

Chapter 6

The Inmarsat-C system

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How to send a DISTRESS call Using an Inmarsat-C MES

When you are in grave and imminent danger, you may use your mobile earth station (MES) to send a distress alert. This alert is routed automatically through a land earth station (LES) to a land-based rescue co-ordination centre (RCC) which will establish communications with you to organise the search and rescue (SAR) services you may need.

1. Methods for sending a distress alert:

You may send a distress alert to an RCC by using your MES terminal menu or by pressing the dedicated distress button(s) if you have one (or more) fitted to your MES.

2. To send a distress alert using the dedicated distress button(s) (if fitted):

If your terminal is fitted with a dedicated distress button (or a combination of buttons), you may send a distress alert simply by pressing the button(s) and holding down for the required number of seconds (typically five seconds).

3. To send a distress alert using your MES terminal menu:

- i. *Access the distress alert menu on your MES terminal.*
- ii. *Fill in the selections on the menu presented, entering first your vessel's position and then as much other information as you can in the time available (unless this information is supplied automatically from navigational instruments, e.g. the GPS receiver). Select the nature of the distress from the list provided.*
- iii. *Select an LES, preferably the one nearest to your vessel within your ocean region. (You may, however, select any LES within your ocean region).*
- iv. *Send the distress alert.*
- v. *Wait for an acknowledgment from the LES. If you do not receive one within five minutes, repeat the above.*

After the distress alert has been sent and confirmed, a more detailed distress priority message can be sent giving more information about the distress and asking for assistance required. The distress priority message is also automatically routed to the RCC.

QUICK REFERENCE GUIDE TO OPERATING YOUR INMARSAT-C MES

The steps below summarise how you should use your Inmarsat-C MES for distress and safety purposes and to send and receive messages.

Prepare your MES	Comment
1. Make sure your MES antenna has an unobstructed view of the sky in all directions.	
2. Switch on your Inmarsat-C MES and all associated equipment.	<i>Refer to the equipment manufacturer's instructions.</i>
3. Log in to the ocean region you have selected.	<i>See Section 6.3.1 for more information.</i>
4. Decide on the LES through which you are going to communicate.	<i>Refer to Appendix E for the LESs in each ocean region. Section 6.3.2 tells you more.</i>
5. Confirm that your MES is logged in and receiving a strong NCS Common Channel signal.	<i>Check the indications on your MES monitor.</i>

Routine checks	
<ul style="list-style-type: none"> Throughout your journey, make sure that your MES is receiving a strong signal and all associated equipment is working properly. 	
<ul style="list-style-type: none"> If you are going to sail outside the ocean region to which you are currently logged in, make sure your MES is logged in either manually or automatically to the new ocean region and receiving a strong signal. 	<i>See Section 6.3.5 for more information.</i>

Sending a distress call	
<ul style="list-style-type: none"> You may use your MES to send a brief distress alert or a more detailed distress priority message to an RCC. 	<i>For a summary of the distress call procedures, refer to page 6-1: 'How to send a distress call using an Inmarsat-C MES'.</i>

Receiving MSI broadcasts	
<ul style="list-style-type: none"> Your MES can receive broadcasts of Maritime Safety Information (MSI) within an ocean region 	<i>See Sections 6.2.3 and 6.5 for more.</i>

Sending a message (ship-to-shore)	
1. Create your message on the MES text editor or edit an existing message.	<i>Refer to the MES manufacturer's instructions for details.</i>
2. Select transmit (send) mode.	<i>The destination number you enter, and the transmission type and format, depends on whether the destination is a telex, fax or computer terminal or another Inmarsat mobile. See Section 6.3.8 and Table 6-1 for more information.</i>
3. Insert the destination of your message.	<i>The transmission type is determined at the time of inserting the destination, as it is part of the address.</i>
4. Select the LES through which you want your message routed.	<i>See Section 6.3.2 for more information.</i>
5. Select the time of your message and whether you want confirmation of delivery and hard copy.	<i>Routine priority is selected by default. See Sections 6.3.8 and 6.3.9 for more information.</i>
6. Before sending your message check that all the details you have entered are correct.	<i>Any errors in the details entered could result in your message not being delivered. See Sections 6.3.8 and 6.3.9 for more information.</i>
7. Enter the command to transmit (send) your message.	<i>Your MES should now start to transmit your message, and proceed automatically until complete.</i>

Receiving messages (shore-to-ship)	
<ul style="list-style-type: none"> • Make sure that everyone who may need to contact you knows how to do so. 	<i>See Consideration 1 in Section 6.3.2 for more information.</i>
<ul style="list-style-type: none"> • Provided your MES is logged in and receiving a strong NCS Common Channel signal, it should automatically receive all messages intended for it. 	<i>At regular intervals, check your MES receive log and EGC log for any messages received.</i>
<ul style="list-style-type: none"> • Make sure that your MES is set to store and/or print all received messages. 	<i>Refer to the MES manufacturer's instructions for details.</i>
<ul style="list-style-type: none"> • Note that some EGC messages may be sent frequently and could fill up your MES's memory or disk storage. 	

IMPORTANT OPERATING PROCEDURES FOR AN INMARSAT-C MES

Note the following important operating procedures, which you should observe at all times to ensure your own safety. For more information refer to the relevant sections of Chapter 6.

DURING A DISTRESS CALL



DISABLE AUTOMATIC SCANNING ON YOUR MES

When you make a distress call, the Inmarsat-C system uses the NCS Common Signalling Channel for the ocean region into which you are logged so as to establish a communications channel from your MES to an RCC. To ensure your MES remains tuned to this channel, you should disable the **automatic scanning facility** on your MES to stay **in the ocean region into which you are logged** and to make it your preferred ocean region. Doing so ensures that the RCC can communicate with you while you are within that ocean region.

For more information, see Sections 6.3.3 - 6.3.5.

Note that automatic scanning is NOT allowed on GMDSS-compliant MESs.

WHEN RECEIVING MARITIME SAFETY INFORMATION:

IF YOU WISH TO CONTINUE RECEIVING MARITIME SAFETY INFORMATION (MSI) FROM YOUR CURRENT OCEAN REGION, YOU SHOULD DISABLE THE AUTOMATIC SCAN ON YOUR MES.

Note that automatic scanning is NOT allowed on GMDSS-compliant MESs.

Log out before you switch off!

If possible, keep your MES switched on at all times and logged in to an ocean region.

When switching off your MES, follow the important points below:

If you intend not to use your MES for a prolonged period of time (for example, to conserve battery power) and it is currently logged into an ocean region, **you must log out before switching your MES off** (see Section 6.3.6)

6.1 Introduction to the Inmarsat-C system

An Inmarsat-C mobile earth station (MES) is a small and power-efficient terminal which provides global communications, is inexpensive to purchase and simple to install and use. The Inmarsat-C network can be used to send and receive text or data messages only.

6.1.1 A summary of the operation of the Inmarsat-C network

The Inmarsat-C network is a digital network whereby messages containing text, numeric data or other information are converted to a digital format before being transmitted over the system. The technique used for sending a message is known as store-and-forward messaging. It is not possible to use this network for any voice communication.

When sending a ship-to-shore message, the message is initially prepared locally and then transmitted via the Inmarsat satellite in a series of data packets to an Inmarsat-C land earth station (LES). The LES acts as an interface (or gateway) between the Inmarsat space segment and the national/international telecommunications networks. If the LES receives any data packets with errors, it signals back to the MES to re-transmit those packets and the procedure is repeated until the LES has received the complete message with no errors. The LES stores the message briefly before forwarding it over the telecommunication networks to the intended destination (hence the term store-and-forward).

Users should be aware of the brief delay which occurs with the store-and-forward technique used in the Inmarsat-C system.

When sending an average-size message - 10/15 kbit/s or ½ A4 size page - in either direction, the typical delay from a message being sent to it being received at its destination without any errors is two to five minutes.

A similar procedure happens when a shore-based correspondent sends a message through an LES to your terminal.

The Inmarsat-C system is very flexible, allowing for a wide variety of equipment to be connected. Figure 6-1 shows a general overview of the system, indicating some of the different types of equipment that may be connected at either end. The actual equipment and the associated communications services depend on individual circumstances. The following sections discuss some of the possibilities.

6.1.2 Equipment which may be connected to the MES

Inmarsat permits only type-approved MES models to be used. As shown in Figure 6-1, an MES has two parts: the DTE (data terminal equipment) and the DCE (data circuit terminating equipment).

The DTE interfaces external input/output devices to the MES, such as:

- A keyboard, screen and printer for message processing. In some MES models these are built in to the DTE, while in other models they are separate.

- An external computer such as a laptop or desktop model. This computer may be used to format and store messages before they are sent or to run specialised software (for example formatting the data into a data report for sending to a reporting centre or compressing input data to save transmission time). Ideally, the computer should be dedicated solely to operating the Inmarsat-C MES but in some installations may task other functions.

Note the following precaution about interfacing with other systems onboard:

When the Inmarsat-C MES is a part of the GMDSS station, no other programmes or external interfaces (except GPS/NMEA) can be connected to the MES.

The Inmarsat-C DCE is a ‘satellite modem’ which provides an interface between the MES and the satellite system using a transmitter, receiver and an antenna (similar to a computer modem which links a computer to the telephone network.)

The antenna must be able to maintain a line-of-sight to the selected satellite.

A maritime Inmarsat-C antenna is omni-directional and can transmit and receive messages from the satellite when the vessel is pitching and rolling in heavy seas. (Note that this type of antenna has no moving parts, unlike the larger Inmarsat-A, B, M and mini-M directional antennae, which move constantly to counter the motion of the ship.)

6.2 Basic description of Inmarsat-C communication services

Both the MES and the LES must support the communications service that you select. To find whether your MES supports a particular service or needs to be upgraded, contact the manufacturer at the address given in Appendix B. To find whether an LES supports a particular service, contact the LES customer service using the numbers given in Appendix E, Table E-1.

The following services are available via the Inmarsat-C network:

- Store-and-forward messaging and data services (Section 6.2.1);
- Distress alerting and distress priority messaging (Section 6.2.2);
- Reception of EGC (Enhanced Group Call), SafetyNET™ and FleetNET™ broadcasts (Section 6.2.3).
- Data reporting, polling and SCADA (Section 6.5).
- Operator-assisted and value-added services (Section 6.6).

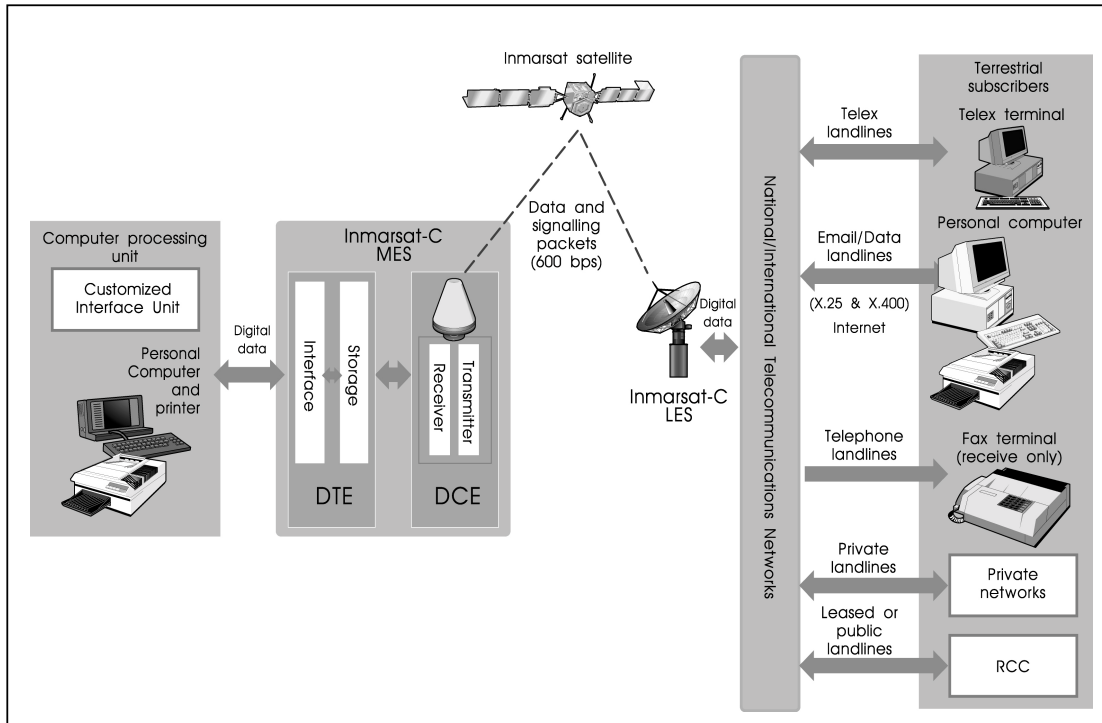


Figure 6-1 An overview of the Inmarsat-C communications system

6.2.1 Store-and-forward messaging services

The Inmarsat-C network can be used for sending different types of store-and-forward messages:

- Telex message service: you can send and receive messages between your MESS and any telex terminal connected to the national/international telex network;
- Fax messaging service: this allows an MESS to send text messages to a shore-based fax machine. It is not possible for a shore-based fax user to send messages directly to an MESS. A fax message can only be sent as a text message via a fax bureau service: see Section 6.6.5;
- Messages to and from a computer: you can send and receive messages between your MESS and any computer terminal connected to the PSTN or PSDN network. For shore-to-ship traffic you need to be registered with an Inmarsat service provider to get access to the service required.
- Electronic mail (e-mail) services: messages can be sent via either the Internet or hub services. See Section 6.6.4 for more information;
- Dedicated data processing systems connected via a private network (such as a leased line);
- Ship-to-ship communications;
- Short access code or 2-digit code messaging.

6.2.2 Distress alerting and distress priority messaging

Every Inmarsat-C LES is connected by a reliable telecommunications link to a rescue co-ordination centre (RCC) known as the 'associated RCC'. RCCs are equipped with facilities to organise search and rescue activities in response to a distress alert or distress priority message

being received from an MES. Each associated RCC is connected by the international telecommunication networks to other RCCs around the world and is also equipped with Inmarsat terminals, enabling it to communicate with other rescue centres and ships in the vicinity to ensure that rapid assistance is given.

You can make two different types of distress call with your MES:

- A brief **distress alert** which contains summarised information on your distress circumstances;
- A more detailed **distress priority message** in which you can send your distress circumstances and ask for the assistance you require.

Either of the above types of distress call will be automatically routed through the Inmarsat-C network with top priority to an RCC, which will establish communications with you to organise the rescue services you may require.

If you accidentally send a distress alert, you should notify the appropriate RCC to cancel the alert by sending a distress priority message via the same LES through which the false alert was sent.

Example of message:

NAME, CALL SIGN, IDENTITY NUMBER, POSITION

Cancel my Inmarsat-C distress alert of DATE, TIME UTC

= MASTER

Please note the following points when using the dedicated distress button(s):

Note 1: Sending a distress alert by pressing the dedicated distress button(s) sends a pre-programmed alert containing the MES ID, date, time, position, course and speed dating only from when the information was last updated, providing that there is no automatic position input. The nature of the distress will be 'undesignated' as the default set-up. If your position, course and/or speed have changed from the information stored in the MES and there is no automatic position update, you should update it manually, select the nature of the distress from the list provided in the MES and send the alert by pressing the dedicated distress button(s). If a new nature of distress is selected, this selection will remain for one hour. After that it will revert to default.

Note 2: Pressing the dedicated distress button(s) sends a distress alert immediately via the Inmarsat system to an RCC irrespective of whether your MES is engaged in message transfer or logged into an ocean region.

To avoid sending false distress alerts, do not press the dedicated distress button(s) except in the case of a real emergency when you are in grave and imminent danger.

6.2.3 Enhanced Group Call (EGC) services

The SafetyNET™ service allows an information provider (e.g. a meteorological or hydrographical office or an RCC) to broadcast Maritime Safety Information (MSI) to all vessels in fixed geographical areas such as the IMO-defined NAVAREAs or METAREAs or to pre-determined areas.

The FleetNET™ service allows information providers such as shipping companies or governments to broadcast commercial information addressed to a selected group of EGC receivers belonging to a closed user group (a special list of subscribers/customers).

Section 6.4 gives more information on the SafetyNET™ and FleetNET™ services offered via the EGC services.

6.2.4 Two-digit access codes

It is possible to send messages to special services offered by LESs by using special two-digit codes as indicated in Appendix D, Table D-1.

Some LES operators and MES manufacturers more usually refer to the two-digit codes that are available for maritime safety services and general utility as 'special access codes' or SACs.

To find whether an LES supports a particular SAC, contact the LES's customer service department (see Appendix E) or Inmarsat's Customer Care Centre (Appendix A).

Note: some two-digit codes are free of charge for ship operators.

6.3 How to use your Inmarsat-C MES

Once your MES has been installed and successfully activated as described in Chapter 3, you may prepare it for use.

Check at frequent intervals that your antenna has an unobstructed view of the sky to the horizon in all directions. If your antenna's view to one satellite is obstructed and you are in the overlapping area of more than one satellite, you should select another satellite.

6.3.1 Logging in to an ocean region

The Inmarsat-C differs from the other systems in that your MES must first be logged in to an ocean region before it can send or receive any messages. Logging-in informs the network that your MES is available for communications and tunes your MES to the correct NCS Common Signalling Channel (also known as the NCS Common Channel) for that ocean region. When your MES is tuned to the NCS Common Channel, it means that the MES is synchronised with the NCS or is in idle mode. Some MESs may automatically log in to the Inmarsat-C network when first switched on, selecting the strongest NCS Common Channel signal if they are in an overlapping area. Other MESs must be manually logged in to the selected ocean region or NCS. Refer to your manufacturer's instructions on how to perform a manual log-in.

After a few minutes your MES should indicate that it has successfully logged in to the selected ocean region and also indicate signal strength received from the NCS. The signal

strength should be at least the minimum required by the manufacturer. If not, refer to the manufacturer's instructions on what action you should take.

6.3.2 Selecting an ocean region and a land earth station operator (LES)

Many parts of the world are covered by more than one Inmarsat satellite. For example, the Inmarsat coverage map shows that the AOR-W, AOR-E and the IOR satellites cover the North Sea. Within such an area it is possible for an antenna to have line-of-sight to each of these satellites. You should be aware of the following considerations before selecting an ocean region to log in to:

Consideration 1: Can your shore-based correspondents contact you in the ocean region you have selected?

For a shore-based subscriber to be able to call your MES, a routing arrangement must exist between the national telecommunications carrier in that country and an Inmarsat-C LES operator or service provider serving the required ocean region. The LES operator or Inmarsat-C service provider then transmits the call via an LES to your MES in the requested ocean region. This call from a shore-based correspondent does not require an ocean code as the Inmarsat-C LES knows already which ocean region the terminal is logged into, and will route the message accordingly. A subscriber based in a country with limited routing arrangements for some of the ocean regions can contact the MES when it is logged in to one of those ocean regions, but not if it is logged in to a different ocean region. In these circumstances, to enable communications from such subscribers, you should, if possible, log in to an ocean region served by the routing arrangement. Subscribers who are based in a country with no routing arrangement may be able to communicate with you by a special arrangement with a service provider.

Further information about fixed to mobile routing and two-stage access can be found in Chapter 11.

Consideration 2: Does the LES you select support the communication services you want?

Your choice of ocean region will determine which LESs you can select and the services that they can offer.

Most LESs provide all Inmarsat-C communication services but for more information please contact their customer services department at the numbers given in Appendix E.

Consideration 3: How to receive Maritime Safety Information (MSI) for a particular NAVAREA or METAREA

For a given NAVAREA or METAREA that is covered by more than one ocean region (see Figure 6-2), scheduled broadcasts of MSI are made only via the nominated ocean region. **To receive scheduled broadcasts of MSI for a particular NAVAREA or METAREA, your MES must be tuned to the nominated ocean region at the scheduled time of broadcast.** Full description of the SafetyNET™ service together with the appropriate transmission schedules can be found in the Admiralty *List of Radio Signals Volume 5*, Chapter 5, SafetyNET™ section, published by the UK Hydrographic Office, or a relevant national publication.

6.3.3 Automatic scan and log-in

Your MES has a facility known as automatic scan and log-in which, when initiated, causes your MES to scan through the list of ocean regions searching for the strongest NCS Common Signalling Channel. The automatic scan facility may be initiated either automatically every 24 hours from when first switched on and logging in to a ocean region, or manually by issuing a command from the MES. For further details, refer to your MES manufacturer's operating instructions.

When the automatic scan facility finds a stronger NCS signal than your current ocean region, it automatically performs a log-out from that ocean region and then performs a log-in to the new strongest ocean region signal it has found.

Note that automatic scanning is not allowed on GMDSS-compliant MESs.

6.3.4 Routine operational tasks

It is recommended that you undertake the following tasks on your MES at regular intervals:

- Check into which ocean region you are logged. If your MES has automatically re-tuned to a different ocean region from that which you were using previously, make sure that the new one is suitable for your requirements. Refer to Section 6.3.2.
- Advise any shore correspondents who use an ocean region code to contact you of your new ocean region.
- Check that the signal strength indicated on your MES is above the minimum level recommended by the manufacturer. If not, log in to another ocean region.
- If the MES does not have automatic position input, e.g. an integrated GPS receiver, check that the current position is correct and, if necessary, update it manually.
- If you need to switch off your terminal, ensure that you first log out of your current ocean region.

6.3.5 Logging in to a different ocean region

As you sail towards the edge of the ocean region into which you are logged, the signal strength indicated on your MES will start to decrease. As long as the signal strength remains above the minimum advised by the manufacturer, you may remain logged in to that region. If the signal strength falls below the minimum signal strength, your MES will not be able to continue to communicate via the satellite for that ocean region. To maintain communication, your MES must be logged in to another ocean region with a stronger signal. Some manufacturers include a visual or audio alarm to let you know when the signal strength is below minimum.

Note: When your MES logs in to a new ocean region, the new NCS uses this information to update the network. You do not need to log out from the previous ocean region.

6.3.6 Logging out when not using your MES

If you are not expecting to use your MES for a prolonged period of time, **it is recommended that you log out of your current ocean region before switching off your MES.** Logging out informs the NCS that your MES is no longer available for communication. The NCS in your ocean region updates its database with this information. The system knows not to accept any messages intended for your MES and informs would-be callers that your MES is not available.

If, however, you do not log out before you switch off and a remote caller tries to send you a message, the system will repeatedly attempt to send the message via the selected LES to your MES. Eventually (after a number of re-tries which depend on the particular LES) the LES will stop trying to send the message and will send a non-delivery notification (NDN) back to the message originator. Table D-3 in Appendix D lists some of the common NDN failure codes and their meanings.

Some MESs automatically log out when they are switched off; check with your manufacturer's instructions as to whether your MES has this facility. If your MES does not have an automatic log-out facility or if you are not sure whether it does, you should always initiate a manual log-out every time before switching off.

The message originator may also be charged by the national or international telecommunication authorities for the time spent accessing the network (even if your MES does not receive the message). If your MES remains switched off for a long time but still logged in, this could prove expensive to the remote caller!

6.3.7 Upgrading your MES software version

The version of software installed in your Inmarsat-C MES may affect the services and facilities available for your use.

To be able to access these services and facilities, you may need an upgrade to the software installed on your MES. Further information is available from your manufacturer directly at the addresses given in Appendix B.

6.3.8 How to send a ship-to-shore message

Your MES can communicate using the different services listed in Section 6.2, providing that the following conditions are met:

- Your MES must support the communications service required; refer to the manufacturer's handbook.
- Your MES must be logged in to an ocean region and indicate received signal strength greater than the minimum required by the manufacturer.
- The LES selected must support the service and network that you wish to use (see Table 6-1 for types of networks).
- The shore-based equipment (telex, fax or computer as appropriate) must be capable of receiving the particular type of message.

To send a message from your MES via the international telecommunications networks (telex, fax, mobile, special, PSTN, X.25, e-mail), follow the suggested procedure:

1. Create your message either by using the MES text editor or by editing an existing message.
2. Select transmit (send) mode.
3. Enter the details of the destination to which you want to send the message either by selecting a destination whose details are already stored in the MES or by entering a new destination in the form:

Name (optional)		Destination number		Answerback (optional) (telex only)
----------------------------	--	-------------------------------	--	---

Where: **Name** is an optional name you may enter to identify your correspondent.

Destination number: depends on the destination type as given in Table 6-1.

Answerback: applies only to telex destinations and is optional.

4. Select the LES through which you want to send your message considering the factors discussed in Section 6.3.2.
5. Select the time at which the message should be sent (if time selection is an option on your MES). If time is not specified, the transmission starts immediately as default set-up.
6. Remember that routine priority is the default selection for all communications except for distress.

If you select Distress Priority your message will be routed only to an RCC associated with the LES selected, regardless of the destination.

7. If required, select the option to receive a confirmation of delivery of your message at the destination (remember that the LES may charge for this service). If confirmation of delivery is not selected, you will still have a notification that the message has been received by the LES.
8. Before issuing the command to send the message, confirm that you have entered all the correct information. If everything has been put in correctly, enter the command to transmit the message.
 - Your MES should now start transmitting the message and will proceed automatically until complete.
 - Within a few minutes of your MES transmitting the message the LES should return an acknowledgment stating that the message has been successfully received at the LES (this is not the same as confirmation of delivery of the message at the destination).
 - If you have requested confirmation of delivery of your message, this should be received from the LES within three to five minutes.
 - If the LES is unable to deliver the message, it will send a Non-delivery Notification (NDN) with a failure code identifying the reason (this is a non-chargeable service provided by all LESs). Table D-3 in Appendix D lists some common NDN failure codes and their meanings.

6.3.9 Message status information

LESs send confirmation messages at two levels:

1. Confirmation of the message transmission from the MES to the LES; this is a mandatory service for all LESs;
2. Confirmation of the message delivery from the LES to the final destination; this is an optional and chargeable service. Most MESs offer the option to request a confirmation.

LESs will automatically inform you if a message is not delivered to the final destination; this service is free of charge. All other status information mentioned above may appear on your screen without further status request.

If a message is addressed to a mailbox, the status 'confirmation OK' will be given only when the message has been retrieved from the mailbox. The message status will remain 'confirmation requested' if the message has been delivered to the mailbox but has not yet been retrieved by the addressee.

Table 6-1 Accessing different networks

Destination type	Destination number	Presentation code (see Note 1)
Inmarsat system		
Telex	Telex country code + subscriber's telex number (given in Appendix G, Table G-1)	5-bit or 7-bit
Mobile (telex message) Inm-A – telex terminal Inm-B – telex terminal Inm-C – telex terminal	Telex ocean region access code + IMN (given in Chapter 11, Table 11-2) IMN - Inmarsat Mobile Number	5-bit or 7-bit
Mobile (fax message) Inm-A – fax terminal Inm-B – fax terminal Inm-M – fax terminal	Telephone ocean region access code + IMN (given in Chapter 11, Table 11-1) IMN - Inmarsat Mobile Number	5-bit, 7-bit or 8-bit See Note 2
Mobile (data message) Inm-A – computer Inm-B – computer Inm-C – computer Inm-M – computer	DNIC + Inmarsat Mobile Number (given in Appendix F, Table F-2) DNIC – Data Network Identification Code	8-bit See Note 2
PSDN (X.25) (data message)	DNIC + subscriber's X.25 (data) address (given in Appendix F, Table F-2)	5-bit, 7-bit or 8-bit See Note 2
Fax	Telephone country code + subscriber's fax number (given in Appendix F, Table F-1)	5-bit, 7-bit or 8-bit See Note 2
PSTN - PC + modem PSTN - modem + printer PSTN – mailbox	Telephone country code + subscriber's modem address or number of the mailbox (given in Appendix F, Table F-1)	5-bit, 7-bit or 8-bit See Note 2
e-mail	Address information to be included in message. (Refer to e-mail service provider guides.)	7 bit or 8-bit See Note 2.
Two-digit code Telex service	Special Access Codes (SAC) (given in Appendix D, Table D-1)	5-bit or 7-bit See Note 2

Note 1: The term 'presentation code' used here is also known as 'format'. Some MESs and LESs use different terms as listed below. All LESs support 7-bit (ASCII) code but not all can support 5-bit and/or 8-bit codes. For more information refer to the MES manufacturer's instructions and to LES operators.

Note 2: Check that the selected LES supports the required service.

5-bit: also known as **telex** or **ITA2** (International Telegraph Alphabet 2) or **5-bit Packed**. This is an alphanumeric character set based on a 5-bit code which is generally used for sending valid telex characters only over telex networks. Note that this character set supports only UPPER CASE characters, so any lower case characters entered on your MES will be received as UPPER CASE. Files created using 5-bit codes are smaller than those using 7- or 8-bit codes, and therefore about one third cheaper to send.

7-bit: also known as **ASCII** or **IA5** (International Alphabet 5). This is an alphanumeric character set based on a 7-bit code which is generally used for sending text messages over the PSTN networks to a computer or fax terminal. This character set supports both UPPER and lower case characters, so any lower case characters entered on your MES will be received correctly.

8-bit: also known as **data**, is based on an 8-bit code. This is generally used to send binary-encoded data over the PSDN (data) land-lines, for example numerical data from instruments, encoded text from a word processor or from software which supports non-Western (Roman) characters such as Arabic, Chinese, Japanese or Russian.

Message status information may vary according to the MES used, but most MESs give the following status information on a screen:

Table 6-2 Message status information

Sending	Message transmission to the LES is in progress
Acknowledged	Message has been received by the LES
Confirmation requested	Message has been received by the LES but not delivered to the final destination
Confirmation OK	Message has been delivered to the final destination
Failed	The LES failed to deliver the message (the failure code should be given on the print-out)
Rejected	The LES rejected transmission (no message was sent)
Pending	The LES has postponed the onward transmission, e.g. terrestrial lines from the LES are busy

The status ‘**confirmation requested**’ and ‘**confirmation OK**’ will be given only if you have requested confirmation when sending the message.

6.4 The Enhanced Group Call (EGC) services

The Inmarsat-C system operates an information broadcast service known as Enhanced Group Call (EGC) which enables authorised information providers to broadcast messages through an LES and NCS to groups of MESs which are fitted with an EGC receive capability.

Two types of EGC services are available: SafetyNET™ for the broadcast of Maritime Safety Information (MSI) and FleetNET™ for the broadcast of commercial information to defined groups. MESs with an EGC receive capability can receive both SafetyNET™ and FleetNET™ messages.

6.4.1 EGC SafetyNET™ service

The EGC SafetyNET™ service provides those information providers so authorised by the International Maritime Organisation (IMO) under the Global Maritime Distress and Safety System (GMDSS) with the means to distribute Maritime Safety Information (MSI) to ships at sea.

The following table list the MSI which can be broadcast via the EGC SafetyNET™ service.

Table 6-3 The EGC SafetyNET™ MSI service

• Shore-to-ship distress alerts to circular area
• Urgency message, meteorological and navigational warnings to circular area
• Urgency message and navigational warnings to rectangular area
• Meteorological and NAVAREA warning and meteorological forecasts to NAVAREA/METAREA
• Search and rescue co-ordination to circular and rectangular areas
• Chart correction services

Coastal warning	
<i>Message prefix (B2 character)</i>	<i>Message content</i>
A	Navigational warnings
B	Meteorological warnings
C	Ice reports
D	Search and rescue information
E	Meteorological forecasts
F	Pilot service messages
G	DECCA messages
H	LORAN messages
I	OMEGA messages
J	SATNAV messages
K	Other electronic navaid messages
L	Additional navigational warnings
Z	No message on hand

The coastal warning broadcast facility is used for the transmission of coastal information to areas where NAVTEX is not provided.

Authorised information providers include:

- Hydrographic offices: for navigational warnings and electronic chart correction data;
- National weather services: for meteorological warnings and forecasts;
- RCCs: for shore-to-ship distress alerts and other urgent information;
- International Ice Patrol: for North Atlantic ice hazards.

There are no charges for receipt of SafetyNET™ messages or Inmarsat system messages.

6.4.2 EGC FleetNET™ service

The FleetNET™ service allows authorised information providers, such as commercial subscription services, shipping companies and governments, to broadcast messages to selected groups of MESs which are registered with the information provider and which have been added to a FleetNET™ EGC closed network (ENID).

The FleetNET™ service is a closed network of which an MES must be a member. Typical applications of FleetNET™ include:

- Fleet or company broadcasts
- News broadcasts
- Commercial weather services
- Market quotations
- Government broadcasts to all vessels on a country's register.

Charges may be made for the receipt of FleetNET™ messages depending on the arrangement with the FleetNET™ information provider.

6.4.3 The EGC SafetyNET™ MSI service, GMDSS/SOLAS and NAVTEX

The EGC SafetyNET™ Maritime Safety Information (MSI) broadcast service is included by the International Maritime Organisation (IMO) as an element of the Global Maritime Distress and Safety Service (GMDSS). By February 1999 all SOLAS compliant ships should have implemented the requirements of GMDSS as required by Chapter 4 of the Safety of Life at Sea (SOLAS) Convention.

Provided that its installation meets the GMDSS requirements of the administration of the country of registry, an Inmarsat-C MES with EGC receive capability can be used as a primary means to meet the SOLAS carriage requirements for the receipt of MSI in Sea Areas A1, A2 and A3 which are not served by the NAVTEX system.

The Sea Areas are defined as below:

- Sea Area A1** is defined as an area within range of a shore-based VHF station fitted with DSC (Digital Selective Calling).
- Sea Area A2** is defined as an area within range of a shore-based MF station fitted with DSC and excluding Sea Area A1.
- Sea Area A3** is defined as an area within coverage of the Inmarsat satellite system and excluding Sea Areas A1 and A2.
- Sea Area A4** is defined as all areas outside Sea Areas A1, A2 and A3.

The combination of 518 kHz NAVTEX and the international SafetyNET™ service through the Inmarsat EGC service provides a highly reliable method of distributing navigational warnings, weather forecasts and other urgent information all over the world.

6.4.3.1 Selecting an ocean region with consideration to MSI

To receive a scheduled broadcast of an MSI for a particular NAVAREA or METAREA, you should be logged in to the appropriate ocean region at the time of broadcast, but the following limitation on the reception of MSI in some areas should be considered:

For a given NAVAREA/METAREA that is covered by more than one ocean region (e.g. NAVAREA/METAREA 1, which is covered by AOR-W, AOR-E and IOR satellites), the scheduled broadcast of MSI is made via a single nominated ocean region. If an MES is logged in to a different ocean region, it will not receive any of the scheduled broadcasts for that particular NAVAREA/METAREA, even if it is located within the required area. The MES would, however, receive any unscheduled broadcasts, such as gale warnings or distress alert relay messages, which are made via all satellites that cover the area. Information on the transmission schedule is available in the List of Radio Signals published by various countries or in the Admiralty *List of Radio Signals (Volume 5)* published by the UK Hydrographic Office. Further information in respect of the EGC SafetyNET™ service can be obtained from:

The Chairman, International SafetyNET™ Co-ordinating Panel
 International Maritime Organisation (IMO)
 4 Albert Embankment
 London SE1 7SR
 UK
 Tel: +44 (0)20 7735 7611
 Fax: +44 (0)20 7587 3210
 Telex: + 5123588 IMOLDN G
 Website: www.imo.org
 E-mail: info@imo.org

6.4.3.2 Priority levels for MSI messages

EGC SafetyNET™ MSI messages are broadcast using one of three priority levels: Safety, Urgency or Distress.

The position of your ship must be updated in the MES at least once every 12 hours otherwise all SafetyNET™ messages with priorities higher than routine will be printed.

Updating the position can be done either manually as per the instructions in the manufacturer's operators' handbook or automatically from either the ship's electronic navigation system or from a GPS receiver connected to or integrated into the MES.

6.4.4 Receiving SafetyNET™ broadcasts

The EGC receiver continuously monitors the Inmarsat-C broadcast channel (NCS common channel) when the MES is idle and processes any messages that are received (Class 1 MESs do not have an EGC function).

The EGC receiver receives all SafetyNET™ messages but may not automatically print all these messages, including, for example:

- messages concerning subject matter of no relevance to the ship;
- messages directed to geographical areas (rectangular or circular) outside that where the ship is sailing.

The receiver also inhibits the receipt of multiple broadcasts of the same EGC message when it has already been received error-free and printed. It is not possible to reject navigational warnings, SAR information and shore-to-ship distress alerts directed to a geographical area within which the EGC receiver is situated. If the MES receives a distress or urgency priority message it will raise audible and visual alarms.

Although reception of SafetyNET™ traffic is automatic, the shipboard operator must initially set up the EGC receiver correctly at the start of the voyage to ensure the selected ocean region is appropriate for the scheduled broadcast. A transmission table of these schedules is contained in national *Lists of Radio Signals*.

The operator also has control over current and planned NAVAREA/METAREA and coastal service coverage areas for which the MSI information is required. The options that may be pre-programmed into a MES are indicated below.

- MES's position;
- Current and planned NAVAREA/METAREA;
- Current and planned coastal service coverage area.

For details on programming, refer to the MES manufacturer's manual.

The ship's position on the MES may be entered automatically from an external navigation aid or integrated GPS receiver or may be entered manually. It is recommended that the ship's position be updated at least every four hours. The MES will notify the operator if the position is not updated within this time. If the ship's position has not been updated for more than 12 hours, all SafetyNET™ messages with priority higher than routine within the entire ocean region will be received and printed.

In order to ensure that all necessary MSI is available before sailing, it is recommended that the EGC receiver remains switched on and tuned to the correct ocean region while the ship is in port.

If the ship's EGC receiver shares a directional antenna with an Inmarsat-A or Inmarsat-B MES, any MSI sent through it will be received via the satellite which the antenna is tracking. Therefore the MES antenna must track the correct satellite at the time of the scheduled broadcast.

When preparing a message for broadcast, the information provider includes addressing information which specifies the area in which the message is to be received. The address may specify one of the following:

- EGC receivers within an open network, such as all ships within a given geographical area. The area could be a specific NAVAREA/METAREA, a circle around a vessel in distress, a rectangular area or coastal area;
- EGC receivers within a closed network, for example, all ships belonging to a fleet, identified by a single ENID code;
- Individual EGC receivers;
- All EGC receivers in an ocean region.

EGC SafetyNET™ messages are broadcast at frequent intervals and could fill the message storage capacity of your MES. To avoid any problems and missing important messages relating to a distress, you should check the EGC log regularly, print out any wanted messages and clear any unwanted messages.

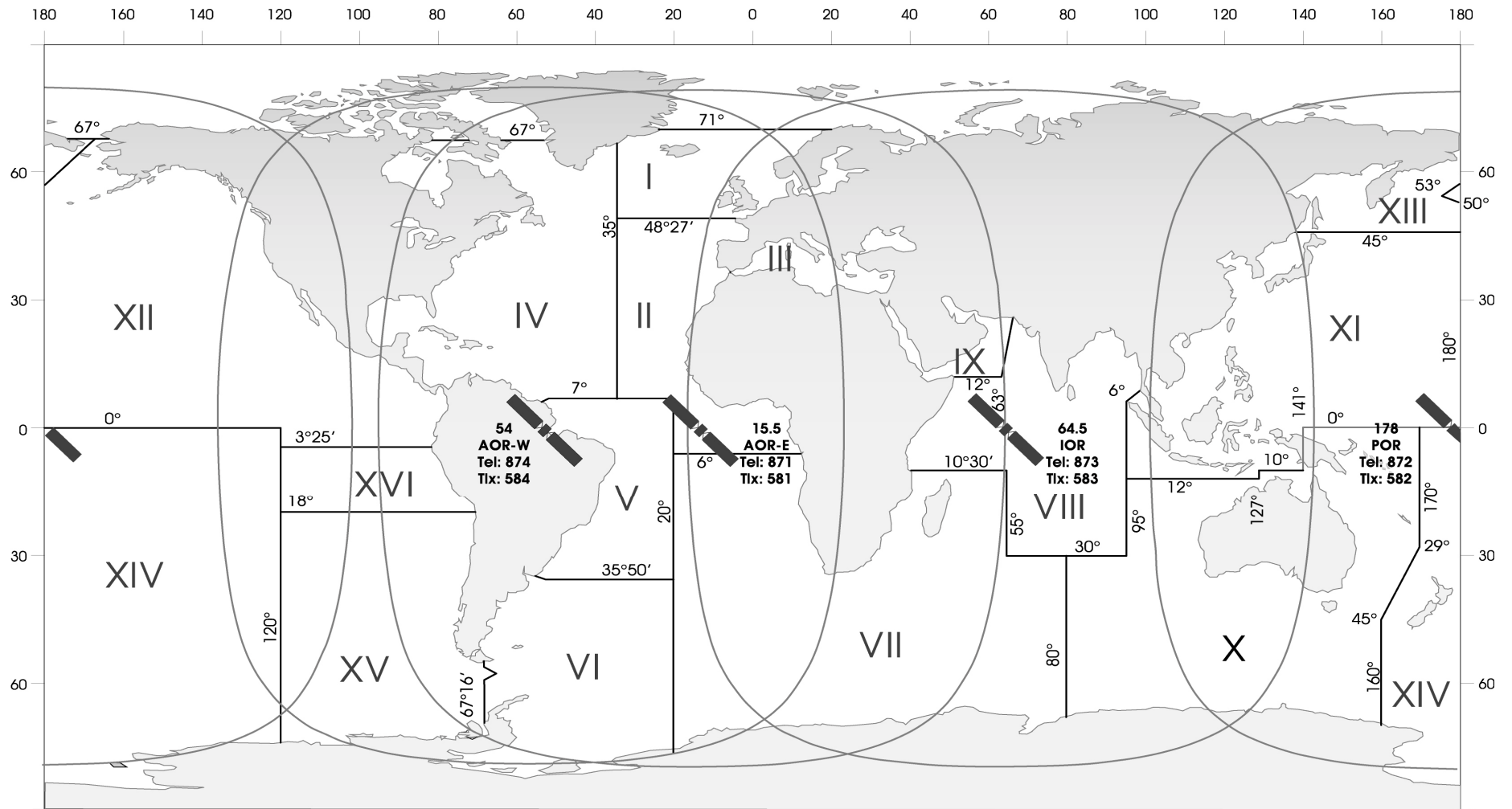


Figure 6-2 NAVAREA/METAREA used for MSI broadcasts via SafetyNET™ service

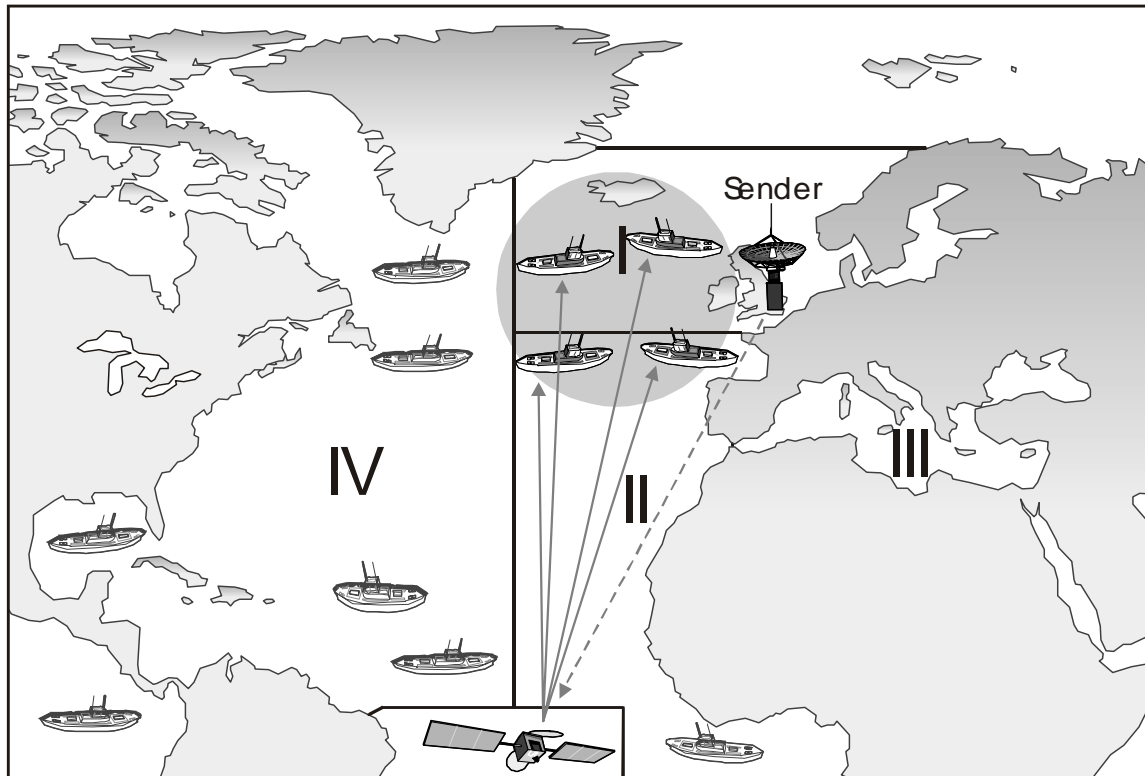


Figure 6-3 SafetyNET™ call to a circular area around an emergency

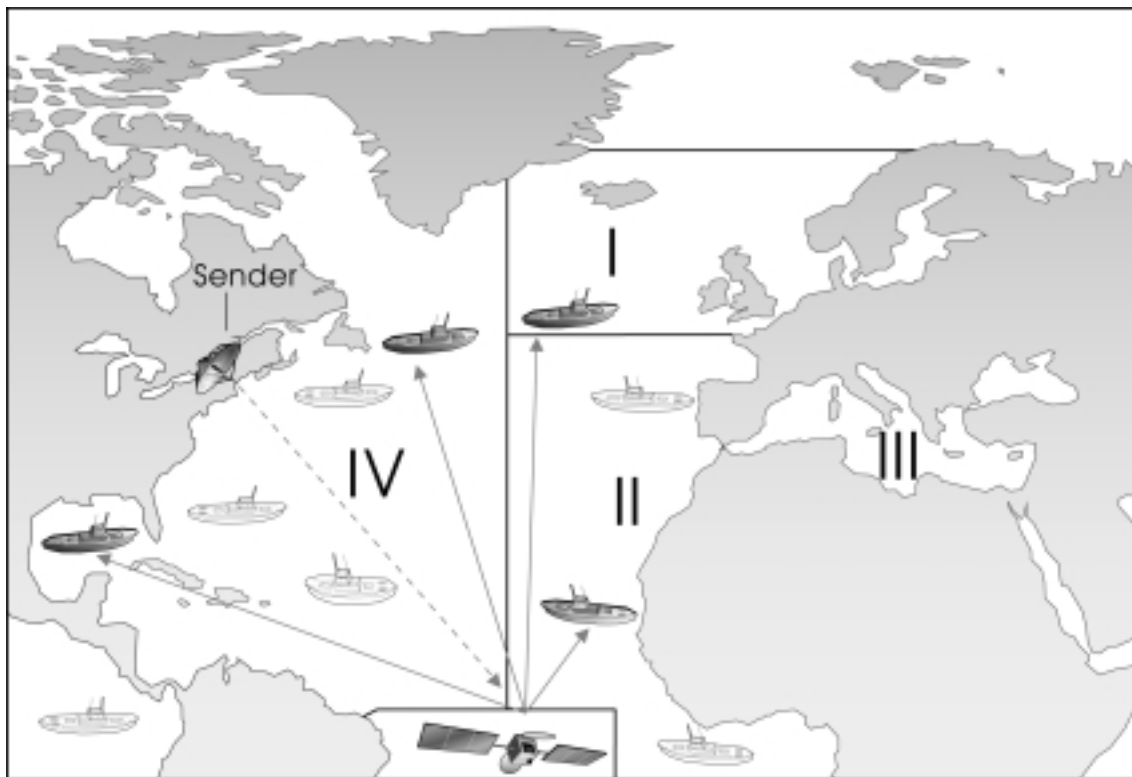


Figure 6-4 FleetNET™ call to a selected group of vessels

6.4.5 Pre-programming an MES for FleetNET™ message reception

To be able to receive FleetNET™ messages you must first have your MES programmed by the relevant LES in conjunction with the authorised FleetNET™ information provider. To join the FleetNET™ service (for example a commercial news service), an MES must first be registered with a FleetNET™ information provider.

The FleetNET™ service operates as a closed user group and the MES requires a unique receiver address provided from the LES to ensure secure transmission of messages. To add an MES to a FleetNET™ closed user group, the LES initially downloads an EGC network identification (ENID) code which is stored in the MES.

Messages sent using FleetNET™ will be received simultaneously by all members of the user group which has been programmed with the ENID. The MES remains able to receive all FleetNET™ messages addressed to that user group until the MES ceases the service by disabling the ENID. The information provider is also able to cancel the service by downloading a deletion command to that particular MES.

Note: An MES is not limited to receiving broadcasts from just one FleetNET™ information provider but may register with several. The MES operator is not able to change the ENID information but may be able to inhibit the reception of FleetNET™ messages if desired.

6.4.6 Inmarsat system messages

The Inmarsat Network Operations Centre (NOC) and Customer Care Centre regularly broadcast service messages providing information about the Inmarsat-C system, for example:

- regular service announcements about new LESs or services being offered;
- advance notice of changes to be made to the system;
- information on planned outages.

6.4.7 Classes of Inmarsat-C MES and their EGC reception

Inmarsat specifies four different classes of Inmarsat-C MESs which differ in their ability to receive EGC messages:

Class 1 – MES for Inmarsat-C message transfer only (no EGC receiver);

Class 2 - MES can receive EGC messages, when not engaged in normal (non-EGC) message transmission and reception.

Class 3 - MES has two receivers, one for Inmarsat-C message transfer at any time and the other for EGC reception at any time. So the uninterrupted operation of both modes is possible.

Class 0 - MES is for stand-alone EGC reception only.

Figure 6-5 shows the configuration of the different classes of Inmarsat-C MESs. A Class 2 MES shares the receiver between the EGC message processor and the non-EGC message processor. EGC message reception is determined by the operating mode selected for the MES. To change the operating mode, refer to the MES manufacturer's instructions.

The two operating modes which can be selected on a Class 2 MES are:

Shared message mode: when the receiver is able to receive either normal or EGC messages. When the MES is engaged in normal message transfer, the MES receiver will be tuned to the LES messaging channel for the duration of the message transfer. As EGC messages are sent on the

NCS Common Channel, the MES is not able to receive any of them. Once the normal message transfer is complete, the receiver will automatically re-tune back to the NCS Common Channel and will then be ready to receive EGC messages (most SafetyNET™ MSI messages are repeated with a six-minute echo).

Exclusive EGC mode: when the receiver is available only for the reception of EGC messages and not for normal Inmarsat-C messages. If you want to be certain of receiving a particular EGC message, you should SWITCH FROM NORMAL MESSAGE MODE TO EXCLUSIVE EGC RECEPTION MODE. The Inmarsat system will then know not to send you any messages until you resume normal (shared message) mode. Once you have received the EGC messages you want, it is advisable to return to the normal message mode.

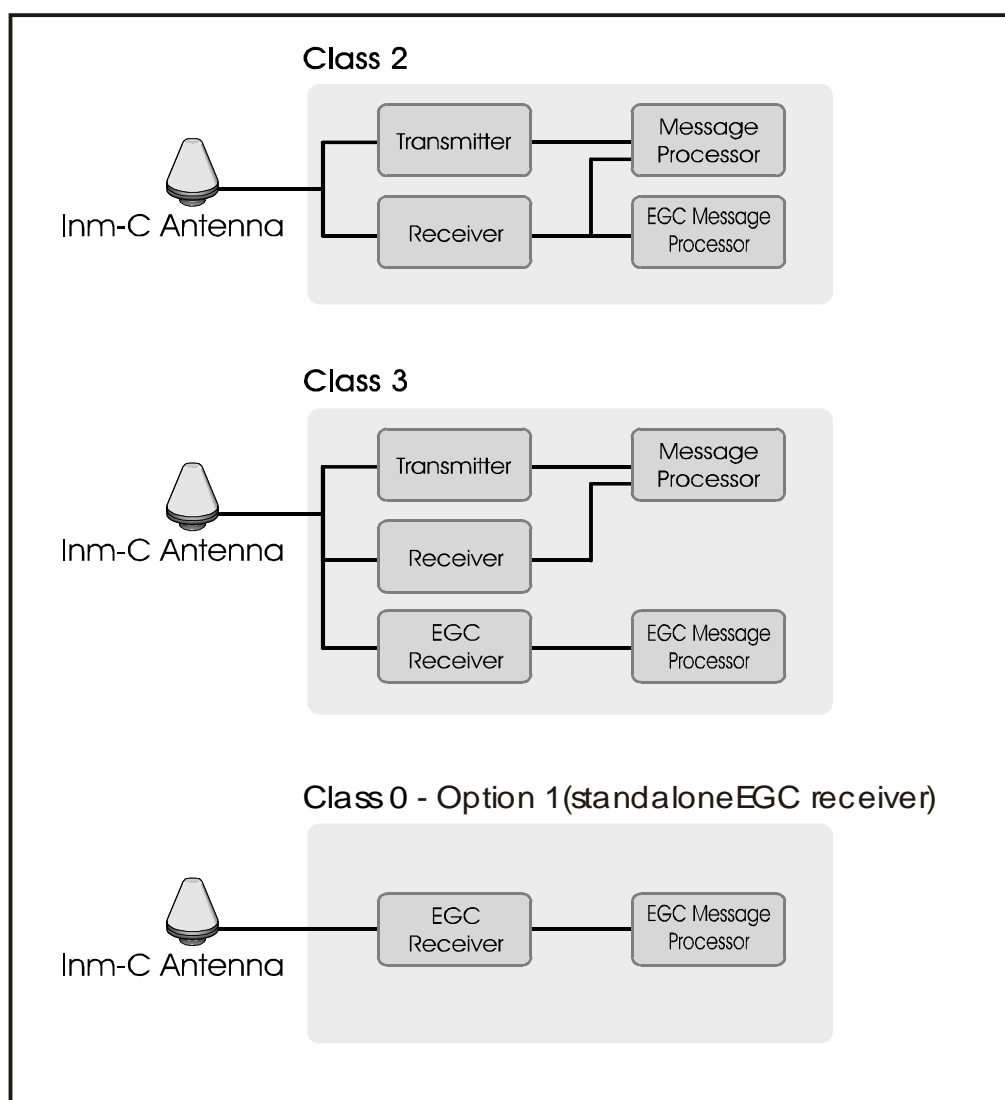


Figure 6-5 Different classes of Inmarsat-C MESS

6.4.8 Language used for EGC SafetyNET™ and FleetNET™ broadcasts

International EGC SafetyNET™ messages are broadcast in English using an alphanumeric character set known as the International Alphabet 5 (IA5), or 7-bit ASCII, as required by the IMO.

EGC FleetNET™ messages may be broadcast in English using 7-bit ASCII or 8-bit data format; alternatively the messages may be broadcast in another language using a non-Roman script, for example Arabic, Chinese, Japanese or Russian characters, providing that the following conditions are met:

- The FleetNET™ information provider must prepare the messages in 8-bit data presentation code;
- The LES through which the FleetNET™ message is to be routed must support 8-bit data presentation code;
- The MES which is to receive the message must be equipped with suitable software to interpret the 8-bit coded message sent in non-Roman characters.

6.5 Data reporting, polling and SCADA services

The data reporting service allows MESs to send short data reports to an operational centre. A typical data report could be a ship's position, read from external navigational instruments or an integrated GPS receiver, or engine room data monitored by sensors.

Data reports may be sent regularly, randomly or in response to a polling command from a shore-based operational centre.

Sending short data reports makes efficient use of the Inmarsat-C network and saves both time and costs over the conventional Inmarsat-C store-and-forward messaging system. Data reporting allows the use of an efficient data-encoding technique, which allows more information to be fitted into a data report.

The Inmarsat-C system allows for an operational centre to send a polling command to selected MESs. A typical polling command may instruct an MES to send a data report immediately or at a defined start time with particular repetition intervals or to perform a defined task.

When used together, the data reporting and polling services offer a Supervisory Control and Data Acquisition (SCADA) service to which the MES is interfaced. A typical SCADA application, for example, is to control the operation of an ocean-going buoy; the data collected from the different sensors is applied via an interface to the MES, from which the information is sent in a data report over the Inmarsat system to the operational centre. In response, the centre could return polling/control commands to operate control devices to regulate the system.

An MES may send data reports:

- automatically at regular pre-programmed intervals;
- automatically in response to a signal from an external sensor;
- manually under control of the MES operator;
- on demand in response to a polling command from a remote operational centre.

The efficient use which the data reporting service makes of the Inmarsat-C system results in fast throughput times and consequently is of economic benefit.

6.5.1 Macro-encoded messages (MEMs)

In order to include as much information as possible in a data report, macro-encoded messages (MEMs) can be used to represent general terms by assigning a pre-defined code. For example, a MEM code could be assigned to mean, 'We require fuel at our next port of call'.

6.5.2 Maritime ship reports

Many different types of maritime information can be formatted into data reports. For example, position information obtained from navigational instruments may be used for position-reporting systems such as AMVER, AUSREP and JASREP. Other reports which are considerably longer than position reports, such as the Dangerous Goods Report, Hazardous Substances Report, Marine Pollution Report, Weather Data Report and Fish Catch Report, may be adapted to the data reporting format by the use of MEMs and binary coded data.

6.5.3 Registering an MES into a data reporting network

To enable its data reports to be identified, the MES must include a unique identification with the report. The MES obtains this identification information when it first registers with an operational centre and LES for data reporting and polling service. The LES assigns a Data Network Identification (DNID) code to the network to which the MES will belong, plus a Member Number for the MES within that network. This type of network is closed because it is limited to the particular MESs registered as being on it.

The centre subsequently arranges with an LES to download the DNID and Member Number which is uniquely addressed to the particular MES. On receiving the DNID and Member Number, the MES stores them in its memory.

6.5.4 Transmitting a data report

To transmit data reports, the MES should have DNID(s) and Member Number(s) downloaded which identify closed network(s) through which to send data reports.

The MES then transmits the report either automatically or manually over the satellite network to the LES. The LES stores the report in the appropriate DNID file, along with any other reports from other MESs belonging to the same DNID group for further retrieval, or delivers it directly to the final destination (note that an MES may have several different DNIDs for different reporting networks).

The method by which the data reports are stored in the DNID file and transferred to the operational centre depends on the arrangements made between the LES operator and the operational centre. The LES may send the DNID file over the public networks at pre-set times or when the file is full. Alternatively, the LES may allow the centre to access the file and download the data at any time. Arrangements may also be made to send reports immediately to the final destination over telex, PSTN or PSDN networks or the Internet and these should be checked with the LES operator at the time of registration.

6.5.5 The polling service

The Inmarsat-C polling service allows the following different types of polling:

Individual polling: The operational centre prepares a polling command, including the DNID plus a list of the Member Numbers that are to be polled. If required, the centre may also include a short text message with the polling command.

To receive the polling command, each MES must be logged in and not be engaged in message transfer. If the MES is busy, the NCS will not send the command but will store it briefly and try again later. This method is very effective for ensuring that individual MESs receive the polling command.

On receipt of the command, each MES will respond as instructed; for example, by returning a data report or performing a SCADA task.

Group polling:

The operational centre prepares the polling command including the DNID for the closed network but does not specify individual MESs. The polling command is then accepted by all MESs belonging to that DNID group which are synchronised to the NCS Common Channel and are not busy at that time. To avoid the system being overloaded by many MESs responding at the same time, the NCS includes a random interval number in its broadcast, causing the MESs to return their reports at different random times.

If an MES is not synchronised to the NCS Common Channel when the message is broadcast, or it is busy at the time, it will not receive the command. This form of polling the Inmarsat-C closed network will not re-broadcast the message to those MESs which have not received the message, unless specifically requested by the operational centre.

Area polling:

This type of polling is similar to group polling. The operational centre sends a command with details of the DNID group but also defines the geographical area which is to receive the command. The centre does not specify any individual MESs.

When the NCS broadcasts the polling command, it includes both the DNID information and the geographical information. The polling command is accepted only by those MESs which belong to the DNID group, are not busy at that time and are also within the defined geographical area – whether that is NAVAREA/METAREA or a circular, rectangular or coastal area. If any of the addressed MESs is busy, it will not receive the command. The NCS will not re-transmit the message to those MESs which have not received the message, unless specifically requested by the operational centre to do so.

6.6 Operator-assisted and value-added services

It is possible to obtain some operator-assisted services and value-added services as listed below.

To find out more about the services offered by an LES service provider, contact its customer services centre (Appendix E) or contact the Inmarsat Customer Care Centre (Appendix A).

6.6.1 Operator-assisted services

Operator-assisted services offered by some land earth station operators include:

- Sending a text message from your MES to an operator to be forwarded as a voice message to a telephone number, answering machine or voice mailbox;
- Sending a text message from your MES to an operator to be sent through the post as a letter

- The LES will accept a message from your MES addressed to a destination on the national or international network for delivery at a later time;
- Directory services: the LES operator will find a number on the national/international network;
- Translation services: the LES operator will arrange to have your message translated into another language and forwarded to a specified destination;
- Access to databases: the LES operator will find the information you require and call you back.

6.6.2 How to obtain operator assistance

If you require operator assistance or suspect a problem with the terrestrial connection, you can obtain assistance by using a two-digit code, as listed in Table 6-4 (provided that the LES through which you are communicating offers this).

Table 6-4 Two-digit access codes for operator assistance

Two-digit code	Service	Remarks
11	<i>International operator</i>	Use this code to obtain information from the international operator of the country within which the LES is situated.
12	<i>International information</i>	Use this code to obtain information about subscribers located in countries other than that in which the LES is situated.
13	<i>National operator</i>	Use this code for assistance to connect to subscribers in the country in which the LES is situated. In countries which don't have an international operator, use this code instead of Code 11.
14	<i>National information</i>	Use this code to obtain information about subscribers located in the country in which the LES is located.

6.6.3 Value-added Services (VAS)

Value-added services provided by some land earth station operators are:

- Two-stage access to enable shore-based subscribers to send messages to an MES from a country which does not have a routing arrangement. The subscriber must register with an LES which provides the service. The LES service provider will notify the subscriber of the user name, PIN and access procedure which should be used to send a message to an MES.
- E-mail services to enable your MES and your shore-based correspondents to access the international e-mail networks or Internet to exchange text messages and data files all over the world. See Section 6.6.4 for more information.
- Fax bureau services to enable a shore-based subscriber to send text messages from a fax terminal to an MES. See Section 6.6.5 for more information.
- Two-digit code services to allow your MES to access a wide range of special maritime safety and general services. See Section 6.2.4 and Appendix D for more information.

6.6.4 Ship-to-shore and shore-to-ship access via e-mail

It is now possible to send a message from a ship via a dedicated e-mail service or the Internet to e-mail addresses all over the world. But to send an e-mail message in the shore-to-ship direction, your e-mail address must be registered with an Inmarsat-C LES service provider. These services allow you and your shore-based subscribers to exchange text messages and data files in both ship-to-shore and shore-to-ship directions. No alterations to the MES are necessary in order for it to use the service.

To find out which LESs provide an e-mail service and access arrangement, contact the LES's customer services department directly; the relevant numbers are given in Appendix E. The LES service provider will also advise shore-based subscribers on how to access the service. Details of how to send messages via the Internet can be found in Chapter 12.

6.6.5 Shore-to-ship fax bureau services (text only)

A different procedure is required for sending a fax message in the shore-to-ship direction. Sending a fax in the shore-to-ship direction is not a straightforward procedure and requires a third party to provide a fax bureau service. Some Inmarsat-C LES land earth station operators and other third parties offer this service. To find their addresses and access arrangements, contact either the LES service provider directly (Appendix E) or Inmarsat's Customer Care Centre (Appendix A).

It is only possible to send a text message and the shore subscriber should include in the message the following information:

- the ship's name;
- the Inmarsat mobile number;
- the ocean region in which the MES is logged in (if known).

On receipt of the message, the bureau operator will convert it to the necessary format and forward it to the Inmarsat-C MES as a store-and-forward message.