminals

Access control arrangements for controlling and giving, or temporarily denying, access by maritime mobile terminals to the system should at all times allow maritime mobile terminals access for transmission of maritime distress alerts/calls and distress messages.

3.11 Test facilities

The system should provide facilities making it possible for maritime mobile terminals to test the distress capability of their stations without initiating a distress alert/call.

4 CRITERIA AND REQUIREMENTS FOR EARTH STATIONS

4.1 Functional requirements

4.1.1 Earth stations serving the GMDSS should:

- .1 be in continuous operation;
- .2 be connected to an associated RCC;
- .3 keep continuous watch on all appropriate satellite communication channels; and
- .4 be capable of transmission and reception of at least the maritime distress and safety communications services included in paragraph 3.1.

4.2 Priority

4.2.1 The earth station should be capable of automatically recognizing the priority of ship-to-shore and shore-to-ship communications, and should process maritime mobile communications while preserving the four levels of priority specified in paragraph 3.3.1.

4.2.2 Priority access should be given for distress alerts and calls in real time. In any case, distress alerts and calls should be given priority treatment by providing immediate access to satellite channels, and distress alerts and calls for store and forward systems should be placed ahead of all routine traffic. Any satellite system designed for use in the GMDSS should be able to recognize the four levels of priority and give appropriate access for communications in the ship-to-shore direction and in the shore-to-ship direction for distress, urgency and safety traffic originated by RCCs or other Search and Rescue Authorities.

4.2.3 Limitations in existing public switched networks concerning facilities for indication and use of priority access codes might necessitate special arrangements such as use of leased lines between, for example, MSI providers and the earth station, until such facilities become available in the public switched network.

4.3 Pre-emption

Satellite systems participating in the GMDSS should make arrangements to ensure that it will always be possible for an MRCC to obtain an immediate connection to a maritime mobile terminal and that the MRCC could use the systems for SAR alerting and communication without any delay. This may be achieved by a process of pre-emption or by other suitable means approved by IMSO.

4.4 Routeing of maritime distress alerts

4.4.1 The satellite system should have reliable communication links to one or more associated MRCCs. These links may be implemented directly between the MRCC and an earth station, or some other suitable point in the system's network. The arrangements between the system and the MRCC are subject to approval by the national administration.

4.4.2 The system's network should be capable of automatically recognizing maritime distress and safety communications and of routeing, as far as possible automatically, maritime distress alerts/calls directly to the associated MRCC, via a highly reliable communication link. In cases where capability exists, the system may route alerts directly to the responsible RCC as defined in the IAMSAR Manual.

4.4.3 The earth station or other relevant part of the system's network should be provided with an aural and visual alarm to alert a designated responsible person in the event that automatic connection to the MRCC cannot be achieved within 60 seconds. In this case, all necessary action should be taken to immediately inform the MRCC of the details of the distress alert or call. Personnel should always be available to react to such an alarm so as to ensure that the distress alert or call can be forwarded to an MRCC within 5 minutes of the alarm being triggered. All messages with distress or urgency priority should sound an alarm at the earth station or other relevant part of the system's network, which should require manual cancellation.

4.4.4 The MRCC should be provided with reliable communication links to the system's network for efficient handling of shore-to-ship distress alert relays and distress traffic, preferably via dedicated communication links.

4.5 Identification

The system should be capable of automatically identifying ship earth stations. If other identification than the Maritime Mobile Service Identity (MMSI) is used in the system, the means should be provided 24 h per day to easily identify the ship and to provide the MRCC with all the appropriate additional information necessary for effecting the rescue, including the MMSI number where available.

4.6 Voice communication systems

4.6.1 The communication links for mobile-satellite voice communication systems should be connectable to the public switched network in accordance with relevant ITU-T Recommendations.

4.6.2 Satellite systems using the public switched network for routing maritime distress calls and distress traffic to and from MRCCs should, upon receipt of ship-to-shore or shore-to-ship distress alerts/calls or distress traffic, immediately attempt to establish the connection necessary for transfer of the distress alert or distress message.

4.7 Data communication systems

4.7.1 The communication links for mobile-satellite data communication systems should be connectable to the public data communication network in accordance with relevant ITU-T Recommendations. The system should provide the capability to transfer the identity of the calling subscriber to the called subscriber. Maritime distress alerts/calls and distress messages should include the ship identity and the earth station identity, or other means of identifying the point of access to the satellite network.

4.7.2 Satellite systems using the public switched network for routing distress alerts/calls and distress traffic to and from MRCCs should, on receipt of ship-to-shore or shore-to-ship distress alerts/calls or distress traffic, immediately attempt to establish the connection necessary for transfer of the distress alert or distress message.

4.8 Store and forward systems

Satellite systems using store and forward communication systems should:

- .1 make an initial attempt to deliver a ship-to-shore or shore-to-ship message within 60 seconds for any maritime distress alert or distress traffic, and within 10 minutes for all other maritime messages, from the time the receiving station receives the message (the message should include the ship identity and the earth station or system identity); and
- .2 generate notification of non-delivery immediately once the message is considered non-deliverable, for maritime distress alerts and distress messages not later than 4 minutes after reception of the alert or message.

4.9 Facilities for broadcasting Maritime Safety Information

4.9.1 Satellite systems forming part of the GMDSS should technically be capable of offering facilities for broadcasting Maritime Safety Information (MSI) from MRCCs and authorized providers of MSI, such as Hydrographic Offices and Meteorological Offices, to ships at sea.

4.9.2 Such facilities for broadcast of MSI should provide for automatic, continuous and reliable reception on board ships and should, as a minimum, fulfil the requirements specified in sections 4.9.3 to 4.9.8 below.

4.9.3 The facilities should provide for recognition and processing of the four levels of priority specified in paragraph 3.3.1.

4.9.4 It should be possible to address the broadcast of MSI to all properly equipped ships within a specified area for at least the following types of areas:

- .1 the entire region covered by the satellite or system over which the transmission is made;
- .2 the NAVAREAs/METAREAs as established by the International Maritime Organization (IMO), the International Hydrographic Organization (IHO) and the World Meteorological Organization (WMO) respectively; and
- .3 a temporary area chosen and specified by the originator of the MSI message, including circular or rectangular user-specified areas appropriate for broadcast of distress alert relays and search and rescue co-ordinating communications.

4.9.5 The facilities should provide for transmission of at least the types of Maritime Safety Information required by SOLAS, as follows:

- .1 search and rescue co-ordination information, including distress alert relays;
- .2 navigational warnings; and
- .3 meteorological warnings and forecasts.

4.9.6 The facilities for broadcast of navigational and meteorological warnings should include possibilities for:

- .1 scheduling the broadcast at fixed times or transmitting messages as unscheduled broadcast transmissions; and
- .2 automatic repetition of the broadcast with time intervals and number of broadcast transmissions as specified by the MSI provider, or until cancelled by the MSI provider.

4.9.7 The facilities should provide for marking MSI messages with a unique identity, enabling the shipborne equipment that receives these broadcasts to automatically ignore messages already received.

4.9.8 The broadcasting service should in addition provide facilities for broadcasts similar to NAVTEX to coastal areas not covered by the International NAVTEX Service, in accordance with the identification system (i.e., the identification characters B1, B2, B3, B4) used in the International NAVTEX Service.

5 ADDITIONAL RECOMMENDED CAPABILITIES

5.1 Mobile satellite service providers are encouraged to:

- .1 route Automatic Location Identification (ALI) and Automatic Number Identification (ANI) in accordance with appropriate ITU-T Recommendations, with distress calls originating from MSS terminals routed directly to the RCCs responsible for voice and data calls;
- .2 automatically route information contained in registration databases in accordance with resolution A.887(21), in a recognizable format and including the distress call to the responsible RCC, once means are established for doing so; and
- .3 be capable of retrieving maritime safety information in a timely manner from NAVAREA, METAREA, other relevant co-ordinators, and the International Ice Patrol Service, in a standard format and process established by those co-ordinators.

6 NOVEL TECHNIQUES

Satellite systems may be permitted to use novel techniques to provide any of the capabilities required by this resolution. Approval to use such novel techniques for a period of up to 12 months may be given provisionally by IMO in order to allow early introduction and proper evaluation of the technique. Final recognition of a novel technique may be given by the Organization only after receiving a report allowing full technical and operational evaluation of the technique.

7 LEGACY SERVICES

7.1 All satellite-based systems and services for the GMDSS which were already approved and in use* before the entry into force of this resolution are exempt from the requirements of paragraphs 2.1, 2.2 and 2.3. These systems are:

- .1 Inmarsat-A (due to be withdrawn 31 December 2007)
- .2 Inmarsat-B
- .3 Inmarsat-C
- .4 The International SafetyNET Service

7.2 The services defined in paragraph 7.1 are subject to the requirements of paragraph 2.4.

* IMO has decided that Inmarsat Fleet 77 already meets the requirements of Assembly resolution A.888(21) and recommended that Fleet 77 terminals should be used in GMDSS ship installations and by Rescue Co-ordination Centres.