Overview of Inmarsat C Enhanced Group Calling (EGC) SafetyNET Services and proposals to use them as a complement to Navtex in Baltic Sea

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Note: This paper should be read in conjunction with the IMO International SafetyNET Manual, 2003 edition (IMO sales number: IA908E).

1. Introduction

Inmarsat C EGC SafetyNET service is used for broadcasting Maritime Safety Information (MSI), such as weather forecasts, navigational and meteorological warnings, shore-to-ship distress alerts, SAR coordination information and other safety related information to all vessels at sea in fixed geographical or pre-determined and coastal areas.

Fixed areas include the 16 IMO defined NAVAREAs/METAREAs and pre-determined areas that are defined by the authorised MSI providers and restricted by a circle or rectangle. Coastal area broadcasts incorporate NAVTEX type addressing (B₁ – transmitter identification character and B₂ – subject indicator character) and the current NAVAREA/METAREA number is also included in the address format (see paragraph 5, 6 and 7 below for more details).

Figure 1 below gives details about existing Navtex services in the Baltic Sea and a proposal how existing or new MSI providers can use certain EGC SafetyNET services in the area, for example sending shore-to-ship distress alerts to a circular area, sending Search and Rescue (SAR) coordination messages to a circular or rectangular area, sending meteorological or navigational coastal warnings and forecasts, etc.

Inmarsat C Land Earth Station (LES) Operators (LESOs) offer EGC SafetyNET services only to the registered MSI providers authorized by the IMO SafetyNET Coordinating Panel. The procedure for obtaining authorisation and registration of the EGC SafetyNET information providers is explained in the IMO International SafetyNET Manual, Annex 8.

After registration, the LES Operator (service provider) will send you a Username, Password and general information on how to access the SafetyNET service. Maritime Safety Information providers can register with one or more Inmarsat LESOs to gain access to the SafetyNET services subject to their operational requirements. LESOs will only register those MSI providers who have received a Certificate of Authorisation issued by the SafetyNET Coordinating Panel.

It should be noted that this paper provides only general guidelines on access to the SafetyNET service and detailed procedures may vary among different LESOs (service providers).
2. A summary of the Inmarsat C system and services

Inmarsat C is a digital store-and-forward communication system whereby text or data messages are converted into a digital format before being transmitted via satellite and supports message exchange in ship-to-shore, shore-to-ship and ship-to-ship directions.

When sending a message in any direction, it is transmitted via an Inmarsat satellite in a series of data packets to the addresses LES, which acts as an interface between a mobile satellite (ship’s) terminal and national or international telecommunications networks. If the LES receives any data packet with errors, it “signals” back to the
ship’s terminal to re-transmit packets with errors until the LES receives all packets error free. The LES stores all received packets, then assembles them into a single message and forwards it to the final destination – hence the term store-and-forward.

An Inmarsat C or mini-C Mobile Earth Station (MES) is a small power-efficient ship’s terminal with omni-directional antenna, inexpensive to purchase and simple to install on any size of vessel, fisheries trawler, sailing or motor yacht.

Inmarsat mini-C is a new family of MESs smaller in size, cheaper to purchase, with lower power consumption and lower transmitting power. All mini-C models support all communication functions and, depending on the model, can also support maritime distress and safety services - distress calling and EGC SafetyNET and FleetNET reception.

*Note: Inmarsat C does not support voice communication.*

![Figure 2. General configuration of Inmarsat C and Inmarsat mini-C ship’s terminal.](image)

**Inmarsat C characteristics:**
- Global coverage (sea areas A1, A2 and A3);
- Store and Forward communication system;
- Lower cost of terminals and messaging;
- Small size and weight with omni-directional antenna;
- Low power consumption;
- More than 73,000 Maritime Inmarsat C and 20,000 mini-C MESs;
- Compatible with national alphabets;
- Required by SOLAS Convention, Chapter IV, performs 6 (out of 9) GMDSS communications functions.
Inmarsat C services:

- Store-and-Forward data and messaging
  - Messages can be sent to telex, fax (text, one way only), PSDN/PSTN, another mobile, Short Access Code (SAC), e-mail;
  - max message size up to 32 Kbytes.
- Distress Calling (automatically routed to associated Maritime Rescue Coordination Centre (MRCC))
  - distress alerting. It is a single data packet, which contains ship’s ID, position, course, speed, nature of distress, time & date of transmission and last position update and transmitted over signalling channel;
  - distress priority messaging. It is a detailed store-and-forward message transmitted with distress priority over messaging channel and automatically routed to the associated MRCC.
- Enhanced Group Calling (EGC)
  - EGC SafetyNET - promulgation of Maritime Safety Information as required by SOLAS Convention, Chapter 4;
  - EGC FleetNET – broadcast of commercial information, news, etc. to the predetermined group of vessels, e.g. of the same owner, same flag, same shipping company. To receive FleetNET messages mobile terminals should have an Enhanced Group ID (ENID) number loaded into each terminal.
- Data reporting and polling (position monitoring, ship security alerting, Supervisory Control and Data Acquisition (SCADA), LRIT).

3. EGC SafetyNET service in NAVAREA/METAREA I and Baltic Sea

The following EGC SafetyNET messages are broadcast for NAVAREA/METAREA I (including Baltic Sea):
- High seas bulletin for METAREA I issued by the Meteorological office, Aberdeen, UK including storm warnings, general synopsis, area forecasts (Baltic Sea is not covered by meteorological service);
- NAVAREA I warnings; and
- Shore-to-ship distress alerts and SAR coordination to circular areas by MRCC Falmouth (UK) and JRCC Stavanger (Norway). The Baltic Sea may also be covered by the service if the position of the ship in distress is within the area.

Analysis of MSI in the AOR-E satellite coverage area, which covers the Baltic Sea shows that Coastal warnings are not promulgated via EGC SafetyNET. Coastal warnings are widely used in the IOR and POR regions only, with about 4 - 5 thousand messages a month in each ocean region, but they are mainly addressed to coastal areas within NAVAREA/METAREA VII, VIII, X and XIV.

4. Accessing the SafetyNET service

MSI messages are transmitted by telex, data-link or other terrestrial communications to LESs providing Inmarsat C services in accordance with national and international routeing arrangements.

Telex is the standard method for delivery of traffic to the LESs; however, the service in some countries is closing down or has already closed down and many LESs have
the capability to receive EGC messages via two-stage access X25 PSDN, TCP/IP interface, Inmarsat C web access and public switched telephone network (PSTN). Each user interface has its own access procedure and syntax command, which is given by the Inmarsat C LES operator to the MSI provider upon registration.

5. Operational procedure

Figure 3 below shows one sample how EGC messages can be addressed and submitted for transmission but this procedure varies between different service providers. It shows a “simple” Internet-drop service via Telenor for demonstration purpose only and it does not mean that this service is recommended for practical use. It is up to the MSI provider to decide which service to use and the service provider will give the list of all available services.

![Figure 3. Inmarsat C (or mini-C) MES set up of (satellite) Coastal Warning Areas (B1) and Coastal Warnings subject indicators (B2).](image.jpg)

Legend:
1. address format for the EGC message given by the LESO.  
   **Note:** the format of the address and user interface may vary between different service providers (LES operators) and the figure gives only a general idea how EGC messages are addressed and formatted.
2. EGC broadcast command (see paragraph below for more information).
3. Text of the EGC message.
4. “Send” button to send the message to the addressed LES (as on the standard Outlook e-mail service).
Note: Figure 3 illustrates a real “test” Coastal warning message which was broadcast via AOR-East satellite and received by an Inmarsat C terminal as shown below on Figure 5.

To broadcast a message an information provider should also submit a special EGC command which includes a sequence of C-codes, usually five or six codes, which are known as broadcast parameters and are included in the message header. As a common practice for messages, for example sent as e-mail, C-codes are included in the “Subject” field/line of the e-mail user interface. Each “C” code controls an individual broadcast parameter and is assigned a numerical or alpha-numerical value in accordance with the IMO SafetyNET Manual.

The EGC SafetyNET broadcast command syntax is follows:

\[
\text{EGC } C0,C1,C2,C3,C4,C5
\]

(Note: spaces, commas, colons or other delimiters between codes are required and depend on the LES Operator (service provider) requirements)

Where the word EGC is the start command followed by a “space”

C0 – Ocean Region
An optional code to identify the Inmarsat ocean region if the addressed LES operates in more than one ocean region.

- C0=0 – Atlantic Ocean Region West (AOR-W)
- C0=1 – Atlantic Ocean Region East (AOR-E)
- C0=2 – Pacific Ocean Region (POR)
- C0=3 – Indian Ocean Region (IOR)
- C0=9 – All Ocean Regions covered by the LES (optional)

C1 – Priority code
C1=1 – Safety priority
C1=2 – Urgency priority
C1=3 – Distress priority

“Distress” and “Urgency” priority gives priority over messages with “Safety” priority in the Inmarsat C system and also causes audible and visual alarm on the mobile terminal when a message is received.

C2 – Service code
EGC SafetyNET defines the following service codes covering navigational, meteorological and search and rescue services (SAR).

- C2=04 – Navigational warnings to rectangular area
- C2=13 – Coastal navigational or meteorological warnings or forecasts to coastal areas – option to address a message to ships with mobile terminals programmed with required codes
- C2=14 – Shore-to-Ship distress alerts to rectangular area
- C2=24 – Meteorological warnings to circular area
- C2=31 – NAVAREA warnings or Meteorological warnings or forecasts to METAREA
- C2=34 - SAR coordination to rectangular area
- C2=44 - SAR coordination to circular area
C3 – Address code

Rectangular address consists of 12 alphanumerical characters as follows:

\[ D_1D_2LaD_3D_4D_5LoD_6D_7D_8D_9D_{10} \]

Where:
- \( D_1D_2 \) - latitude of south-west corner of the rectangle in degrees
- \( La \) – hemisphere N (North) or S (South)
- \( D_3D_4D_5 \) – longitude of south-west corner of the rectangle in degrees with leading zero if required
- \( Lo \) – longitude E (east) or W (West)
- \( D_6D_7 \) – extent of rectangle in latitude to the North in degrees
- \( D_8D_9D_{10} \) – extent of rectangle in longitude to the East in degrees

A rectangle, whose S-W corner is 54°N and 16°E, extending 11° to the North and 5° to the East, is coded as 54N016E11005

Note: value of latitude is limited from 00° to 90° and longitude from 000° to 180°

Circular address consists of 10 alphanumerical characters as follows:

\[ D_1D_2LaD_3D_4D_5LoR_1R_2R_3 \]

Where:
- \( D_1D_2 \) - latitude of centre of the circle in degrees with leading zero if required
- \( La \) – hemisphere N (North) or S (South)
- \( D_3D_4D_5 \) – longitude of centre of the circle in degrees with leading zero if required
- \( Lo \) – longitude E (east) or W (West)
- \( R_1R_2R_3 \) – radius of the circle in nautical miles, up to 999.

Coastal warning address consists of 4 characters - 2 digits and 2 letters as follows: \( X_1X_2B_1B_2 \)

Where:
- \( X_1X_2 \) – NAV/METAREA in range of 01 – 16 and
- \( B_1B_2 \) – NAVTEX codes to allocate NAVTEX transmitter coverage area (\( B_1 \)) and type of warning (\( B_2 \))

An example of coastal warning address may be as 01UB where:
- 01 – messages addressed to ships in NAV/METAREA 1 including Baltic Sea;
- U - NAVTEX coverage area for Tallinn station (Central Baltic and Gulf of Finland); and
- B – Meteorological warnings

C4 – Repetition code

Repetition code allows a message to be repeated a finite number of times or at specific intervals until cancelled by the information provider.

\( C4=01 \) – transmit once on receipt
\( C4=11 \) – transmit on receipt followed by repeat (or echo) 6 minutes later

\( \ldots \ldots \)
\( C4=13 \) – repeat broadcast every 1 hour with a repeat (or echo) 6 minutes later after each broadcast.

**C5 – Presentation code**

C5=0 (or 00)

For the International SafetyNET service, the presentation code is always 0 (or 00, subject to the registered LES access procedure) – International Alphabet Number 5 (also known as 7-bit ASCII code).

As an example, the whole address string for SafetyNET Coastal Warning message is follows:

**EGC 1,2,13,01JE,11,0**

where:

1 - C0 code for Atlantic Ocean Region East (AOR-E)
2 - C1 Urgency priority code
13 - C2 service code for Coastal warnings
01JE - C3 address code, where:

- 01 – NAVAREA/METAREA I,
- B₁ = J (Gislovshammar Navtex Station – Southern Baltic,
- B₂ = E – Meteorological forecast.

11 - C4 Repetition code (transmit on receipt followed by repeat 6 minutes later)
0 - C5 Presentation code (7-bit ASCII code)

6. **Who will receive EGC SafetyNET message**

If an EGC message is sent to NAVAREA/METAREA, to a rectangular area or circular area, **ALL** ships with Inmarsat C terminals on board, whose position is inside the addressed areas, will receive the message. Reception of EGC messages with Urgency and Distress priority will also cause audible and visual alarm on the terminal which can only be re-set manually.

To receive EGC SafetyNET Coastal warnings, that is an optional function on ships’ terminals, Inmarsat C MES should be programmed (set up) with B₁ (Coastal warning area A…Z or Navtex transmitter coverage area) and B₂ (type of Coastal warning) codes.

B₁ codes for the EGC SafetyNET Coastal warnings are the **same** as for Navtex messages and for the Baltic Sea B₁ codes are I, J, U and H.

Definition of B₂ codes is also the same for both EGC SafetyNET and Navtex services and Inmarsat C MESs support A, B, C, D, E, F, H, J, K and L codes.

The figure below explains how Inmarsat C MESs should be set up to receive EGC SafetyNET Coastal warnings.
Figure 4. EGC Setup procedure on Inmarsat C/mini-C ship’s terminal.

**Note:** the figure shows the interface of Inmarsat C Thrane & Thrane mini-C terminal using easyMail messaging software. Other manufacturers will/may have different interfaces and may have different commands but the general procedure is the same.

**Legend:**
1. On the main screen of the terminal go to “Options” menu.
2. Scroll down to “Configuration”.
3. Click “EGC Setup” and EGC Setup screen comes up.
4. “Additional (secondary) NAVAREA(s)/METAREA(s)” field is used to set up secondary (additional) area(s) to receive MSI addressed to this/these area/s. This option is used when a vessel is sailing from one area to another and additional MSI is required before the vessel sails into the new area. Some (older) MESs may have one “window” to select only one additional NAVAREA/METAREA.
5. “Coastal Warning Areas [A … Z]” field is used to set up B1 “Transmitter identification character”. For the Baltic Sea there are four B1 identification characters as shown on the Figure 1. These are I for Grimeton (Sweden)
NAVTEX station, J for Gislovshammar, (Sweden), H for Bjuroklubb (Sweden) and U for Tallinn (Estonia) stations.

6. The field is used to select B2 "Subject indicator character" or type of NAVTEX warning. They are:
   - A = Navigational warnings
   - B = Meteorological warnings
   - C = Ice reports
   - D = Search and Rescue information (and pirate attack messages)
   - E = Meteorological forecasts
   - F = Pilot service messages
   - H = LORAN messages
   - J = SATNAV messages
   - K = Other electronic navaid messages
   - L = Navigational warnings – addition to letter A.

7. “Fixed positions” are used to receive EGC messages sent to other positions (addressed to rectangular or circular areas) than your current position. It can be used, for example, to receive weather or navigational information for the area you are sailing to. It is possible to enter up to 5 different positions on the planned route to keep updated on MSI.

8. Click “OK” to save EGC Setup.

After that the terminal will receive all Coastal navigational and meteorological warnings, SAR messages, Meteorological forecasts and SATNAV messages addressed to the Baltic Sea according to B1 and B2 codes setup.

7. How to read/print received EGC SafetyNET messages

Received EGC SafetyNET messages are stored in the EGC log and can also be printed, either automatically or initiated by the ship’s operator depending on the MES’s model and its setup.

If the MES is GMDSS compliant, it should have a printer and all EGC SafetyNET messages with Distress and Urgency priority will be printed automatically and also cause an audible and visual alarm. Messages with Safety priority will be stored but can also be configured for automatic printing.

For non-GMDSS compliant mobile terminals a printer is not required and all EGC messages will be stored in the memory but messages with Distress and Urgency priority will also cause audible and visual alarms.

Figure 5 below shows the main window of the communication program with the EGC log and received SafetyNET messages. The figure also gives an explanation how EGC messages can be seen, which information is available on the EGC SafetyNET traffic and how to understand this information.
Figure 5. Main window of an Inmarsat C (or mini-C) MES with the EGC log open and sample of the received EGC message.

Legend:
1. “EGC” button – this opens the EGC log where all EGC SafetyNET and FleetNET messages are stored.
2. Highlighted row – each row represents a single EGC message with its details. Ship’s operator is required to double click the row to open the message.
3. LES number – shows, on the log and header of the received message, the LES through which the message was sent.
4. EGC service – shows, on the log and header of the received message, service type of the EGC message (C2 - Service code) – it is a Coastal warning.
5. Priority – shows, on the log and header of the received message, priority of the EGC message (C1 – Priority code) – it is Safety priority.
6. Urgent priority – information on the EGC log for messages with Distress and Urgency priorities is shown in red.
7. Bit rate – shows “C5” - Presentation code of EGC messages. By default all EGC SafetyNET messages are sent with 7 bit (ASCII) presentation code.
8. Date and time when the EGC message was sent.
9. Address – shows parameter of the “C3” - Address code on the header of the received message is 01JE, where:
   a. 1 (or 01) is NAVAREA/METAREA I;
   b. B₁ code is J - (Navtex area covered by Gislövshammar station); and
   c. B₂ code is E - (Meteorological forecast);
10. PosOK – indicates that the ship’s position on the mobile terminal is valid and was updated within the last 4 hours. If the position is not valid, the status will be changed to NoPos (no position).
11. Size – shows size of the received message in number of bytes – size of the Coastal warning is 323 bytes or characters.
12. Reference number – Unique number of each EGC message on the log and header of the message given by the addressed LES – reference number is 8574.
13. Routing – shows if the received EGC message was routed to the memory only or printer as well (Note: Inmarsat C messaging program shown on the figure is not GMDSS approved and it does not require a printer. That is why all EGC messages on the log are routed to memory only and printing is an option).
14. Two rows are shown in bold indicate that these two EGC messages are not read yet.
15. Header of the EGC message (Note: format of the header may be different depending on the addressed LES but contains similar information).
16. Text of the received Coastal warning.

8. How coastal warnings areas are set up in Australia

The picture below, given as an illustration, shows how EGC SafetyNET coastal warnings areas are defined for Australian waters, B1 codes allocated for each area, nominated satellite and scheduled time of broadcast. To receive coastal warnings, ships’ operators should setup them on mobile terminals plus appropriate B2 codes.

![Coastal warning areas in Australia](image-url)

**Picture 6.** Coastal warnings areas within NAVAREA/METAREA X

*Note: The picture is taken from the Admiralty List of Radio Signals (GMDSS), Volume 5 published by the UK Hydrographic Office and is used with permission.*
9. Proposed plan of actions to implement the EGC SafetyNET service in the Baltic Sea

1. Decide if your MSI provider(s) is/are going to promulgate coastal warning (and other messages) via existing providers, e.g. NAVAREA coordinator, meteorological office or you are going to set up your own service.

2. If an existing MSI provider is used, registration and authorisation, as required in Annex 8 of the IMO SafetyNET Manual, is not required. For a new MSI provider, registration and authorisation via the International SafetyNET Coordination Panel is required. The Panel may also require details of the planned service, type of EGC messages, addresses, traffic volume, ocean region (most likely Atlantic Ocean Region East – AOR-E), required times for broadcast, etc. The Panel will advise you time slot(s) for the traffic.

3. Upon registration with the SafetyNET Panel and obtaining a certificate, the (new) MSI provider needs to contact an Inmarsat C LES operator or service provider of his choice and register for the service. Details of the registration, including cost involved, end user charges, etc. should be obtained from LESOs.

4. Having registered with the LESO (or LESOs) the MSI provider can start transmission of EGC messages.

5. When a message is submitted for transmission and transmitted successfully, the MSI provider is given positive notification reports. If a message fails, a non-delivery report will also be given. LESOs will give more details on the service.

6. IMO also requires that every MSI provider must monitor the broadcast it originates. It is accomplished by installation of its own Inmarsat C terminal (EGC receiver) ashore to:
   a. check that the EGC message has been broadcast;
   b. confirm that the message has been received correctly;
   c. ensure that the message cancellation has been properly performed; and
   d. monitor any unexpected delay in the message broadcast.

10. End user charges

Inmarsat as a wholesaler is not in a position to give information on the cost of the service and end user charges for the traffic. This information should be obtained from LESOs (service providers).

Vladimir Maksimov
Manager, Maritime Safety Operations
Inmarsat, 99 City Road, London EC1Y 1AX, UK
Tel: +44 20 77281095
Mobile: +44 7801 679648
E-mail: vladimir_maksimov@inmarsat.com