

Fifth Edition

SafetyNET Users Handbook

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Preface

IMO SOLAS regulation IV/12.2 states that “Every ship, while at sea, shall maintain a radio watch for broadcasts of maritime safety information on the appropriate frequency or frequencies on which such information is broadcast for the area in which the ship is navigating”.

This handbook is intended for mariners, to explain the operation of the International SafetyNET service as an element of the IMO Global Maritime Distress and Safety System (GMDSS). SafetyNET is the service for broadcasting and automatic reception of Maritime Safety Information (MSI) via Enhanced Group Call (EGC) system and its receiving capability is part of the mandatory equipment to be carried by certain SOLAS compliant ships. EGC is the system for broadcasting messages via Inmarsat C satellite communications system and supports two services: SafetyNET and FleetNET. This handbook deals mainly with the distribution of MSI via satellite using the International SafetyNET service.

SafetyNET offers the ability to address MSI to a given geographical area. The area may be fixed, as IMO defined NAVAREAs and MEAREAs (there are now 21 areas), coastal warning area, or it may be a user defined circular or rectangular area. MSI is submitted for broadcast using three priorities: Safety – Priority 1, Urgency – Priority 2 and Distress-Priority 3. Aboard ships MSI messages are received by Inmarsat C and mini-C type-approved maritime terminals with EGC SafetyNET capability.

The handbook also explains how the mariner can use the SafetyNET service to obtain vital Maritime Safety Information (MSI) tailored to the needs of the own vessel.

You can obtain more information about EGC SafetyNET and the GMDSS by contacting one of the addresses given in appendix A, or visiting Inmarsat maritime safety services website at www.inmarsat.com/safety.

What is Maritime Safety Information (MSI)?

MSI is defined by IMO as:

“Navigational and meteorological warnings, meteorological forecasts, and other urgent safety-related messages broadcast to ships”.

The MSI service, illustrated in Figure 1, is internationally and nationally co-ordinated network of broadcasts containing information which is necessary for safe navigation from different MSI Providers, for example:

- National hydrographic offices, for navigational warnings and electronic chart correction data;
- National meteorological issuing services, for weather warnings and forecasts;
- Rescue Co-ordination Centres (RCCs), for shore-to-ship distress alerts, Search and Rescue (SAR) coordination and other urgent information; and
- The International Ice Patrol, for North Atlantic ice hazards.

Only MSI Providers officially registered by the IMO in consultation with International Hydrographic Organisation (IHO) and World Meteorological Organisation (WMO), as appropriate, are given authorisation to make SafetyNET broadcasts.

Please note the following point about the SafetyNET service:

Inmarsat Global Ltd. is not an Information Provider, but provides Inmarsat C satellite communications system used for MSI broadcast. Reception of MSI broadcasts is free of charge to all ships.

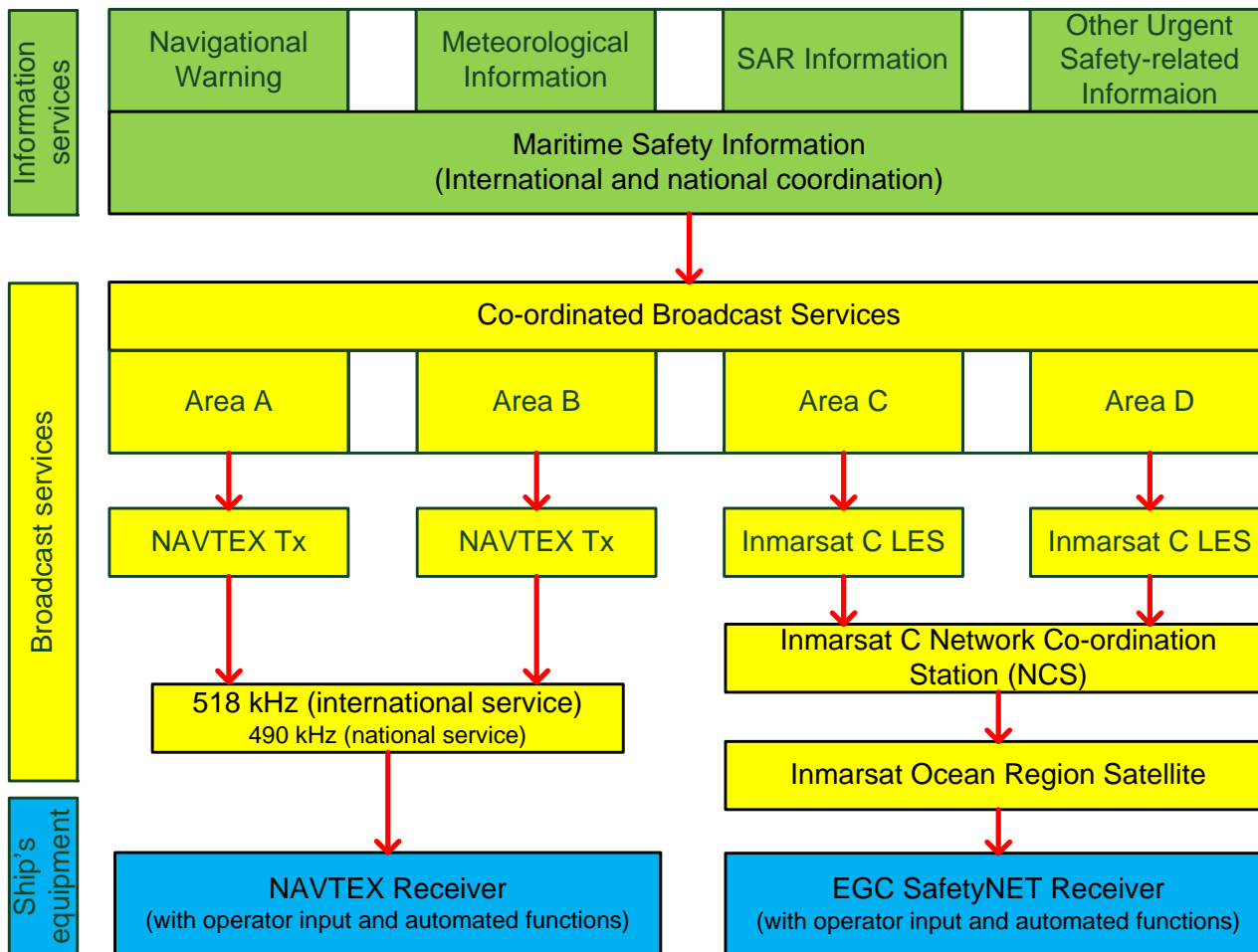


Figure 1 – Provision of Maritime Safety Information (MSI)

Two independent systems for broadcasting MSI

1. The International NAVTEX Service, whereby the Information Provider forwards the MSI for a given area to a 518 kHz MF NAVTEX transmitter. Note that reception of NAVTEX MSI is limited by the range of the MF propagation to the coastal area around the transmitter;
2. The International SafetyNET Service, whereby the Information Provider forwards the MSI for a given area to an Inmarsat C Land Earth Station (LES), for broadcasting via the satellite network over an entire Inmarsat Ocean Region; consequently, ships can receive SafetyNET MSI anywhere in that Ocean Region, irrespective of their distance from the LES or MSI Provider.

As indicated in Figure 1, MSI for a given area is generally broadcast over either NAVTEX or SafetyNET (except for some circumstances where a message may be broadcast using both services); ships equipped with both NAVTEX receiver and SafetyNET receiver, if they are properly configured, will automatically receive MSI for the addressed area where the ship is navigating. Where a coastal area is not covered by the international or national NAVTEX service, for example around Australia, MSI for that area is broadcast on the SafetyNET only.

To find out which MSI service, NAVTEX or SafetyNET, serves a particular area, a user should refer to the current Lists of Radio Signals publication for that area, obtainable from national administrations.

Scheduled and unscheduled MSI broadcasts

To ensure that the user knows when to receive required MSI for a given area, many MSI broadcasts are scheduled, under IMO co-ordination, to a particular time and nominated satellite. For example, all navigational warnings and meteorological forecasts are scheduled broadcasts, while some MSI, for example, severe meteorological warnings, shore-to-ship distress alerts, SAR coordination communication are unscheduled broadcasts and are usually given urgency or distress priority that produces an audible and visual alarm at the terminal.

Information on scheduled broadcasts for both NAVTEX and SafetyNET, is given in current Lists of Radio Signals, available from national administrations.

To be sure of receiving a scheduled MSI broadcast, the receiver **MUST** be tuned to the appropriate or nominated satellite/Ocean Region at the time of transmission. You do this by "Logging-in" to the appropriate ocean region satellite. Unscheduled SafetyNET broadcasts are made over all satellites covering an area, so the receiver will not miss the message, no matter what satellite it is logged-in to. The user is advised of the receipt of an unscheduled distress or urgency broadcast by the terminal giving an alarm.

Language used for MSI broadcasts

All MSI broadcasts made on the International MSI service are printed in English (sometimes a local language is added after the English wording).

NAVAREAs/METAREAs

Figure 2 shows 21 Navigational/Meteorological Areas (NAVAREAs/METAREAs) into which the earth's navigable waters are sub-divided for the purpose of MSI broadcasts. For each area, a NAVAREA co-ordinator or METAREA issuing service co-ordinates broadcast of navigational warnings and meteorological information throughout their area respectively.

The Inmarsat Ocean Regions

Figure 2 also shows the coverage area of the four Inmarsat satellites, corresponding to the four Ocean Regions:

- Atlantic Ocean Region-East (AOR-E)
- Indian Ocean Region (IOR)
- Pacific Ocean Region (POR)
- Atlantic Ocean Region-West (AOR-W)

The four Ocean Regions represent the areas within which an EGC receiver can receive SafetyNET MSI broadcasts - as shown in Figure 2, Ocean Regions cover practically all of the earth's navigable waters, except for the polar regions, beyond 76 degrees North and 76 degrees South. Inmarsat coverage areas are shown for antenna elevation angle of 5 degrees and above.

The Inmarsat Enhanced Group Call (EGC) Services

The Inmarsat C satellite communications system has a capability known as Enhanced Group Call (EGC), which enables MSI providers to send messages for selective reception by EGC receivers located anywhere in the four Ocean Regions.

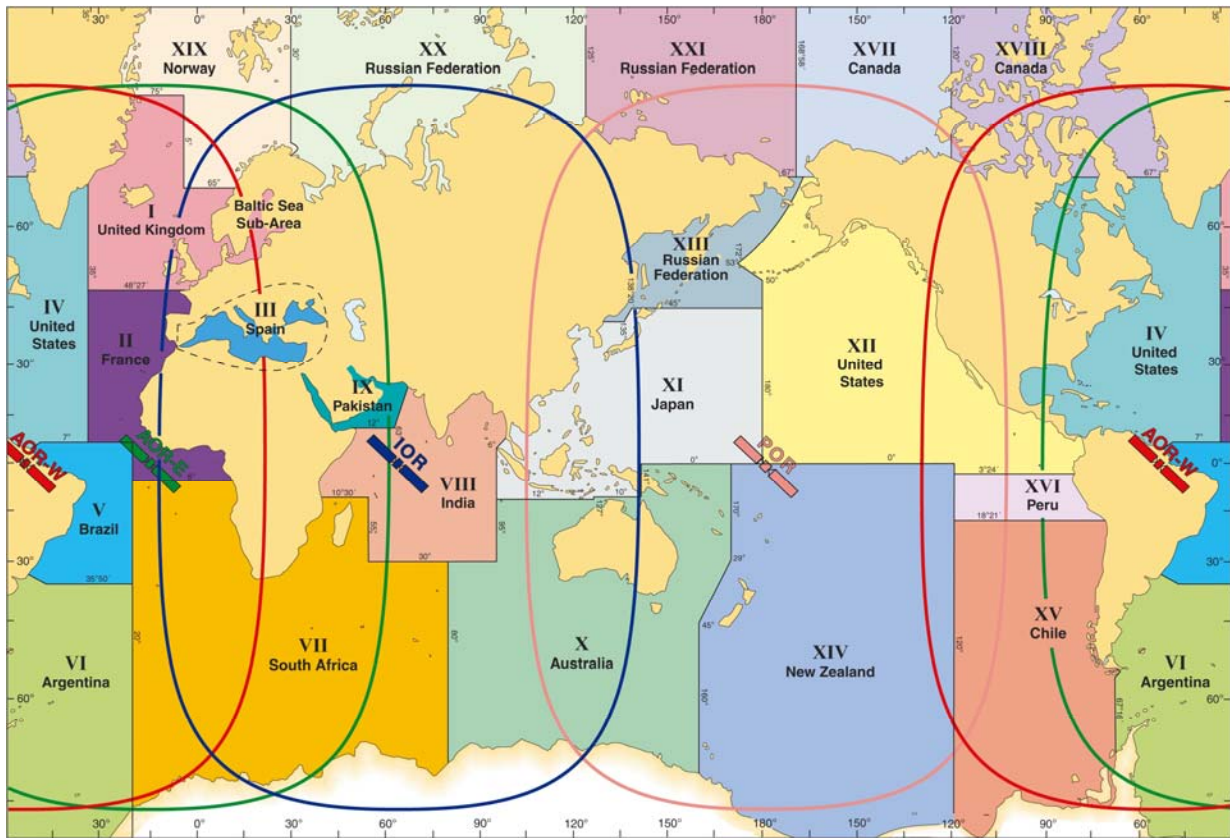


Figure 2 – NAVAREAs/METAREAs with Inmarsat Ocean Regions

The MSI provider determines which receivers or ships are to receive the message by including identifying information, such as the NAVAREA or METAREA number, circular or rectangular geographical area, coastal warning area for which the MSI is intended. On some models identification of NAVAREA/METAREA where the ship is navigating is done automatically. Individual EGC receivers can be programmed (setup) to use identification to select additional EGC messages along with some mandatory MSI addressed to areas where the ship is, and to reject some messages that are not required for the planned voyage. Based on this selective capability, the EGC system supports two services:

The EGC SafetyNET service, which allows the ship's operator to program EGC receiver with main (on some models) and/or additional NAVAREAs/METAREAs, geographical areas or coastal warning areas for which MSI will be received and the categories of coastal warnings required.

In Figure 3, the shaded parts represent the EGC SafetyNET service.

The EGC FleetNET service, a commercial service, where individual EGC receivers are programmed from a shore by a poll command to store an EGC Enhanced Network IDentification (ENID) code or group ID, which is used to receive only messages intended for ships belonging to this group, such as a fleet or national flag, or subscribers to an information service.

In Figure 3, the non-shaded parts represent the EGC FleetNET service. This handbook considers only the EGC SafetyNET service.

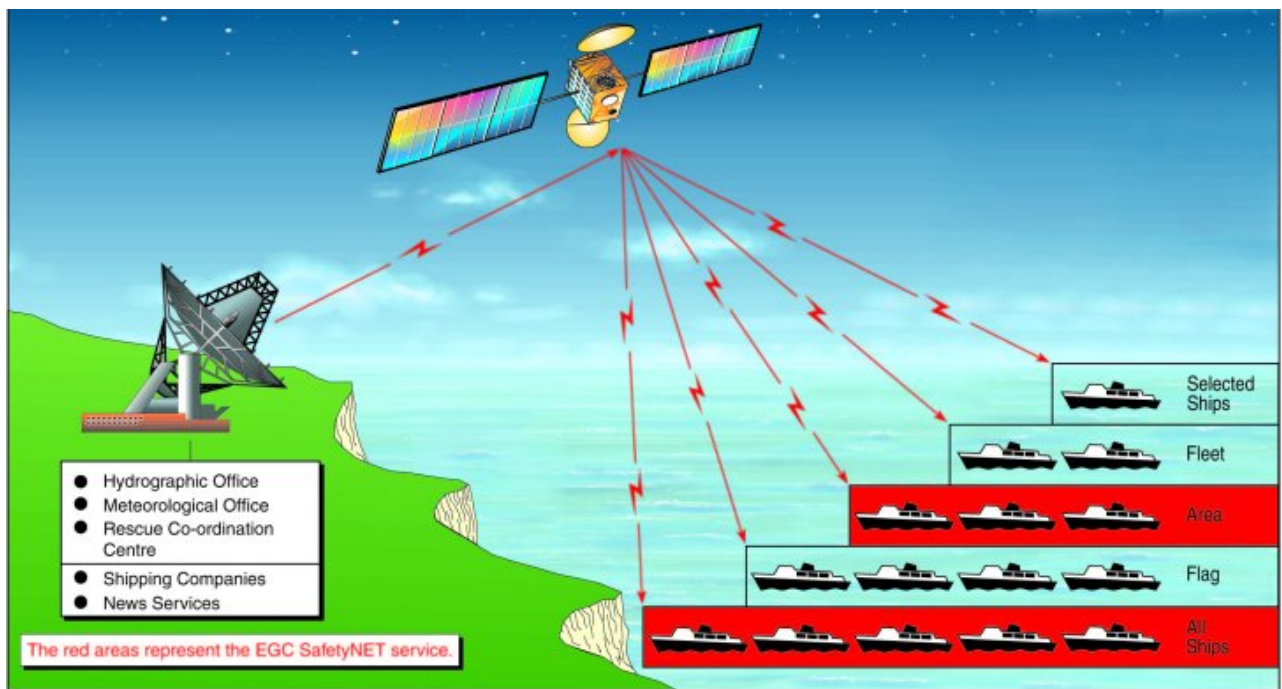


Figure 3 – Inmarsat Enhanced Group Call (EGC) Services

Operation of the SafetyNET Service - an overview

Operation of the SafetyNET service, illustrated in Figure 4, involves a sequence of events:

- A registered MSI Provider, such as a national Hydrographic Office or Meteorological office receives information from its specialised sources.
- Each Information Provider prepares an MSI message in a standardised format, and submits it to the appropriate co-ordinator (Navigational Warning Co-ordinator, SAR Co-ordinator, or Meteorological Issuing Service).
- The co-ordinator checks the message with any other information received, and edits it accordingly, then submits the finalised text to a selected Inmarsat C LES. Included with the message are the following codes (known as the "C" codes), to instruct the LES and MES on how to process the message automatically:
 - **C0 - Ocean Area Code**, to identify which Inmarsat satellite MSI is addressed to (generally the code is used by LESs supporting service in two or three ocean regions);
 - **C1 - Priority Code**, to identify the message priority – Distress - P3, Urgency – P2 and Safety – P1;
 - **C2 - Service Code**, to identify the message type, for example a shore-to-ship distress alert, or meteorological forecast;
 - **C3 - Address Code**, to identify the geographical area for which the MSI is applicable – this may be a fixed geographical area, such as one of the 21 NAVAREAs/METAREAs shown in Figure 2, a temporary area determined by the MSI provider, such as a circular or rectangular area, as shown in Figure 5 and Figure 6 or coastal warning area;
 - **C4 - Repetition Code**, to indicate the number of times the message should be broadcast unless cancelled;
 - **C5 - Presentation Code**, to indicate the character set in which the message will be transmitted. The character set used is always International Alphabet Number 5, which is also known as 7-bit ASCII.

- The MSI provider uses the scheduled time(s) at which the message is to be broadcast and, if a LES operates in more than one Ocean Region, the satellite to be used.
- The LES receives the message with its instructions given by C-codes, and queues it with any other messages received, according to priority and scheduled time of transmission.
- At the required time for transmission, the LES forwards the message over the Interstation Signalling Link (ISL) to the Network Coordination Station (NCS) for the addressed Ocean Region.
- The NCS automatically broadcasts the message on the NCS common signalling channel over the entire Ocean Region.
- EGC receivers must receive the MSI message, and may print it out, unless the operator has chosen to reject unwanted messages, or it has recently been printed out by that terminal. Distress and Urgency priority messages will be printed out automatically irrespective of operator settings. Please note that some MSI is mandatory for reception and some may be suppressed from reception. Further sections of the handbook explain it in more details.

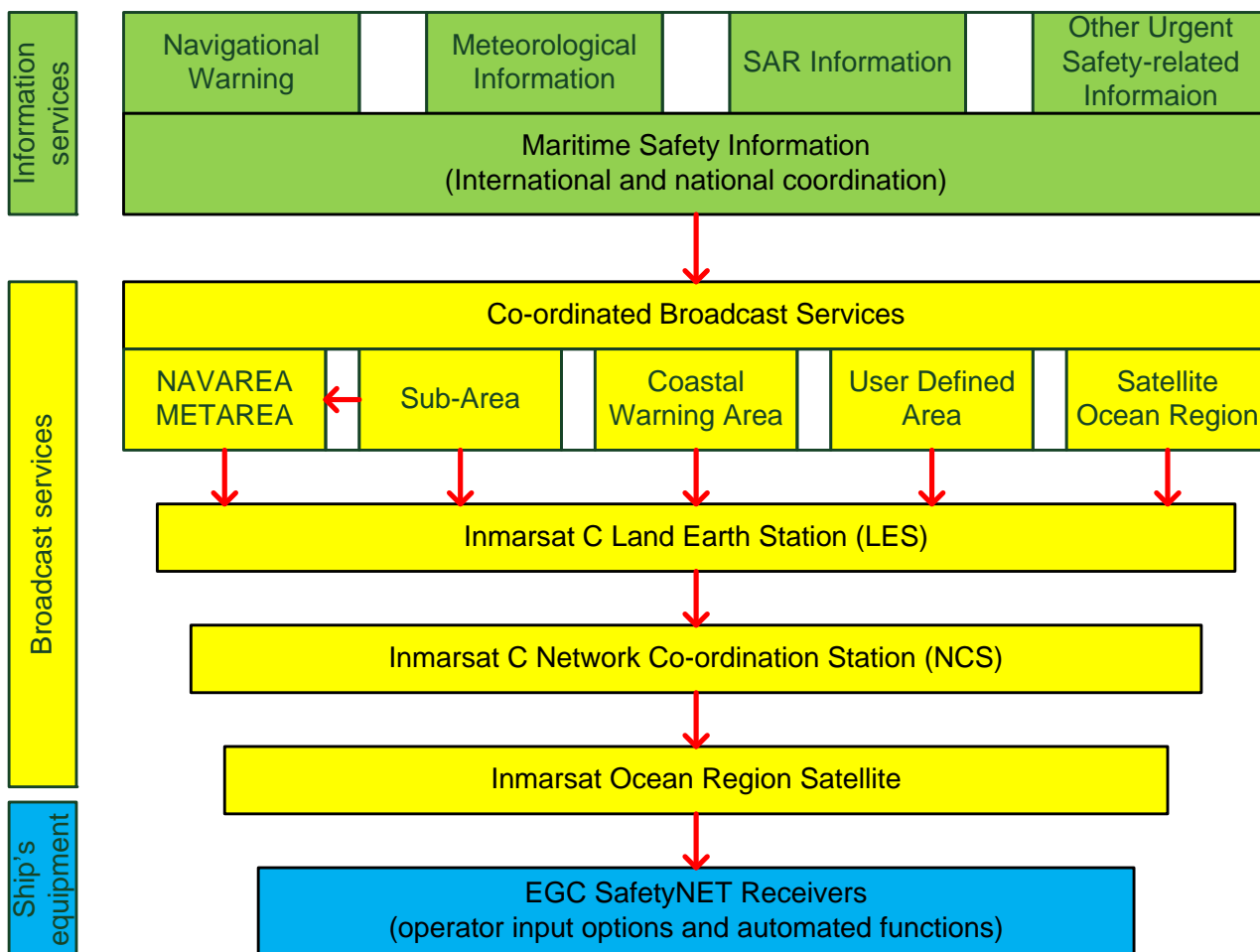


Figure 4 – The International SafetyNET Service System

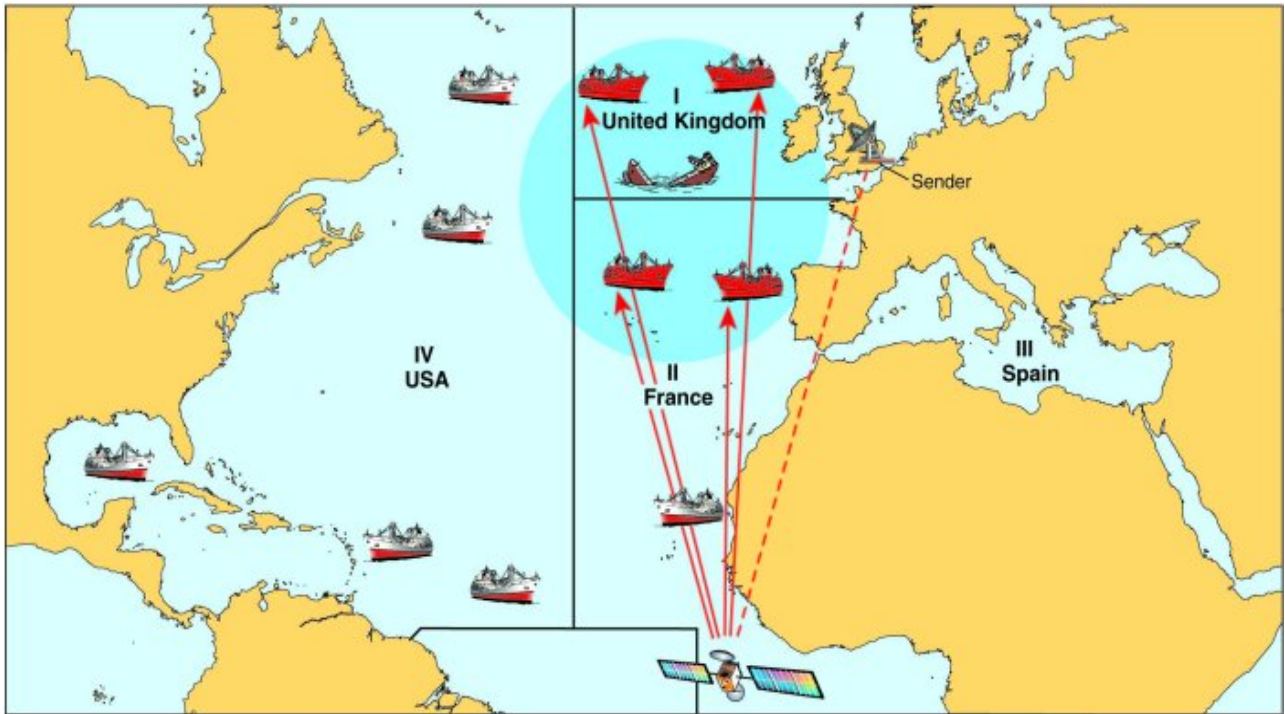


Figure 5 - SafetyNET message addressed to a circular area
(All ships inside the addressed circle receive this MSI automatically)

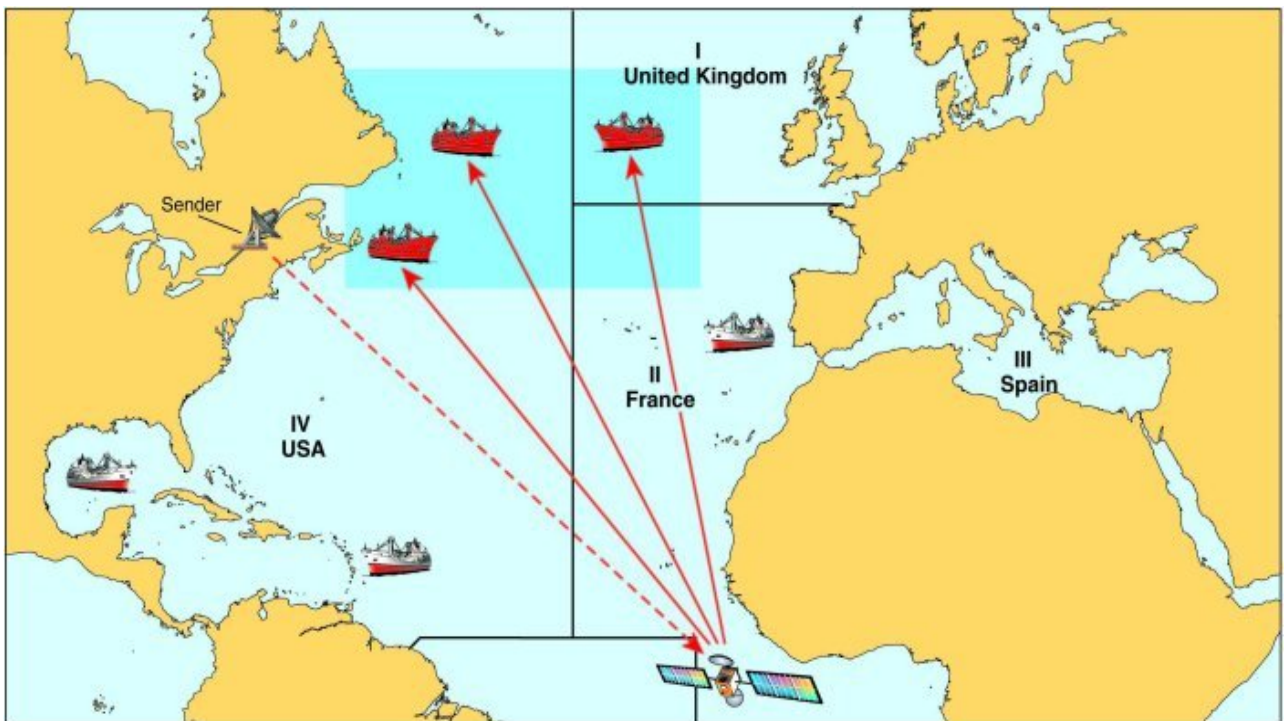


Figure 6 – SafetyNET message addresses to a rectangular area
(All ships inside the addressed rectangle receive this MSI automatically)

What types of MSI can be received?

The following is a list of the different types of MSI you can receive on your receiver, subject to availability, as discussed in the next section.

- All ships (general call – mainly used by Inmarsat to broadcast service announcements);
- NAVAREA/METAREA warning, MET forecast or Piracy warnings to NAVAREA or METAREA;
- Navigational, Meteorological or Piracy warnings to a circular or rectangular area;
- Search and Rescue coordination to ships to a circular or rectangular area;
- Shore-to-ship distress alerts to a circular area;
- Coastal warnings include the following type of messages (*see Notes below*):
 - Navigational warnings;
 - Meteorological warnings;
 - Ice reports;
 - Search and rescue information, acts of piracy warnings, tsunami and other natural phenomena;
 - Meteorological forecasts;
 - Pilot and VTS service messages;
 - AIS service messages (non navigational aid)
 - LORAN system messages;
 - GNSS messages;
 - Other electronic navigational aid messages;
 - Other Navigational warnings (additional to Navigational warnings)
 - No messages on hand

Notes:

1: The SafetyNET coastal warning broadcast is (usually) made available for the transmission of MSI for areas where NAVTEX services are not provided.

2: Detailed information how to set up EGC receives to receive coastal warnings is given in the relevant section on page 21.

Availability of MSI in different areas

To avoid excessive duplication of broadcasts, the IMO has authorised the following arrangements:

For a given NAVAREA/METAREA which is covered by more than one Ocean Region satellite, scheduled broadcasts of MSI, such as navigational warnings and meteorological information, are made only via a single nominated satellite/Ocean Region.

For a NAVAREA/METAREA which is covered by more than one Ocean Region satellite, unscheduled broadcasts of MSI, such as gale warnings, distress alert relays, search and rescue coordination are made via all satellites/Ocean Regions which cover the area concerned.

In addition ships operator should be aware that position information on their Inmarsat C or mini-C terminal (EGC receiver) is updated regularly and valid and it can be checked on the position menu on the terminal. Modern MESs have integrated GNSS receiver and position is updated automatically every few seconds. Some elder models without automatic position input require manual update. If the position information on the terminal is not valid, the terminal will receive all EGC messages broadcast via the satellite that will result in reception (and printing) of numerous unwanted messages.

Table 1 shows availability of MSI in all areas and nominated satellites as of March 2012. Note that this information is subject to change; to obtain latest information you should refer to a current publication of Lists of Radio Signals, available from national administrations.

NAV/MET AREA	NAV Information		MET Information		Satellite
	Co-ordinator	Times (UTC)	Issuing Country	Times (UTC)	
I	United Kingdom	0530, 1730 (AOR-E)	United Kingdom	0930, 2130 (AOR-E)	AOR-E AOR-W
				Warnings only (AOR-W)	
II	France	0430, 1630 (AOR-E)	France	0900, 2100 (AOR-E/AOR-W)	AOR-E AOR-W
III	Spain	1200,2400 & on receipt	Greece ¹	1000, 2200	AOR-E
IV	USA	1000, 2200 (1200, Ice reports N. Atlantic) (AOR-E/AOR-W)	USA	0430, 1030, 1630, 2230	AOR-W
V	Brazil	0030, 1230	Brazil	0730, 1930	AOR-E
				Coastal Warnings for Amazon basin and additional coastal areas	
VI	Argentina	0200, 1400	Argentina	0230, 1730	AOR-W
VII	South Africa	1940 (AOR-E/IOR) 0040, 1240 (IOR) - Reunion 0140, 1340 (IOR) - Kerguelen Islands 0330, 1530 (IOR) - Mayotte	South Africa	0940, 1940 (AOR-E)	AOR-E IOR ⁵
				0940, 1940 (IOR) ²	
VIII	India	1000 0040, 1240 Reunion 0330, 1530 Mayotte	India	0900, 1800 N of 0°	IOR
			Mauritius/ Reunion	0130,1330 S of 0° 0000 ³ ,0600 ³ ,1200 ³ ,1800 ³ S of 0°	
IX	Pakistan	0800	Pakistan	0700	IOR
X	Australia	0700, 1900 & on receipt (IOR/POR) 0140, 1340 (POR) - New Caledonia	Australia	1030, 2330 (IOR) W	IOR/POR
				1100,2300 (POR) N, NE, SE, W Coastal Warnings for Bass Strait Northern Territory & Western Australia	
XI	Japan	0005, 0805, 1205 (POR/IOR)	China	0330, 1015, 1530, 2215 (IOR)	IOR/POR
			Japan	0230, 0830, 1430, 2030 (POR) N of 0° 0815, 2015 (POR) ⁴ S of 0°	
XII	USA	1030, 2230	USA	0545, 1145, 1745, 2345	POR/ AOR-W
XIII	Russian Federation	0930, 2130	Russian Federation	0930, 2130	POR
XIV	New Zealand	Every 12h & on receipt 0140,1340 N. Caledonia 0030, 1230 Wallis & Fortuna 0250,1450 French Polynesia	New Zealand	0330, 0930, 1530, 2130 Warnings 0330, 1530 Synopsis & forecast for high seas area Southern 0930, 2130 Synopsis & forecast for high seas areas Subtropic, Forties & Pacific	POR
XV	Chile	0210, 1410	Chile	0100, 1330 for Areas 1-8 1440 for Area 9 1845 for Area 10	AOR-W
XVI	Peru	0519,1119, 1719, 2319	USA	0515, 1115, 1715, 2315	AOR-W
XVII	Canada	1130, 2300	Canada	1130, 2300	POR
XVIII	Canada	1100, 2300	Canada	1100, 2300	AOR-W
XIX	Norway	0630, 1830	Norway	0630, 1830	AOR-E
XX	Russian Federation	0530, 1730	Russian Federation	0530, 1730	IOR
XXI	Russian Federation	0630, 1830	Russian Federation	0630, 1830	POR

Table 1- MSI transmission schedule in the International SafetyNET Service

Notes:

- ¹ Scheduled bulletins and warnings for Western Mediterranean Sea are prepared by France
- ² Forecasts for 30°S - 50°E/50°- 80°E and tropical cyclone warnings are prepared by Reunion
- ³ Tropical cyclone warnings if any issued by Reunion as unscheduled broadcast through AOR-E as well
- ⁴ Scheduled bulletins and warnings for south of the equator prepared by Australia
- ⁵ Transmission via AOR-E for areas West of 20°E. Transmission via IOR for areas East of 20°E

International Maritime Organisation (IMO) has decided that schedule broadcasts of navigational warnings and meteorological forecasts will be made at times given in Table 1 over a single nominated satellite for each NAVAREA/METAREA. Unscheduled broadcasts of severe weather warnings, distress alert relays, search and rescue coordination will be made over all satellites which serve the area concerned.

Repeat broadcasts of MSI information

Some classes of Inmarsat C and mini-C maritime terminals with EGC receivers do not provide uninterrupted monitoring of the channel used for MSI broadcasts when involved in normal communication traffic because they have a single receiver for both MSI and incoming commercial traffic. See section “EGC receiver types” on page 17 for more details.

To improve the probability of these mobile terminals receiving MSI broadcasts, Information Providers re-broadcast some messages:

- Unscheduled messages, such as distress alerts and gale warnings are usually re-broadcast six minutes after the initial broadcast;
- Scheduled broadcasts, such as navigational warnings and other longer-term information are repeated at every scheduled time, for as long as they remain in force. (Repeated broadcasts of the same message may, however, give some users a problem of receiving and printing too many messages - for advice, see section “Printing only essential messages”.)

SOLAS requirements for receiving MSI broadcasts

Every SOLAS-compliant ship shall meet the following legal requirements for receiving MSI broadcasts:

- Watches - Every ship, while at sea, shall maintain a radio watch for broadcasts of Maritime Safety Information on the appropriate frequency or frequencies on which such information is broadcast for the area in which the ship is navigating (SOLAS Convention, Chapter IV, Regulation 12.2).

In addition to these mandatory requirements, IMO recommends that all current navigational and meteorological messages be retained on the bridge, for as long as they are applicable, for the use of the person in charge of the navigational watch.

Typical MSI broadcasts

Figures 7 - 15 show typical MSI broadcasts of different types and addressing which can be received on your Inmarsat C or mini-C terminal. Please note that format of the message header may be different depending on terminal's model.

Note the following:

1. MSI may be broadcast with a key-word in their header indicating the priority of the message - DISTRESS or MAYDAY for Priority 3, URGENT or PAN PAN for Priority 2, and SAFETY or SECURITE for Priority 1;
2. The date and time of the message in UTC;
3. The priority of the message – Safety, Urgency or Distress is given in the message header. The terminal responds automatically to an Urgency and Distress priority messages by giving an audible/visual alarm and automatic printing of the message.
4. The term PosOK in Figures below that some Inmarsat C and mini-C models include in the message header tells the operator that the EGC receiver has been updated with the ship's position within the last 4 hours and position is valid. Otherwise the indicator will change to NoPos.

LES 102 - MSG 7698 - MetWarn/Fore Safety Call to Area: 1 - NoPos

STRATOS CSAT 81.148.5.74 1-OCT-2012 05:44:00 606085
NAVAREA ONE 044
ENGLAND, EAST COAST
Thames Estuary.
Chart BA 1975.
Black Deep light-buoy moved to 51-47.79N 001-36.31E.
NNNN

Figure 7 – NAVAREA Warning with Safety priority
(addressed to NAVARFEA I)

LES 112 - MSG 9644 - MetWarn/Fore Safety Call to Area: 3 - PosOK

NL BURUM LES 204999123456789 28-SEP-2012 12:21:01 618223
NAVAREA III 068/12
EASTERN MEDITERRANEAN SEA
Offshore rig "OCEAN ENDEAVOR" moved from 32-05.1N 030-36.5E to 32-04.1N
030-29.4E.

Figure 8 – NAVAREA Warning with Safety priority
(addressed to NAVARFEA III)

LES 112 - MSG 11400 - MetWarn/Fore Urgent Call to Area: 5 - PosOK

NL BURUM LES 28-SEP-2012 15:36:29 831346
WARNING NR 074/2011
ROUGH SEA WARNING
ISSUED AT 1500 GMT - MON - 28/SEP/2012
SOUTH OCEANIC AREA S OF 30S AND E OF 035W STARTING AT 010000 GMT.
WAVES FM NE/NW BECOMING SW/SE 3.0/4.0 METERS.
VALID UNTIL 020600 GMT.

Figure 9 – Weather Warning with Urgency priority
(addressed to METAREA V)

LES 112 - MSG 11497 - MetWarn/Fore Safety Call to Area: 1 - NoPos

NL BURUM LES 1-NOV-2012 09:25:35 997803

SECURITE

HIGH SEAS BULLETIN FOR METAREA 1 ISSUED AT 0800 UTC 01 NOVEMBER 2012 BY THE MET OFFICE, EXETER, UNITED KINGDOM FOR THE PERIOD 0800 UTC 01 NOVEMBER UNTIL 0800 UTC 02 NOVEMBER 2012

STORM WARNING

AT 010000UTC, LOW 51 NORTH 39 WEST 1006 EXPECTED 63 NORTH 20 WEST 982 BY 020000UTC. WINDS ARE EXPECTED TO REACH STORM FORCE 10 BETWEEN 50 AND 300 MILES OF THE CENTRE IN THE EASTERN, SOUTHERN AND WESTERN QUADRANTS FROM 011500UTC, PERHAPS VIOLENT STORM FORCE 11 FROM 012200UTC

GENERAL SYNOPSIS

AT 010000UTC, LOW 51 NORTH 39 WEST 1006 EXPECTED 63 NORTH 20 WEST 982 BY 020000UTC. LOW 66 NORTH 34 WEST 982 EXPECTED 66 NORTH 32 WEST 995 BY SAME TIME. HIGH 52 NORTH 08 WEST 1038 EXPECTED 57 NORTH 05 EAST 1043 BY THAT TIME

AREA FORECASTS FOR THE NEXT 24 HOURS

WEST SOLE

VARIABLE 4, BECOMING SOUTHEASTERLY 4 OR 5 FOR A TIME. MODERATE OR ROUGH. MAINLY FAIR. GOOD

EAST SOLE

NORTHEASTERLY 4 OR 5. MODERATE OR ROUGH. FAIR. GOOD

SHANNON ...

ROCKALL ...

BAILEY ...

FAEROES SOUTHEAST ICELAND ...

EAST NORTHERN SECTION ...

WEST NORTHERN SECTION ...

EAST CENTRAL SECTION ...

WEST CENTRAL SECTION ...

DENMARK STRAIT ...

NORTH ICELAND ...

NORWEGIAN BASIN ...

OUTLOOK FOR FOLLOWING 24 HOURS:

STORMS OR VIOLENT STORM EXPECTED IN BAILEY, FAEROES, SOUTHEAST ICELAND, EAST NORTHERN SECTION, NORTH ICELAND AND NORWEIGIAN BASIN. SEVERE GALES EXPECTED IN ROCKALL AND WEST NORTHERN SECTION. GALES OR SEVERE GALES EXPECTED IN WEST CENTRAL SECTION AND DENMARK STRAIT

UNSCHEDULED STORM WARNINGS ARE BROADCAST VIA SAFETYNET AND IN BULLETIN WONT54 EGRR AVAILABLE VIA SOME INTERNET AND FTPMAIL

Figure 10 – METAREA Warning with Safety priority
(addressed to METAREA I)

LES 321 - MSG 16362 - CoastalWarn Safety Call to Area: 8 D A - PosOK

LES21 FRANCE TELECOM 20890000006 5-NOV-2012 00:41:55 551725

THIS IS MRCC REUNION (REUNION ISLAND)

PHONE: +262 262 43 43 43

FAX: +262 262 71 15 95

TELEX: 916 140F

INMARSAT: 422 799 193

HF SSB: 8291 KHZ

SECURITE

COAST WARNING LA REUNION 23/12

INDIAN OCEAN - SOUTH WEST SECTOR REUNION

ONE FISHING CONCENTRATION DEVICE (DCP) HAS BEEN MOORED THE 25 OCTOBER 2012 IN THE NORTH WEST OF RENION ISLAND TO THE INDICATED POSITION: 2102.444S-05503.509E (WGS 84).

CAUTION ADVISED.

ONE FISHING CONCENTRATION DEVICE (DCP) HAS BEEN MOORED THE 25 OCTOBER 2012 IN THE NORTH WEST OF RENION ISLAND TO THE INDICATED POSITION: 2057.624S-05504.780E (WGS 84).

CAUTION ADVISED.

Figure 11 – Coastal Warning with Safety priority

(Navigational warning - letter "A", addressed to coastal warning area "D" inside NAVAREA VIII)

LES 312 - MSG 11517 - Met/NavWarn Safety Call to Area: 38 S 134 E 999 PosOK

NL BURUM LES 204988123456789 1-NOV-2012 11:55:08 021178

SECURITE

HIGH SEAS WEATHER WARNING FOR METAREA 10 ISSUED BY THE AUSTRALIAN BUREAU OF METEOROLOGY, ADELAIDE AT 1154UTC 1.11.2012.

GALE WARNING FOR SOUTH EASTERN AREA

PLEASE BE AWARE

Wind gusts can be 40 percent stronger than the averages given here, and maximum waves may be up to twice the height.

SITUATION AT 011130UTC

Vigorous west to southwest airstream.

AREA AFFECTED

Area bounded by 45S129E 42S141E 50S141E 50S129E 45S129E.

FORECAST

W/SW winds 30/40 knots. Rough to very rough seas. Moderate to heavy swell.

WEATHER ADELAIDE

Figure 12 – Weather Warning with Safety priority
(addressed to a circular area with the centre of the circle at 38°S 164°E and radius 999 nautical miles)

LES 328 - MSG 3487 - NavWarn Safety Call to Area: 30+60 S 20+120 E - PosOK
FROM 165.21.245.44 29-OCT-2012 13:52:18 MSG787929 SENTOSA C LES

291345 UTC OCT 2012

TO : ALL SHIPS TRANSITING OFF SOMALIA / OFF KENYA / OFF TANZANIA

WARNING WARNING WARNING

ON 29.10.2012 AT 1300 UTC IN POSITION 04:29S - 039:57E, OFF MOMBASSA, KENYA. A MERCHANT VESSEL WAS UNDER ATTACK BY 2 SKIFFS AND THE VESSEL HAS EVADED THE ATTACK.

VESSELS ARE ADVISED TO EXERCISE EXTREME CAUTION WHEN NAVIGATING WITHIN 100 NAUTICAL MILES OF THE POSITION GIVEN IN THIS REPORT AND MAINTAIN MAXIMUM CPA WITH ANY SHIP ACTING SUSPICIOUSLY.

EARLY ASSESSMENT / DETECTION WILL ALLOW SHIPS TO TAKE EVASIVE MEASURES TO PREVENT BOARDING AND REQUEST FOR ASSISTANCE.

ALL ATTACKS AND SUSPICIOUS SIGHTINGS INCLUDING POSSIBLE PIRATE MOTHER VESSEL TOWING SKIFFS SHOULD BE REPORTED

IMB PIRACY REPORTING CENTRE

24 HOURS ANTI-PIRACY HELPLINE: +603 2031 0014

EMAIL: piracy@icc-ccs.org

TELEX: MA 34199

Figure 13 – Piracy Warning with Safety priority
(addressed to a rectangular area with SW corner is at
30°S 20°E, 60° extension to the North and 120° to the East)

LES 105 - MSG 5966 - SAR Distress Call to Area: 35+36 N 11+14 E – PosOK

FM MRCC ROME - ITALIAN COAST GUARD

TO ALL SHIPS TRANSITING IN SICILY CHANNEL

IN ORDER TO PROTECT THE HUMAN LIFE AT SEA, YOU ARE KINDLY REQUESTED TO KEEP A SHARP LOOKOUT AND TO REPORT ANY SIGHTINGS OF BOATS WITH MIGRANTS ON BOARD TO MRCC ROME AT FOLLOWING NUMBERS:

PHONE: 0039 06 59084527 / 59084409

FAX: 0039 06 5922737 / 59084793

INM-C: 424744220

EMAIL: ufficio3.reparto3@mit.gov.it

Figure 14 – Search and Rescue (SAR) coordination message with Distress priority
(addressed to a rectangular area with SW corner is at
35°N 11°E, 36° extension to the North and 11° to the East)

Eik LES 24-OCT-2012 11:23:36 028988

SUBJ: NORTH AMERICAN ICE SERVICE (NAIS) ICEBERG BULLETIN
ISSUED BY INTERNATIONAL ICE PATROL (IIP)
SECURITE

1. 24 OCT 12 1200 UTC ICEBERG LIMIT: FROM 5212N 5539W TO 5130N 5345W
TO 5130N 5200W TO 5215N 5130W TO 5300N 5130W TO 6000N 5800W.

2. SEA ICE LIMIT: FROM 4840N 5305W TO 5400N 5530W TO 5600N 5830W TO
5800N 5900W TO 6030N 6030W TO 6500N 5700W TO 7030N 5600W TO 6630N
5600W TO 6230N 5130W TO 6155N 4945W AND FROM 4520N 6100W TO 4600N
5930W TO 4700N 6000W TO 5000N 6600W TO 5000N 6500W TO 4900N 6300W
TO 4850N 6200W TO 4950N 6000W TO 5100N 5800W TO 4840N 5900W.

3. REPORT POSITION AND TIME OF ANY ICE ENCOUNTERED TO
COMINTICEPAT VIA CG COMMUNICATIONS STATION NMF, NMN, INMARSAT
CODE 42, OR ANY CANADIAN COAST GUARD RADIO STATION. MAKE
UNCLASSIFIED SEA SURFACE TEMPERATURE AND WEATHER REPORTS TO
COMINTICEPAT EVERY SIX HOURS WITHIN LATITUDES 40N AND 60N AND
LONGITUDES 39W AND 57W.

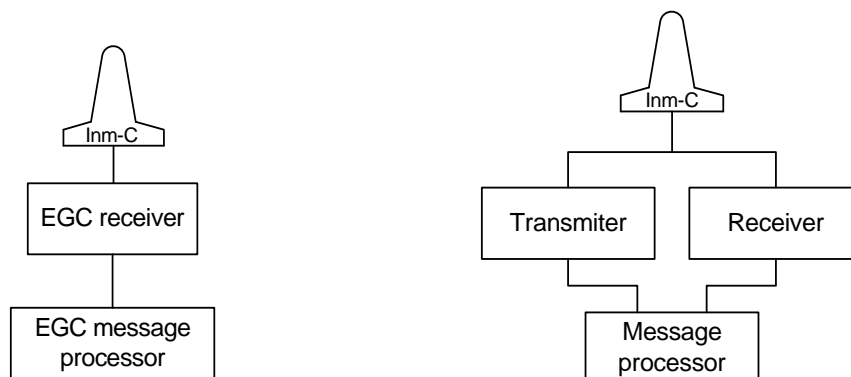
4. NAIS RECONNAISSANCE IS FOCUSED NEAR THE GRAND BANKS OF
NEWFOUNDLAND AND THE EAST COAST OF LABRADOR. ICE CONDITIONS
SOUTH OF GREENLAND ARE NOT MONITORED BY NAIS.

5. ADDITIONAL ICE PRODUCTS AND A SURVEY REGARDING IIP SERVICES
ARE AVAILABLE AT WWW.USCG-IIP.ORG.

Figure 15 – International Ice Patrol Warning with Safety priority
(addressed to NAVAREA IV)

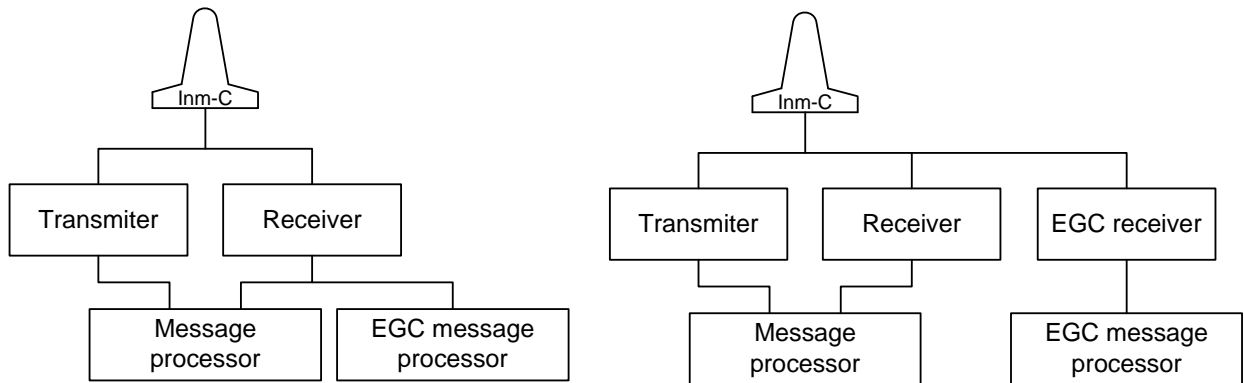
EGC receiver types

EGC SafetyNET (and FleetNET) broadcasts are received using Inmarsat C or Inmarsat mini-C maritime terminals of different classes. Class 2 and 3 models provide EGC capability in addition to shore-to-ship and ship-to-shore messaging capability; class 0 are self-contained EGC receivers only. It should be noted that not all these models meet GMDSS requirements and not all non-GMDSS models support reception of MSI.



Class 0 MES (stand alone EGC receiver)

Class 1 MES (no EGC receiver)



Class 2 MES (single receiver) - See Note

Class 3 MES (two receivers)

Note: Majority of Maritime MESs with EGC receivers are Class 2 terminals

Figure 16 – Classes of Inmarsat C and mini-C Mobile Earth Stations

Managing your EGC receiver

This section gives the operator of an EGC receiver advice on how best to set-up and use the receiver, to obtain required results from the SafetyNET service.

The section should be read in conjunction with the manufacturer's instructions for specific information on how to do the following:

- Select a satellite/Ocean Region and log in;
- Program the receiver for additional NAVAREA(s)/METAREA(s) for which to receive and print messages. Some models require programming for the main NAVAREA/METAREA in which the ship is navigating;
- Majority of modern EGC receives have an automatic position update from the built-in GNSS receiver and if it is not available on some elder models or failed, update ship's position manually at least every 4 hours;
- Specify the additional types of MSI message required. It may be MSI for some fixed areas that are outside sailing area or coastal warnings. Please refer to the next paragraph on how to configure EGC receiver to receive coastal warnings broadcast as the EGC SafetyNET service.
- Ensure that the MES is idle (not transmitting) at the scheduled times of MSI broadcasts, as given in a current List of Radio Signals publication.

Advisory information on MES operating procedures

To avoid possible problems, and to ensure that all mandatory MSI is received and printed, if required, recommended procedures in the manufacturer's equipment operating handbook and the below procedures should be followed:

Message/Archive Log: All ingoing (received and EGC messages) and outgoing (transmitted) messages are recorded on a disk in specified log files. Each log file may hold a limited number of messages (limited by disk size or PC storage capacity). When the free disk space falls below a certain size, the terminal will display a warning message asking to allocate additional memory.

Message Routing: Check the message routing option on the terminal. Incoming messages should be routed to at least one of the output media - disk or printer. EGC SafetyNET messages with Urgency and Distress priority will be stored on the disk

and printed out automatically, if a printer is fitted (*Please note that a printer is mandatory requirement on SOLAS compliant ships*). EGC SafetyNET messages with Safety priority can be printed out automatically too (user option), otherwise they will be stored on the disk. Reception of MSI is mandatory on SOLAS compliant MESS and cannot be deactivated.

EGC SafetyNET setting-up: Ensure that you are logged into the appropriate satellite for the scheduled MSI that you need to receive. Timetables of broadcast and nominated satellites can be found in various national/international publications, such as Admiralty List of Radio Signals, Vol.5 or Table 1 of this handbook.

If properly set-up, your MESS will receive automatically all relevant NAVAREAs/METAREAs and other MSI messages addressed to the area where you are in. If you require additional MSI for adjacent area(s), you must program your terminal to receive this information.

EGC only option: Be careful if using the "EGC only" or "EGC only receiver" option. If this option is selected, the terminal will, effectively, be logged out and you will not be able to receive normal messages (mail) on your terminal. Also, if you choose "EGC only", previous EGC settings may be ignored and the terminal may receive all EGC messages within the ocean region.

Configuration of the mobile terminal: If Inmarsat C or mini-C terminal is used for communication (not as a supervisory control and data acquisition (SCADA) or "black box" terminal), it MUST have a DTE terminal which includes a keyboard, video display unit or messaging unit and printer. Every mobile terminal, if properly configured, set up and maintained, will automatically receive and print out all relevant messages addressed to it. These messages will be displayed and printed out, stored, or both. Improper settings, including printer settings, not in accordance with the manufacturer's instructions, will degrade the performance.

Reduce the number of alarms

Your receiver is built to give an audible/visual alarm on receiving MSI with distress or urgency messages, to which you should respond immediately. To make sure that you do not get any unnecessary alarms, however, you should do the following:

- Keep the ship's position updated, to ensure that the receiver rejects messages for any geographic areas which do not include the ship's position;

It is strongly recommended that automatic position updating is used whenever available on those elder terminals without built-in GNSS receiver by using a satellite position input on navigational interface.

What MSI you MUST receive

Under SOLAS requirements (as well as for the safety of all aboard), receipt of the following types of EGC SafetyNET MSI messages is mandatory:

- Shore-to-ship distress alert relays for circular areas if your position is contained within such an area;
- Navigational, meteorological or piracy warnings addressed to a circular or rectangular area if your position is contained within such an area;
- Search and Rescue coordination to a circular or rectangular area if your position is contained within such an area;
- NAVAREA warnings for the current NAVAREA;
- METAREA warnings or forecasts for the current METAREA.

What MSI you MAY receive

In addition to the receiving the above mandatory message types, IMO recommends that it also be programmed to receive the following messages:

- MSI for any other NAVAREAs/METAREAs in which the ship is planned to sail. Note that additional NAVAREAs/METAREAs specified do not need to be adjacent to the current area but be aware of the satellite used for MSI broadcast for additional area(s).
- Coastal warning for areas where the service is available and if Inmarsat C or mini-C MES is programmed with appropriate B₁, B₂ codes. (*Note: please see section below with more information on how to set up EGC receiver to receive Coastal warnings*)

Good operating practice

The following advice is given to help you obtain the best possible use of the SafetyNET service:

- Ensure any equipment associated with the EGC receiver is working properly, as indicated in the manufacturer's instructions, and that the printer is loaded with paper and print cartridge.
- Make sure your Inmarsat C MES monitors the appropriate satellite/Ocean Region at the time of a scheduled broadcast.
- Make sure that the terminal is not storing unwanted messages, and has storage space for new messages.
- If your printer has an option for printing in a small font, consider selecting this option to reduce the amount of paper used for messages.
- Keep watching your current position on the terminal as explained in the previous sections.
- On the terminal, enter all NAVAREAs/METAREAs and coastal areas for which you want to receive MSI, considering your intended voyage. Also enter the Coastal warning message types you want to receive, rejecting any unwanted types.
- While in port, keep the EGC receiver in operation, to ensure that you have received all necessary MSI before sailing.
- To find time of scheduled MSI broadcasts, refer to the current List of Radio Signals obtainable from national administrations. At the scheduled time, make sure that the receiver is tuned to the appropriate channel/Ocean Region, as shown in Table 1.
- When sailing from one Ocean Region to another region ensure that the terminal is manually "Logged in" to the new region when it is required. An alarm will sound when synchronisation has been lost due to vessel sailing out of coverage of an Ocean Region. Manual "Logging in" to the new Ocean Region will automatically cause the system to "Log the MES" out of the previous Ocean Region. *Please note that an automatic logging in to the new ocean regions with a stronger satellite signal is not allowed on SOLAS compliant MESs and it should be done manually.*

Throughout your voyage, ensure that a written log is kept of the identities of all received messages, and a printed copy is kept of all distress traffic. Other messages should be kept on the bridge for as long as they remain in force.

What to do about missed messages

If you think you have missed any messages, for example at a scheduled broadcast time, you can:

- Switch the terminal off and on again - this will clear the internal memory of all stored message IDs, so that if the message is re-broadcast, your receiver will not reject it as a repeated message, and will store/print it.

Regular position updates

Your EGC receiver **MUST** be updated regularly with the ship's position if automatic GNSS update is not provided on elder models.

The reasons for updating your EGC receiver regularly with the ship's position include:

- To receive and print only messages for the area where this ship is navigating - if the ship's position has not been updated for 4 hours (depending on the model), the receiver will automatically print or store all geographically addressed messages within the entire Ocean Region;
- To decide if the receiver should receive and print a message addressed to a additional geographic areas;

Another important reason for updating the terminal regularly with the ship's position, while not directly related to the SafetyNET service, is to ensure that the correct position is given if a distress alert has to be sent.

Two ways are available to update a terminal with the ship's position:

- **Automatically**, using a built-in GNSS receiver; most modern MES models now contain an integrated GNSS receiver, whilst older models may be interconnected to a separate on-board GNSS receiver.
- **Manually**, by keying position co-ordinates directly into the terminal; IMO requires this be done every four hours. Otherwise you will receive and print ALL EGC SafetyNET messages broadcast via the satellite.

How to set up EGC receiver to receive Coastal warnings

Inmarsat C or mini-C terminal receives all EGC messages on the broadcast channel, however it can suppress some messages from being displayed and printed automatically. All SafetyNET messages addressed to NAVAREAs/METAREAs, rectangular and circular areas are mandatory for reception if ship's position is inside the addressed area. *Note: some models require manual setup of the main NAVAREA/METAREA where the ship is navigating in order to receive this information automatically; some models recognise the main NAVAREA/METAREA automatically.*

To receive coastal warnings manual EGC set up is required that involves programming appropriate B₁, B₂ codes as shown in Figure 17 below.

The screenshot shows the 'EGC Setup' screen with the following fields and options:

- EGC-only receiver:** (See Note 2)
- System Messages:** (See Note 4)
- Additional Navarea(s)/Metarea(s) [0...99]:** [2] [3] [9] [] [] (See Note 3)
- Coastal Warning Settings:**
 - Coastal Warning Areas [A...Z]:** [ABCEFKM] (B₁ codes)
 - Type of Coastal Warnings:**
 - Navigational Warnings
 - Meteorological Forecasts
 - GNSS messages
 - Meteorological Warnings
 - Pilot & VTS service messages
 - Other Nav aids
 - Ice Reports
 - AIS messages
 - Additional Nav Warnings
 - Search and Rescue
 - Loran messages
 - No messages on hand

Figure 17 – General overview of EGC Setup screen

MSI providers address coastal warnings using 4-digit format – $X_1X_2B_1B_2$, where X_1X_2 is NAVAREA/METAREA number (two digits) in the range 01 - 21 (see *Note 1 below*), B_1 – coastal warning area A – Z within the main NAVAREA/METAREA, B_2 – subject indicator (or message type) A - Z:

- A - Navigational warnings;
- B - Meteorological warnings;
- C - Ice reports;
- D - Search and rescue information, acts of piracy warnings, tsunami and other natural phenomena;
- E - Meteorological forecasts;
- F - Pilot and VTS service messages;
- G – AIS service messages (non navigational aid);
- H - LORAN system messages;
- J - GNSS messages;
- K - Other electronic navigational aid messages;
- L - Other Navigational warnings (additional to Navigational warnings); and
- Z – No messages on hand.

Note 1: EGC Coastal warning service is not supported within all NAVAREAs/METAREAs. Please refer to the current publication of Lists of Radio Signals, available from national administrations.

Main and/or additional NAVAREAs/METAREAs, B_1B_2 codes are set up on the Inmarsat C and mini-C terminals via the EGC Setup screen and a general configuration of the screen is shown in Figure 17. Please remember that both B_1 and B_2 codes should be set up.

It should be noted that configuration of the EGC setup screen varies between different Inmarsat C and mini-C models and the Figure above gives only a general overview, however the EGC setup functions are the same for all models.

Note 2: Explanation of the “EGC-only receiver” is given in section “EGC only option” on page 19.

Note 3: EGC setup screen shows that additional NAVAREAs/METAREAs 2, 3 and 9 are selected to receive MSI but to be sure that this information is received, it is necessary to check if the terminal is logged in to the nominated satellite, if it is different from the satellite used to receive MSI for the main area during broadcast time.

Note 4: “System Messages” options is used to set up the terminal to receive Inmarsat “System” type EGC messages giving information about Inmarsat systems, planned outages, new services, etc.

EGC SafetyNET Log

All Inmarsat C and mini-C terminals that support EGC services have an EGC Log that is shown in Figure 18.

Message number	LES	Service	Priority	Rec Date & Time	Size	Seq. No	Routing
12091405.egc	102	MET/NAV Warning/Forecast	Safety	12-09-14 03:31	3672	1906	Prn+Mem
12091402.egc	102	SAR Coordination	Urgency	12-09-14 03:02	1478	1905	Prn+Mem
12091301.egc	101	Coastal Warning/Forecast	Safety	12-09-13 02:56	451	8256	Prn+Mem
12091205.egc	104	Distress Alert Relay	Distress	12-09-12 20:44	548	720	Prn+Mem
12091204.egc	117	NAV Warning	Safety	12-09-12 19:41	322	9715	Prn+Mem
12091203.egc	112	MET Warning	Safety	12-09-12 19:35	336	614	Prn+Mem

Figure 18 – General overview of EGC Log

EGC log contains the following information on all EGC message received by the terminal:

- Message number – generated by the terminal;
- LES – number of the addressed LES;
- Service – type of EGC messages;
- Priority – priority of the message – Safety, Urgency or Distress;
- Rec Date & Time – the date/time group when the message was received;
- Size – message size in number of bytes or characters;
- Seq. No – the unique message sequence number given to the message by the addressed LES; and
- Routing – message routing – memory or memory+printer – set up by the ship's operator. For SOLAS compliant MESs routing to Printer+Memory is mandatory for Urgency and Distress priority messages.

It should be noted that configuration of the EGC Log screen varies between different Inmarsat C and mini-C models and the Figure above gives only a general overview, however the EGC data are the same for all models.

Who to contact for advice

You can obtain further information about SafetyNET from the following sources:

- The International SafetyNET Manual, obtainable from IMO at the address given in Appendix A.
- The Master Plan of Shore-based Facilities for the GMDSS, obtainable from IMO.
- Current Lists of Radio Signals, obtainable from national administrations.

For general advice on the SafetyNET service, contact the Chairman of the International SafetyNET Broadcast Co-ordinating Panel, at the address given in Appendix A.

For general advice on the Inmarsat satellite networks, contact the Inmarsat at the address given in Appendix A.

Annex A

For general information on the International SafetyNET service contact:

The Chairman
International SafetyNET Broadcast Co-ordinating Panel
International Maritime Organisation (IMO)
4 Albert Embankment
London SE1 7SR
United Kingdom

Telephone: +44 20 7735 7611

Fax: +44 20 7587 3210

E-mail: info@imo.org

For general information on the Inmarsat satellite services contact Inmarsat Customer Care Centre:

Customer Care Centre
Inmarsat Global Ltd.
99 City Road
London EC1 1AX
United Kingdom

Telephone: +44 20 7728 1777

Fax: +44 20 7728 1746

E-mail: customer.care@inmarsat.com

The Customer Care Centre is normally manned between the hours 0600 to 2359, London local time, Monday to Friday.

Information is also available on the Inmarsat web site: www.inmarsat.com

You may also access a directory of IMNs (Inmarsat Mobile Numbers) for a particular vessel via the above web site.

Specific information on the Inmarsat's Maritime Safety Services and Inmarsat's role within the GMDSS, may be found online at: www.inmarsat.com/safety

You can also contact Inmarsat Maritime Safety Services team by e-mail at: maritime.safety@inmarsat.com

Annex B

Annex to IMO Resolution MSC306(87) 2010: Revised Performance Standards for Enhanced Group Call (EGC) Equipment.

1 INTRODUCTION

1.1 The enhanced group call equipment (EGC) to be used in the GMDSS should comply with the general requirements set out in Assembly resolution A.701(17), IEC 61097-4 and IEC 60945 and the following minimum performance requirements.

1.2 The equipment should be capable of producing a printed copy of received information. Received EGC messages may be stored for later printing with an indication to the operator that the message has been received except for the vital messages referred to in paragraph 3.2 which should be printed out upon receipt.

1.3 The EGC installation may be either separate or combined with other installations.¹

2 TECHNICAL REQUIREMENTS

The equipment should be type approved by Inmarsat and should comply with the environmental conditions and electromagnetic compatibility requirements specified in IEC 60945.

3 OPERATION

3.1 The equipment should provide a visual indication that the ship's position has not been updated during the last 12 hours. It should only be possible to reset this indication by revalidating the ship's position.

3.2 Means should be provided to enter the ship's position and current and planned NAVAREA/METAREA codes manually so that area group calls can be received. Means should also be provided to enter current and planned coastal warning service coverage areas and different classes of messages. Optionally, the ship's position, as determined by the navigational equipment, may be entered automatically and the NAVAREA/METAREA code automatically derived therefrom.

3.3 Provision should be made for a specific aural alarm and visual indication at the position from which the ship is normally navigated, to indicate receipt of a distress or urgency priority EGC message. It should not be possible to disable this alarm and it should only be possible to reset it manually and only from the position where the message is displayed or printed.

3.4 The equipment should indicate when it is not correctly tuned or synchronized to the EGC carrier.

3.5 Any message should be printed regardless of the character error rate of its reception. The equipment should print a low line mark if a character is received corrupted.

3.6 Acceptance or rejection of service codes² should be under the operator's control except that equipment should always receive navigational warnings, meteorological warnings and

¹ Elements of other installations, e.g. the antenna, low noise amplifier and down-converter of the ship earth station, may be shared for the reception of EGC messages.

forecasts, search and rescue information and shore-to-ship distress alerts, which are directed to a fixed or absolute geographical area within which the ship is operating.

3.7 Means should be provided to prevent the re-printing of a message once it has been received without error.

3.8 The printing device should be capable of printing at least the standard International Alphabet Number 5 (IA5) character set. Other character sets are optionally used according to ISO 2022³ standards or ITU-T Recommendation T.61.

3.9 The printing device should be able to print at least 40 characters per line.

3.10 The signal processor and printing device should ensure that if a word cannot be accommodated in full on one line, it should be transferred to the next line. The printing device should automatically feed five lines after completing the printed messages.

3.11 A local audible alarm should be sounded to give advanced warning of the printing device “paper low” condition. It should not be possible to confuse the sound of the “paper low” alarm with that of the distress or urgency alarm caused by the reception of a distress or urgency priority message.

4 SOURCES OF ENERGY

4.1 The EGC equipment should normally be powered from the ship's main source of electrical energy. In addition, it should be possible to operate the EGC equipment, and all other equipment necessary for its normal functioning, from an alternative source of energy.

4.2 Changing from one source of supply to another, or any interruption of up to 60 seconds' duration of the supply of electrical energy, should not require the equipment to be manually re-initialized and should not result in loss of received messages stored in the memory.

5 ANTENNA SITING

5.1 Where an omnidirectional antenna is used, it is desirable that the antenna be sited in such a position that no obstacle likely to degrade significantly the performance of the equipment appears in the fore and aft directions down to -5° and in the port and starboard directions down to -15° .

5.2 Where a stabilized directive antenna is used, it is desirable that the antenna be sited in such a position that no obstacle likely to degrade significantly the performance of the equipment appears in any azimuth down to -5° .

5.3 For omnidirectional antennas, objects, especially those within 1 m of the antenna, which cause a shadow sector of greater than 2° , are likely to degrade significantly the performance of the equipment.

5.4 For directive antennas, objects, especially those within 10 m of the antenna, which cause a shadow sector of greater than 6° , are likely to degrade significantly the performance of the equipment.

² The meaning of the service codes is in accordance with the Recommendation ITU-R M.540-2 1990, Operational and technical characteristics for an automated direct-printing telegraph system for promulgation of navigational and meteorological warnings and urgent information to ships.

³ Note: ISO 2022, “Information technology – Character code structure and extension techniques” standards.