

Management of False Alert in GMDSS

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Abstract-Global Maritime Distress and Safety System (GMDSS) was designed by International Maritime Organization (IMO) in 1986. It is a system that has a search and rescue (SAR) ability to rapidly and automatically send alert to a distress situation so that assistance could be given to ships in the distress situation within a minimum delay. Despite the positive aspects of GMDSS, there are some aspects of the features that need to be improved, some of which are; communication within the polar region (sea area A4) and false alert. This paper suggests measures to be put in place to minimize false alert in GMDSS.

keywords: GMDSS, Modernization Plan of GMDSS and False Alert

I. INTRODUCTION

GMDSS was once adopted through IMO as phase of the 1988 amendment to the International Convention for the Safety of Life at Sea convention, 1974(SOLAS) however it used to be utterly implemented in 1st February, 1999 [1].

The GMDSS architecture ensures that a vessel in distress somewhere should usually be heard and answered to [1]. It encompasses a special mixture of global technical and operational requirements and pointers and similarly a globally coordinated use of frequencies, for both on shore and on board ships.

It has served the mariners and the maritime industries well since its initiation, but some of the GMDSS applied sciences used have now not reached their full potential. Some GMDSS features ought to be carried out with the aid of more modern technologies. Taking into account the above and the e-navigation Project at 86 session, the Maritime Safety Committee (MSC) agreed to include in the Sub-Committee on Radio Communications and Search and Rescue (COMSAR) work programme, a sub-item on "Scoping exercise to set up the need for a evaluate of the factors and methods of the GMDSS"[2].

As a result of this work, in 2012, the MSC permitted a new unplanned output on the Review and Modernization of the GMDSS. The project consists of a High-Level Review (completed in 2014), a Detailed Review (completed in 2016), and then a Modernization Plan (started in 2016) based on the beforehand work, assigning the COMSAR Sub-Committee as the coordinating organ. After the adjustments in the organization of the work of IMO Sub-Committees at the give up of 2013, the problem is the competence of the new Sub-Committee on Safety of Navigation, Communication and Search and Rescue (NCSR). The Sub-Committee on Radio Communications and Search and Rescue (COMSAR) at its fifth session agreed to set up a Correspondence Group on false alerts. At its seventh session, (13th to seventeenth January 2003)

the Sub-Committee agreed on the Guidelines to Administrations on false alerts, prepared with the aid of the correspondence group. The motive of the hints is to advice Administrations on how to gather records and to use the standardized types when reporting false signals [3].

II. GMDSS

From 1st February 1999, the GMDSS grew to be obligatory for all industrial ships carrying 300 gross tons and above operated on worldwide voyages. Although the GMDSS does enable countrywide administrations to dispense with the on-board radio officer, compliant ships ought to have GMDSS certified personnel, in accordance with Standards of Training, Certification and Watch preserving (STCW) Chapter IV requirements.[4] It is widely recounted that the GMDSS works and has already saved many lives (IMO, 1999)[4].

However, as any new gadget with especially technical and useful content, the GMDSS is no longer problem-free, and it looks that its implementation difficulties shortly became its operational drawbacks. So far, research on GMDSS effectiveness levels from problems related with false alerting (MCA, 1998) [4]. The core function of the system is to grant rapid alerting more often than not of shore-based rescue and communications authorities in the tournament of an emergency, as nicely as alerting vessels in the immediately neighborhood and imparting accelerated capability of locating survivors [4].

One feature of the GMDSS replaces the ordinary approach of setting up communications via voice calling with an automated method, applicable to Medium Frequency (MF), High Frequency (HF) and Very High Frequency (VHF) radios, known as Digital Selective Calling (DSC). Other factors of the GMDSS include the INMARSAT A, B, and C maritime satellite systems, the coastal NAVTEX and INMARSAT Safety Net broadcast structures which supply weather and maritime protection information. Emergency Position Indicating Radio Beacons (EPIRB) used for misery alerting and locating, and radar transponders (SART) [4]. GMDSS alerting used to be brought in order to automate the name for search and rescue of ship in distress, via the utilization of the most contemporary terrestrial and celestial verbal exchange systems. However, the GMDSS inefficiencies are frequently manifested in the structure of false alert, which aside from the use of resources, degrade the overall effectiveness of the SAR operation.

III. MODERNIZATION PLAN OF GMDSS

As a result of the short comings of the GMDSS, the NCSR got here with a modernization layout for the

GMDSS. For the purpose of this report, the following aspect of the preliminary GMDSS Modernization Plan would be looked at [NCSR 4/12, 2016]:

- Overarching considerations
- Functional requirements: alignment with the Radio Regulations and other ITU-R documents,
- Provision of GMDSS satellite services and redefinition of Sea Area 3,
- VHF Data Exchange System (VDES),
- NAVDAT,
- Routing of distress signals and related information

A. Overarching considerations

According to NCSR [5] IMO liaison statements to the radio verbal exchange sector of International Telecommunication Union (ITU-R) have to be guided by using the principle that non-SOLAS vessels can make use of the GMDSS.

B. Functional requirements: alignment with the Radio Regulations and different ITU-R documents

In order to align the practical requirements with Radio Regulations [RR, 2015] and different ITU-R archives the following issues be considered [NCSR 4/12, 2016][6]

- Definitions are wanted for protection communications and other communications, as well as requirements for radio installations to operate these functions.
- References to the International Radio Consultative Committee (CCIR) need to be modified to the International Telecommunications Union (ITU-R).
- Terms and definitions have to be harmonized with the Radio Regulations and other ITU-R documents; MSC/Circ.1038 ought to be revised with respect to time-honored communications
- Security communications and other verbal exchange should be delivered to the functional requirements in addition to the GMDSS functions
- The present day functional necessities require ships to transmit and acquire Maritime Safety Information (MSI), but by way of definition MSI is sent from shore stations and received by ships; ships transmit and acquire protection associated information

C. Provision of GMDSS satellite services and redefinition of Sea Area 3

This is the place amendments to SOLAS chapter IV was made to supply for additional cellular satellite tv for pc systems for use in the GMDSS. Again, the definition of Sea Area A3 in SOLAS chapter IV ought to be an area, except for sea areas A1 and A2 inside the coverage of a recognized mobile satellite tv for pc verbal exchange provider supported with the aid of the ship earth station carried on board in which continuous alerting is handy [NCSR 4/12, 2016]:

D. VHF Data Exchange System (VDES)

The VHF Data Exchange System (VDES) is one of the attainable elements of e-navigation. VDES is successful of exchanging Applications Specific Messages

(ASM) facilitating several purposes for information security and security of navigation, protection of marine environment and shipping efficiency. VDES will prospectively have a sizeable beneficial influence on the maritime information services including, Aids to Navigation (AtN) and Vessel Traffic Service (VTS). It also gives neighborhood Maritime Safety Information (MSI) to mariners. The VDES idea includes a satellite component. This device element may be suitable to be used for the transmission of MSI in faraway areas

E. NAVDAT

Navigational Data (NAVDAT) Medium Frequency is the radio system, for use in the maritime cellular service, running in the 500 kHz band for digital broadcasting of maritime security and security associated information from shore-to-ship. The NAVDAT gadget uses a time-slot allocation comparable to the NAVTEX gadget which may want to be coordinated by using IMO. The device additionally works on Single Frequency Network (SFN). In this case transmitters are frequency synchronized and the transmitted information ought to be the same for all transmitters. The NAVDAT 500 kHz digital gadget gives a broadcast transmission of any form of message from shore-to-ship with possibility of encryption and the broadcasting message ought to be supplied by way of a tightly closed and managed source. Message types broadcast can include, however are no longer limited to the following:

- Safety of navigation
- Security
- Piracy
- Search and rescue
- Meteorological messages
- Piloting or harboring messages
- Vessel traffic device files transfer

These messages are broadcasted for the interest of all ships, a crew of ships or in a specific navigation area. These messages can be addressed to one ship, the use of the maritime cellular carrier identification (MMSI) as well. The NAVDAT device is organized upon five vectors performing the following features [Rec. ITUR M.2010, 2012][7]:

1. System of information and administration (SIM):

- Collects and controls all kinds of information
- Creates message archives to be transmitted
- Creates transmitting programme in accordance to message files precedence and want of repetition

2. Shore network:

- Assures the transportation of the message documents from sources to the transmitters

3. Shore transmitter:

- Receives the message archives from SIM
- Translates message archives to orthogonal frequency division multiplexing (OFDM) signal;
- Transmits Radio Frequency (RF) sign to the antenna for broadcast to ships.

4. *Transmission channel:*

Transports the 500 kHz RF signal.

5. *Ship receiver:*

De-modulates the RF OFDM signal

Re-constructs the message files

F. *Routing of misery alerts and associated information*

The issue of routing distress signals and its related data by way of Rescue Coordination Centre (RCC) wishes to be considered, taking additionally into account the feasible use of the COSPAS-SARSAT gadget for distribution of GMDSS digital misery signals in addition to the contemporary 406 MHz beacon alerts [1].

IV. FALSE ALERT

According to IMO, false distress indicators continue to be a serious problem, causing unnecessary work and cost if search and rescue operations are initiated as a end result of such a false alert. In 1996, it used to be estimated that extra than 90 % of distress signals via some sub-systems have been false. One of the predominant reasons for false distress signals is wrong use of GMDSS gear with the aid of untrained personnel and the lack of practical journey on board ships by way of trained personnel [8]. This paper appears at how the false alert in the GMDSS will be minimized. According to [Korc TransNav 2011] no precise action has been identified to reduce false alerts and no determinations have been made at this stage as to which GMDSS tools is most accountable for false alerts.

However, Emergency Position Indicating Radio Beacons (EPIRBs) and Medium Frequency (MF)/High Frequency (HF) Digital Selective Calling (DSC) are identified as transmitting a excessive quantity of false signals under the modern-day GMDSS. From Korcz TransNav 2011, if the EPIRBs and MF/HF DSC have been identified as transmitting higher number of false alert then measures must be taken to guide/educate human beings on how to handle EPIRBs and MF/HF DSC equipment in order to avoid miss activation, consisting of seafarers, operators, shipyards (both for building and recycling), inspectors and surveyors.

Reduction of false alerts prompted by using human error has to be addressed. Again, Korcz restricted the false alert only to the operational blunders neglecting tools being inadequately protected in opposition to the initiation of these false distress alerts. Also, a report on GMDSS repute by Captain Jack Fuechsel, USCG (Ret.); Director, National GMDSS Task Force under the caption effectiveness: He said "a number of GMDSS structures have established awesome overall performance as evidenced by the high share of false alarms in all systems". From Fuechsel report, it is the GMDSS itself accountable for the excessive rate of false alert. Thus, Fuechsel holds a distinction view to Korcz. Again, Fuechsel referred to with Korcz when he talked about operator competence, the place he stated whilst a few false alerts can be attributed to tools malfunctions, most appear to be caused by using incompetent operators. From the

above, it is clear that false alert is caused with the aid of the GMDSS itself and by using the operators of the system.

V. MEASURES TO MINIMIZED FALSE ALERT IN GMDSS

The Maritime Safety Committee, at its sixty-ninth session (11 to 20 May 1998), raised worries with the high proportion rate of false misery alerts which have been experienced in many GMDSS radio structures in the course of the last years, The Committee additionally referred to the giant range of non-convention ships which are expected to healthy GMDSS tools in the coming years and diagnosed that false distress indicators already impose a full-size burden on Rescue Co-ordination Centres (RCCs) and divert SAR assets away from real misery situations and therefore also limit the confidence of seafarers. To this effect, International Marine time Organization (IMO) decided to urge Member Governments to [6]:

to make sure that all GMDSS equipment being manufactured and established on ships comply entirely with the modern IMO performance standards including, the place relevant, a devoted and blanketed misery button as the solely ability of initiating a misery alert

to require ship owners when ordering GMDSS gear for their ships to seek and make sure from producers that such tools complies thoroughly with the state-of-the-art IMO overall performance standards

to motivate producers additionally to co-operate so as to agree on frequent standards and simplification of working gear design, in particular associated to the amenities and design for initiating, and responding to distress alerts

In addition to the suggestion with the aid of IMO above, the following measures can additionally assist to minimize false alert in GMDSS [9]:

Place sensors in proper place: Sensors in GMDSS be strategically located to stop interference from air or heat that should without problems set off false alert in the system.

Properly instruct users: Here, intensive seafarer training, shore-based personnel coaching and operational requirements training should be given to operators of the GMDSS.

Equipment checking: GMDSS equipment ought to be usually inspected to ensure that it is working properly. Once a whilst the equipment in the device have to tested to make sure that they are transmitting alerts properly.

VI. CONCLUSION

Recognizing that the variety of false signals should even be more extreme in the coming years due to the predicted large expand in the wide variety of GMDSS installations. Unless high quality measures are put in area to minimize or get rid of false alerts, false alert in GMDSS will continue to exist. Since the main causes of false alert

are the mixture of operators' mistakes and some tools being used in the GMDSS. So, evidence has been acquired in support of the conclusion that all future efforts closer to the promoting of GMDSS operations and subsequently its effectiveness include the following statements:

- The influence of the human element upon delivery security is indisputable, however the promoting of security is greater possibly to come thru the improvement of the operator's presence inside the device as a substitute than introducing more technology toward the operator's replacement.
- consider establishing requirements for GMDSS radio equipment not equipped with a dedicated and blanketed button as the only ability of misery alerting to be modified so as to incorporate such facilities
- Ships should be operated via human beings who are more experienced and not simply by means of units and equipment. The latter are supposed to resource the going for walks of the ship, and they can only do so if they are operationally friendly, in any other case they can be potentially dangerous.

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