BS EN 62940:2017

BSI Standards Publication

Maritime navigation and radiocommunication equipment and systems — Integrated communication system (ICS) — Operational and performance requirements, methods of testing and required test results

bsi.

National foreword

This British Standard is the UK implementation of EN 62940:2017. It is identical to IEC 62940:2016.

The UK participation in its preparation was entrusted to Technical Committee EPL/80, Maritime navigation and radiocommunication equipment and systems.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Navigations- und Funkkommunikationsgeräte und -systeme für die Seeschifffahrt - Integriertes Kommunikationssystem (ICS) - Betriebs- und Leistungsanforderungen; Prüfverfahren und geforderte Prüfergebnisse (IEC 62940:2016)

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European foreword

The text of document 80/816/FDIS, future edition 1 of IEC 62940, prepared by IEC/TC 80 "Maritime navigation and radiocommunication equipment and systems" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62940:2017.

The following dates are fixed:

• latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2017-08-30
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2019-11-30

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Endorsement notice

The text of the International Standard IEC 62940:2016 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60812	NOTE	Harmonized as EN 60812.
IEC 61162-2	NOTE	Harmonized as EN 61162-2.
IEC 61162-3	NOTE	Harmonized as EN 61162-3.
IEC 62616	NOTE	Harmonized as EN 62616.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu

Publication	Year	Title	EN/HD	Year
IEC 60945	-	Maritime navigation and radiocommunication equipment and systems - General requirements - Methods of testing and required test results	EN 60945	-
IEC 61162-1	-	Maritime navigation and radiocommunication equipment and systems - Digital interfaces - Part 1: Single talker and multiple listeners	EN 61162-1	-
IEC 61162-450	-	Maritime navigation and radiocommunication equipment and systems - Digital interfaces - Part 450: Multiple talkers and multiple listeners - Ethernet interconnection	EN 61162-450	-
IEC 61162-460	2015	Maritime navigation and radiocommunication equipment and systems - Digital interfaces - Part 460: Multiple talkers and multiple listeners - Ethernet interconnection - Safety and security	EN 61162-460	2015
IEC 61924-2	2012	Maritime navigation and radiocommunication equipment and systems - Integrated navigation systems - Part 2: Modular structure for INS - Operational and performance requirements, methods of testing and required test results	EN 61924-2	2013
IEC 62288	2014	Maritime navigation and radiocommunication equipment and systems - Presentation of navigation-related information on shipborne navigational displays - General requirements, methods of testing and required test results	EN 62288	2014
IMO Resolution A.694 (17)	-	General requirements for shipborne radio equipment forming part of the Global Maritime Distress and Safety System (GMDSS) and for electronic navigational aids	-	-

Publication	Year	Title	EN/HD	Year
IMO Resolution MSC.191(79)	-	Performance standards for the presentation of navigation-related information on shipborne navigational displays	-	-
IMO MSC.1/Circ.1389	-	Guidance on procedures for updating shipborne navigation and communication equipment	-	-
ITU-R Recommendation M.493	-	Digital selective-calling system for use in the maritime mobile service	-	-

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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MARITIME NAVIGATION AND RADIOCOMMUNICATION EQUIPMENT AND SYSTEMS – INTEGRATED COMMUNICATION SYSTEM (ICS) – OPERATIONAL AND PERFORMANCE REQUIREMENTS, METHODS OF TESTING AND REQUIRED TEST RESULTS

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 62940 has been prepared by IEC technical committee 80: Maritime navigation and radiocommunication equipment and systems.

The text of this standard is based on the following documents:

FDIS	Report on voting
80/816/FDIS	80/821/RVD

Full information on the voting for the approval of this document can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

IEC 62940 incorporates the applicable parts of the performance standards included in IMO Resolution A.811(19) for an integrated radiocommunication system. It also incorporates the applicable requirements for the presentation of information included in IMO Resolution MSC.191(79) which is associated with IEC 62288, applicable requirements for bridge alert management included in IMO Resolution MSC.302(87) based on, and in compliance with applicable requirements for Ethernet interconnection in IEC 61162-450.

The ICS is a system in which individual radiocommunication equipment and installations are used as subsystems, i.e. without the need for their own control units, providing outputs to and accepting inputs from a communications human machine interface (COM-HMI). Each subsystem is in compliance with the type approval requirements for that subsystem where applicable, and is in compliance with the interface requirements in this document. An ICS consists of at least two individual GMDSS subsystems.

The COM-HMI is designed so that it can be made available on a bridge workstation either dedicated to communications or as part of a multi-function display.

MARITIME NAVIGATION AND RADIOCOMMUNICATION EQUIPMENT AND SYSTEMS – INTEGRATED COMMUNICATION SYSTEM (ICS) – OPERATIONAL AND PERFORMANCE REQUIREMENTS, METHODS OF TESTING AND REQUIRED TEST RESULTS

1 Scope

IEC 62940 specifies the minimum operational and performance requirements, technical characteristics and methods of testing, and required test results, for shipborne integrated communication systems (ICS) designed to perform ship external communication and distress and safety communications (GMDSS) and the functions of onboard routeing of this communication. It takes account of IMO Resolution A.694(17) and is associated with IEC 60945. When a requirement in this document is different from IEC 60945, the requirement in this document takes precedence.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60945, *Maritime navigation and radiocommunication equipment and systems – General requirements – Methods of testing and required test results*

IEC 61162-1, *Maritime navigation and radiocommunication equipment and systems – Digital interfaces – Part 1: Single talker and multiple listeners*

IEC 61162-450, *Maritime navigation and radiocommunication equipment and systems – Digital interfaces – Part 450: Multiple talkers and multiple listeners – Ethernet interconnection*

IEC 61162-460:2015, *Maritime navigation and radiocommunication equipment and systems – Digital interface – Part 460: Multiple talker and multiple listeners – Ethernet interconnection – Safety and security*

IEC 61924-2:2012, *Maritime navigation and radiocommunication equipment and systems – Integrated navigation systems – Part 2: Modular structure for INS – Operational and performance requirements, methods of testing and required test results*

IEC 62288:2014, *Maritime navigation and radiocommunication equipment and systems – Presentation of navigation-related information on shipborne navigational displays – General requirements, methods of testing and required test results*

IMO Resolution A.694(17*), General requirements for shipborne radio equipment forming part of the global maritime distress and safety system (GMDSS) and for electronic navigational aids*

IMO Resolution MSC.191(79), *Performance standards for the presentation of navigation-related information on shipborne navigational displays*

IMO MSC.1/Circ.1389*, Guidance on procedures for updating shipborne navigation and communication equipment*

ITU-R M.493, *Digital selective-calling system for use in the maritime mobile service*

3 Terms, definitions and abbreviations

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1.1
COM-HMI
communications human machine interface
human machine interface for presentation and handling of communication tasks on the bridge

3.1.2
CCRS
consistent common reference system
sub-system or function of an INS for acquisition, processing, storage, surveillance and distribution of data and information providing identical and obligatory reference to sub-systems and subsequent functions within an INS and to other connected equipment, if available

3.1.3
ICS
integrated communication system
composite communication system designed to perform ship external communication and distress and safety communications and the functions of onboard routeing of this communication

3.1.4
radio communication
wireless transmission of information

Note 1 to entry: Examples of radio communication are voice radio communication and the wireless exchange of data.

3.1.5
remote COM-HMI
remote communications human machine interface
human machine interface for presentation and handling of communication tasks, placed outside the ICS

3.1.6
subsystem
communication-related device within the ICS

3.2 Abbreviations

AIS	automatic identification system
BAM	bridge alert management
BNWAS	bridge navigational watch alarm system
CAM	central alert management
DSC	digital selective calling

EPFS	electronic position fixing system
EUT	equipment under test
FMEA	failure mode and effects analysis
FTP	file transfer protocol
GMDSS	global maritime distress and safety system
HMI	human machine interface
HTTP	hypertext transfer protocol
IMAP	internet message access protocol
INS	integrated navigation system
MFD	multi-function display
MSI	maritime safety information
SMTP	simple mail transfer protocol

4 General and operational requirements

4.1 General requirements

4.1.1 Requirements

The ICS shall meet the general requirements set out in IMO Resolution A.694(17) as further specified in IEC 60945 appropriate to their category, for example "protected". However, specific requirements may be made in individual equipment standards so consideration should be given to any exemptions or additional requirements in combination with standards for all included radiocommunications equipment in the ICS.

The manufacturer shall declare any preconditioning required before environmental checks. For the purposes of this document, the following definitions for "performance check" and "performance test", required by IEC 60945, shall apply:

Performance check	Reconfigure the EUT and check by non-quantitative visual checks that the system is still operative.
Performance test	Identical to the "performance check".

The manufacturer shall declare the equipment to be tested and the tasks and functions that it performs. The EUT shall be installed in compliance with the manufacturer´s installation manual. Where equipment is divided, the entire configuration shall be tested together.

The manufacturer shall declare

- the physical parts involved,
- the location of tasks and functions,
- the general data flow between physical and/or logical parts, and
- the dependencies between tasks and functions.

NOTE Typical examples are hardware overviews down to the lowest replaceable unit, block diagrams or high functional level software descriptions.

The acoustic alarm level may be capable of being adjustable below the level defined in IEC 60945.

The ICS shall meet the requirements for the presentation of information on shipborne displays *s*et out in IMO Resolution MSC.191(79) as further specified in IEC 62288:2014, Clause 4 and Clause 7.

The ICS shall meet the requirements for alert management as an alert source (see Clause 6 and Clause 7).

4.1.2 Methods of testing and required test results

Verify conformance with IMO Resolution A.694(17) by testing in accordance with IEC 60945.

Verify conformance with IMO Resolution MSC.191(79) by testing in accordance with IEC 62288:2014, Clause 4 and Clause 7.

4.2 Test site

Unless otherwise stated, all tests in this document are to be executed in a laboratory environment with a simulator arrangement or via live "on-air" tests on the actual equipment.

For a simulator arrangement, the following characteristics are required:

- capable of simulating the "air-interface" for transmission of radio signals for the equipment included in the ICS;
- capable of simulating AIS targets and other AIS messages.

The simulated signals shall be in accordance with the applicable international standards. The output signals shall comply with IEC 61162-1 and with the types of interfaces supported by the EUT according to the manufacturer´s declaration.

4.3 Functional requirements

4.3.1 GMDSS equipment

4.3.1.1 Requirements

The manufacturer shall declare which selected functions of the GMDSS are integrated in the ICS. All functional requirements of the GMDSS equipment integrated into the ICS shall conform to the performance standards for that equipment. For functionality of DSC, the latest version of ITU-R M.493 is applicable.

NOTE The functions of the GMDSS are given in SOLAS regulation IV/4 and the performance standards are given in IMO Resolutions which are referenced in SOLAS regulation IV/14. The relevant Resolutions are given in the Bibliography.

The implementation of a specific item of GMDSS equipment or its installation shall not impair the availability, operation or functionality of another equipment integrated into the ICS.

For radio transmission, at least two simultaneous operations are required. All receiver functions shall be available simultaneously.

4.3.1.2 Methods of testing and required test results

Confirm by inspection of the documented evidence that the documents provided by the manufacturer declare the configuration of the ICS.

Confirm by observation or analytic evaluation that the implementation of a specific item of GMDSS equipment or its installation does not impair availability, operation or functionality of another equipment integrated into the ICS.

Confirm by observation that for radio transmission at least two simultaneous operations are possible, and that all receiver functions are available simultaneously.

4.3.2 Non-GMDSS equipment/function

4.3.2.1 Requirements

The ICS may integrate non-GMDSS communication and other equipment/functions. The manufacturer shall declare which non-GMDSS communication and other equipment/functions are integrated in the ICS. Such equipment/functions shall comply with IEC 60945, and the ICS shall be compliant with the relevant interface requirements of IEC 61162-1.

The implementation of a specific item of non-GMDSS equipment or its installation shall not impair the availability, operation or functionality of another equipment integrated into the ICS.

4.3.2.2 Methods of testing and required test results

Confirm by inspection of documented evidence whether non-GMDSS communication equipment/functions are integrated in the ICS.

Confirm by inspection of documented evidence that such equipment complies with the relevant interfaces requirements in IEC 61162-1.

Confirm by inspection of documented evidence that such equipment complies with the relevant requirements in IEC 60945.

Confirm by observation or analytic evaluation that the implementation of a specific item of non-GMDSS equipment or its installation does not impair the availability, operation or functionality of another equipment integrated into the ICS.

4.4 Operational requirements of ICS

4.4.1 Requirements

The ICS shall

a) comprise at least two COM-HMI capable of performing GMDSS functions for the included GMDSS equipment,

b) ensure that initiating a distress alert has priority over all other functions of the ICS,

c) be capable of performing all distress functions, for the included GMDSS equipment,

d) include a printing capability if required by individual IMO performance standards and not provided by the individual equipment,

e) make MSI available based on a common storage media if provided (see 4.6),

f) have facilities for automatic reception of position and time data from the ship’s CCRS, in addition to provision for manual input of this data (if required),

g) have a power supply arrangement which ensures that it is not possible to inadvertently switch off any part of the ICS,

h) have a failure analysis, at ICS functional level, performed and documented for the ICS. The failure analysis shall verify that the ICS is designed on "fail-to-safe" principle and that failure of one part of the integrated system should not affect the functionality of other parts, except for those functions directly dependent on the defective part.

NOTE IEC 60812 (FMEA) describes how failure analysis can be performed.

4.4.2 Methods of testing and required test results

Perform the following:

a) confirm by inspection of documented evidence that the EUT comprises at least two COM-HMIs capable of performing GMDSS functions for the GMDSS equipment included into the EUT;

b) confirm by analytic evaluation that initiating a distress alert has priority over all other functions of the EUT;

c) confirm by observation that the EUT is capable of performing all distress functions for the GMDSS equipment included into the EUT;

d) confirm by observation that the EUT provides printing capability, if required by the individual performance standards related to the GMDSS equipment included into the EUT;

e) see test for 4.6;

f) confirm by observation that the EUT has facilities both for automatic reception of position and time data and for manual input from the ship's CCRS for position and time data;

g) confirm by analytic evaluation that the power supply arrangements for the EUT are such that it is not possible to inadvertently switch off any part of the EUT;

h) use the manufacturer's documentation for failure analysis to select randomly 3 cases from the failure analysis and confirm by observation that what is documented in the failure analysis happens in the EUT.

4.5 Operational requirements of the COM-HMI

4.5.1 General

4.5.1.1 Requirements

Each of the COM-HMI shall

- have consistent and identical lay out of the user interfaces,
- have consistent and identical access to each function for different subsystems (use of different screen sizes is allowed), and
- be capable of being operated independently of each other.

Only one COM-HMI, at one indicated workstation or MFD task station shall be in control of configuration per "non-shareable function" at any time, and only one COM-HMI or MFD task station shall be assigned to accept control commands per "non-shareable function" at any time.

NOTE An example of a non-shareable functions is VHF voice; an example of a sharable function is making a text message for Inmarsat-C.

It shall be visually indicated to the bridge team, if not otherwise obvious, which COM-HMI is in control of which functions. Means shall be available on the COM-HMI to take over control of individual functions to that COM-HMI.

4.5.1.2 Methods of testing and required test results

Confirm by observation that each COM-HMI has consistent and identical layout of the user interface for each of the functions provided.

Confirm by observation that there is consistent and similar access to each function of the different subsystems provided on the COM-HMIs.

Access different functions on different COM-HMIs and confirm by observation that it is possible to operate the COM-HMIs independently of each other.

Access a "non-shareable function" on one COM-HMI and do not complete the operation. Confirm by observation that it is indicated on the COM-HMI used that there indeed is access to the "non-shareable function". Then attempt to access the same function on another COM-HMI. Confirm by observation that access to the "non-shareable function" is not accepted. Confirm by observation that a function to take over control is present. Subsequently exercise that function and confirm by observation that control and access is transferred.

4.5.2 Interconnection with automatic identification systems (AIS)

4.5.2.1 Requirements

Where interconnection with AIS is provided, the ICS shall be capable of

- displaying notices using the same rules as for MSI (see 4.5.4),

  NOTE Notices use Application Specific Message (ASM) Functional Identifiers (FI) as identified in Table 6 and Table 7.

- sending and receiving broadcast and addressed AIS safety-related messages, and
- correlating distress information received by DSC with available received AIS ship information and displaying the results in accordance with 4.5.3.2.

4.5.2.2 Methods of testing and required test results

If an AIS interface is provided, use a simulator to send to the EUT:

- VDM sentences containing at least ten notices using ASM FI 22 and 23 and confirm by observation that the notices are available for display using same rules as for MSI (see 4.5.4);
- VDM sentences containing at least ten addressed and broadcast safety related messages and confirm by observation that those messages are available for display. Create an addressed and a broadcast message and confirm by observation that data sentences ABM and BBM are transmitted with the proper format. Acknowledge one of the transmitted addressed safety related message by sending an ABK sentence to the EUT and confirm by observation that the addressed message is displayed as acknowledged.

4.5.3 GMDSS COM-HMI

4.5.3.1 Distress alerting

4.5.3.1.1 Requirements

The COM-HMI for GMDSS functions shall include a dedicated distress button that has no other function than activating distress alerts. An example of an ICS supporting distress communications is shown in Figure 1.

The dedicated distress button shall not be any key of a digital input panel or a keyboard provided on the equipment. The distress button shall be clearly identified and protected against inadvertent activation, requiring at least two independent actions.

NOTE These requirements conform to IMO Circular MSC/Circ.862.

The use of the dedicated distress button shall activate distress alerts on all GMDSS communication subsystems in the ICS when continuously pressed for an activation period of at least 3 s. In this period, the display on the COM-HMI used shall show: "Transmitting undesignated DISTRESS using [MF, HF, VHF, Inmarsat-C] in [Start counter 3 -2 -1] seconds" with a visual indication following the count down, and an audible signal of frequency 2 kHz with a sequence of on 500 ms off 500 ms synchronized with the count down. The COM-HMI shall indicate distress status/progress for each of the radio systems, to give the operator the state of own distress.

If the dedicated distress button is released before the distress alert is transmitted, the distress alert procedure shall be interrupted, and a dedicated distress menu shall be made available on the COM-HMI if multiple distress capable devices/functions are available in the ICS.

A flow chart describing the distress alert procedure is shown in Figure A.1. The follow up voice procedure is shown in Figure A.2.

4.5.3.1.2 Methods of testing and required test results

Confirm by observation that it is possible to initiate transmitting distress alerts from the COM-HMI. Repeat this test for each provided distress method.

For the distress function, confirm by observation that:

a) a dedicated distress button which is not used for any other function is provided;

b) the distress alert cannot be activated by any combination of other keys on the COM-HMI;

c) the distress button is clearly identified and protected against inadvertent activation by at least two actions;

d) the text in 4.5.3.1.1 is displayed on the COM-HMI;

e) if the dedicated distress button is pressed for at least 3 s, then a distress alert is initiated in all GMDSS subsystem integrated in the ICS and that the text in Figure A.1 is shown on the COM-HMI;

f) if the ICS includes only one distress capable function and if the dedicated distress button is released before the distress call is transmitted, then the alert procedure is interrupted;

g) if the ICS includes more than one distress capable function and the dedicated distress button is pressed for less than 3 s, then the alert procedure is interrupted and a dedicated distress menu shown in Figure A.1 becomes available; and

h) the COM-HMI indicates distress status/progress for each of the radio systems, to give the operator the state of own distress.

Simulate transmission of a distress alert and confirm by observation that a the submenu in Figure A.2 is shown to guide the operator in speaking the distress signal "MAYDAY"; the name of the vessel in distress; the call sign or other identification; the MMSI (if the initial alert has been sent by DSC); the position, given as the latitude and longitude, or if the latitude and longitude are not known or if time is insufficient, in relation to a known geographical location; the nature of the distress; the kind of assistance required; any other useful information.

Execute the cancellation of an inadvertent distress alert (an alert which is transmitted by the own ICS and is intended to be cancelled on the same ICS) and confirm by observation that the GMDSS COM-HMI assists the operator in the procedure as described in Annex A.

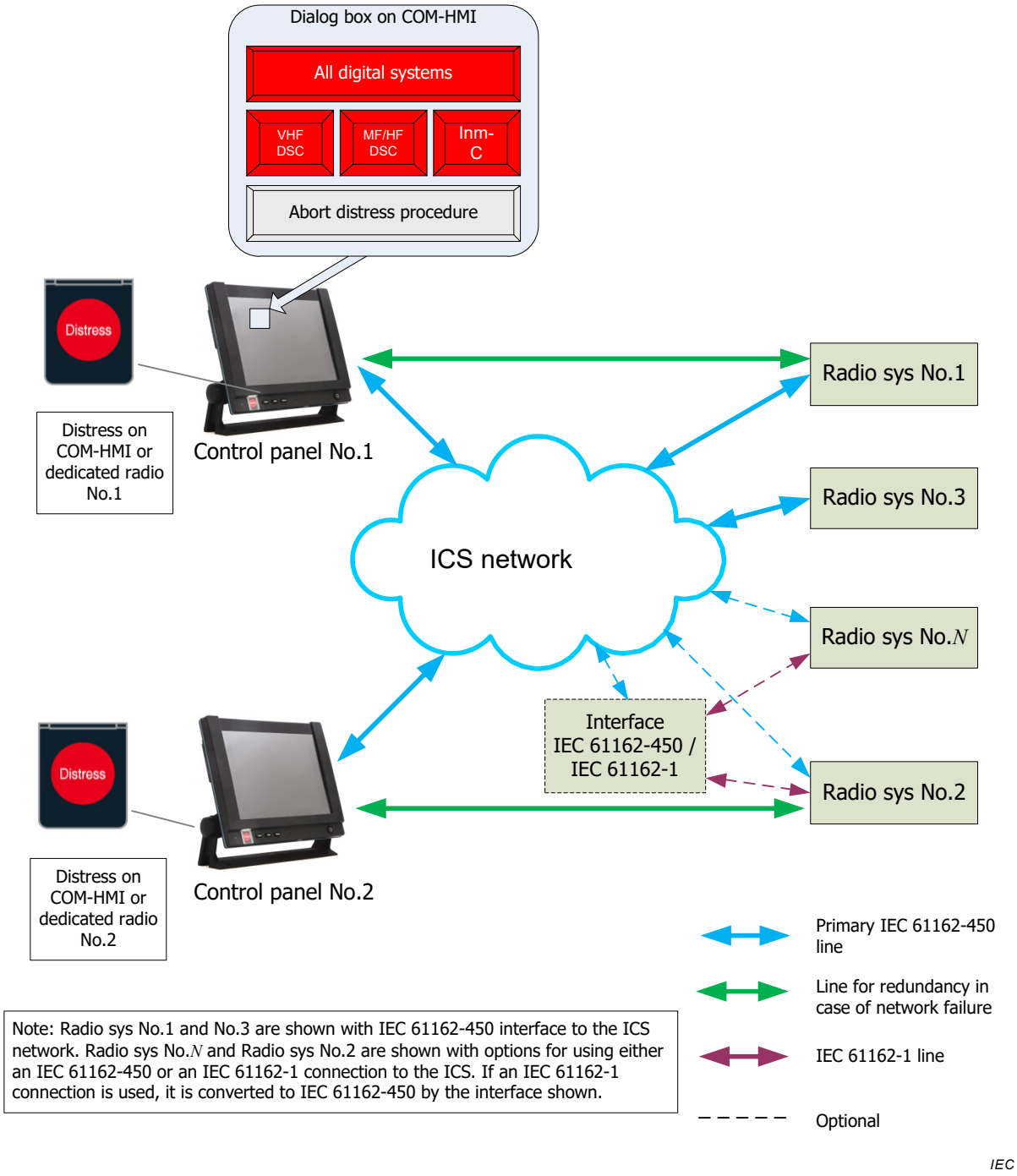

Figure 1 – Example of ICS supporting distress communications

4.5.3.2 Display of distress information

4.5.3.2.1 Requirements

On the COM-HMI, means shall be provided for displaying a transmitted own-ship distress alert in accordance with 4.5.3.1. The information shall include the GMDSS subsystem(s) on which the alert was transmitted; if MF/HF is used, the information shall also include the frequency/frequencies on which the alert was sent, the date and time the alert was transmitted, and all distress acknowledgment information received.

Means shall be provided for displaying in the COM-HMI a received distress alert, distress relay, and distress acknowledgment information, with the receiving communication system shown, ship identification and type of distress labelled and position indicated.

Where interconnection with AIS is provided and when distress alert information can be correlated with received AIS ship information, this received information of the ship in distress or the ship which acknowledged a distress alert shall also be displayed in the COM-HMI with the sources (DSC and AIS) of the information shown. Information shall include vessel name, nature of distress, call sign, speed over ground and true heading (if applicable), type of ship, IMO number, ship overall dimensions, destination, position, and navigational status.

4.5.3.2.2 Methods of testing and required test results

Simulate transmission of an own ship distress alert from each GMDSS subsystem and confirm by observation that each of the distress alert information required in 4.5.3.2.1 is displayed in the COM-HMI. Include VHF DSC, MF/HF DSC and Inmarsat-C as GMDSS subsystems.

Simulate transmissions of distress alerts, distress relays from other ships, and distress acknowledgements from each GMDSS subsystem and confirm that the information required in 4.5.3.2.1 is displayed in the COM-HMI.

Simulate a DSC distress alert and simulate AIS transmissions from ten ships, one of which has a MMSI identical to the distressed ship indicated in the DSC message. Include vessel name, call sign, and speed over ground, true heading, type of ship, IMO number, ship overall dimensions, destination, position, and navigational status in the simulated shipboard AIS transmissions. Confirm by observation that information concerning the distressed vessel is displayed in the COM-HMI.

Simulate a DSC acknowledge of a distress, and simulate AIS transmission from ten ships, one of which has a MMSI identical to the ship indicated in the DSC distress acknowledgment. Include vessel name, call sign, and speed over ground, true heading, type of ship, IMO number, ship overall dimensions, destination, position, and navigational status in the simulated shipboard AIS transmissions. Confirm by observation that information concerning the distressed vessel is displayed in the COM-HMI with the source (DSC and AIS) of the information shown.

4.5.4 Maritime Safety Information

4.5.4.1 Requirements

For NAVTEX, the COM-HMI shall fulfil the requirements for the dedicated display option as described in the equipment standard IEC 61097-6.

For SafetyNET, the COM-HMI shall fulfil the requirements for the dedicated display option as described in the equipment standard IEC 61097-4.

Where interconnection with AIS is provided, AIS maritime safety information ASM FI 22 and 23 shall be provided and displayed.

4.5.4.2 Methods of testing and required test results

Confirm by observation that the dedicated display option is used for NAVTEX and SafetyNET.

Where interconnection with AIS is provided, confirm by observation that AIS maritime safety information ASM FI 22 and 23 is provided and displayed.

4.5.5 Remote COM-HMI

4.5.5.1 Requirements

Optionally, an ICS may support remote COM-HMI(s). Such a remote COM-HMI is external equipment that is interfaced to the ICS (see Figure 2).

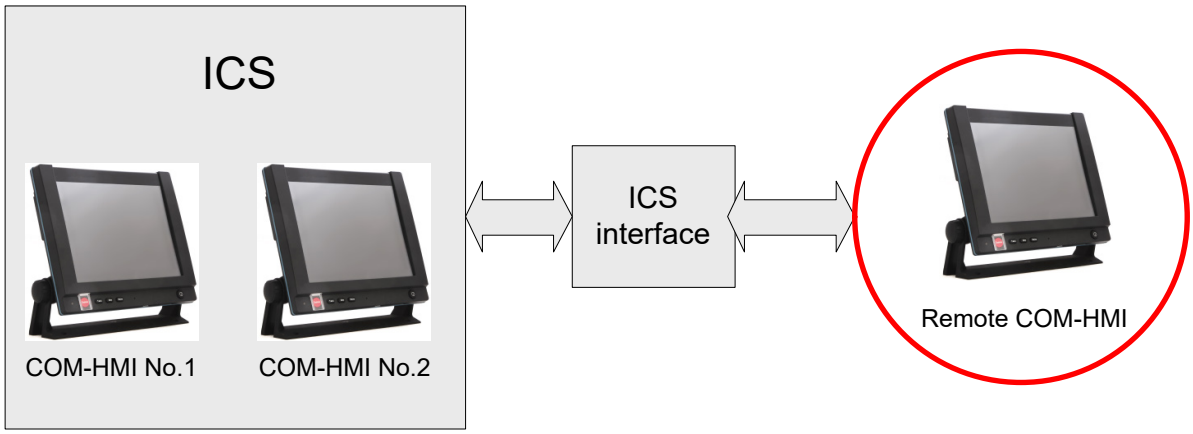

Figure 2 – Remote COM-HMI

NOTE The protocol used in this remote COM-HMI interface is not defined in this document.

The remote COM-HMI(s) may support all communication functionality included in the ICS or a sub-set of the communication functionality included in the ICS. The manufacturer shall declare the communication functions supported by the remote COM-HMI(s).

For each communication function supported, the remote COM-HMI(s) may support full functionality or limited functionality. Limited functionality could include, for example, monitoring of received distress calls but not activation of a distress call. The manufacturer shall declare which communication methods are supported with limited functionality, and what comprises that functionality. For each supported communication function, the remote COM-HMI shall meet all relevant requirements of the COM-HMI of the ICS.

Communication functionality is sub-divided into "control & use" and "monitoring". "Control & use" means activation of communication or equipment and setup of parameters, etc. for that equipment. "Monitoring" means passive viewing of the communication and the equipment status.

The use of remote COM-HMIs shall not prevent "control & use" of a communication function by a COM-HMI within the ICS itself. When a communication function is in "control & use" by a COM-HMI within the ICS, the remote COM-HMI shall indicate this state.

In the case of a detected failure of the interface between the remote COM-HMI and the ICS, the ICS shall move "control & use" of a communication function from the remote COM-HMI to a COM-HMI within the ICS. In such a case, the remote COM-HMI shall indicate the interface failure state.

The ICS may support one or more simultaneous interface(s) for remote COM-HMI(s). The manufacturer shall declare how many remote COM-HMI interfaces are supported by the ICS.

If multiple interfaces are provided, then

- each shall provide user-selection of activation and de-activation of each supported communication function,
- each shall support monitoring of communication state and received communication, and
- only one COM-HMI, including remote COM-HMI, shall be capable of providing "control & use" of a specific item of communication equipment for transmission and setup at any given time. The "control & use" state shall be indicated in each COM-HMI, and each COM-HMI shall provide a means or method to transfer the "control & use" from the active COM-HMI to another COM-HMI, including a remote COM-HMI.

The COM-HMIs shall support all interface sentences listed in the tables of Clause 7, relevant for the supported communication function(s) and equipment. Optional sentences listed in the tables of Clause 7 relevant for the supported communication method(s) may also be supported. Additional functionality may be provided by proprietary sentences or protocols. If provided, the manufacturer shall document the proprietary part(s).

4.5.5.2 Methods of testing and required test results

Confirm by inspection of the documents provided by the manufacturer that the communication functions of the remote COM-HMI(s) have been declared. Furthermore, confirm by inspection of the documentation that any limited functionality of the functions provided is declared and described.

Confirm by observation that each supported communication function of remote COM-HMI meets all relevant requirements of the COM-HMI of the ICS.

Confirm by observation that the use of remote COM-HMIs does not prevent "control & use" of a communication function by a COM-HMI within the ICS itself.

Access "control & use" function(s) on a COM-HMI within the ICS. Confirm by observation that it is indicated on the remote COM-HMI when accessing the same function(s).

Access "control & use" function(s) on the remote COM-HMI. Confirm by observation that this is indicated on a COM-HMI of the ICS. Interrupt the communication line to the remote COM-HMI and confirm by observation that the "control & use" function is released and is now available to COM-HMI(s) within the ICS. Confirm by observation that the remote COM-HMI indicates the interface failure state.

Confirm by inspection of the documents provided by the manufacturer that the number of supported remote COM-HMI interfaces has been declared.

If multiple remote COM-HMI interfaces are provided, then confirm by observation that each provides a user-selection of activation and de-activation of each supported communication function. Confirm by observation that each interface supports monitoring of communication state and received communication.

Access a "control & use" function on a COM-HMI of the ICS. Then try to access the same "control & use" function on remote COM-HMI. Confirm by observation that access is not accepted. Confirm by observation that a function to take over "control & use" is present on the remote COM-HMI. Subsequently exercise the function and confirm by observation that "control & use" access is granted and indicated. Confirm by observation that it is indicated on the COM-HMI within the ICS that the "control & use" of the function has been transferred to another HMI.

Confirm by analytic evaluation of the documents provided by the manufacturer that the remote COM-HMIs support all interface sentences listed in the tables of Clause 7 relevant for the supported communication function(s).

Confirm by inspection of the documents provided by the manufacturer that any proprietary parts of interface protocols are documented.

4.6 Optional common storage media for electronic printing

4.6.1 Requirements

Optionally, the ICS may provide a common storage media for electronic printing. (e.g. portable document format (PDF)) of messages from GMDSS components included in the ICS. The electronic printing shall be non-editable within the ICS.

If provided, the common storage media shall comply with the following:

- non-volatile storage media shall have sufficient capacity for applicable communication sub-systems for a period of 3 months with a minimum capacity of 10 000 entries of 2 000 characters;
- entries older than 3 months shall be erased automatically, unless annotated by the end user for long time keeping;
- means shall be provided for the end-user to erase individual messages;
- a caution shall be activated when the storage capacity for the 3 month period utilizes more than 95 % of the capacity;
- the stored electronic information shall be accessible for viewing;
- the stored electronic information may be accessible for physical printing.

4.6.2 Methods of testing and required test results

If provided, perform the following:

- confirm by analytic evaluation that the electronic printing is non-editable;
- confirm by analytic evaluation that the non-volatile storage media has at least capacity to store 10 000 entries of 2 000 characters;
- confirm by observation that over 3 month old entries are erased automatically unless annotated by the end user for long time keeping;
- confirm by observation that it is possible to erase any individual entry;
- confirm by observation that a caution is created when 95% of the available storage capacity is in use;
- confirm by observation that one can view any individual entry;
- if physical printing capability is provided, confirm by observation that one can print any individual entry.

4.7 Software and firmware maintenance

4.7.1 Requirements

Adequate software and firmware maintenance arrangements shall be supported by the ICS manufacturer in accordance with IMO MSC.1/Circ.1389. ICS equipment shall provide means to display on demand the current software/firmware version.

User authentication shall be provided as specified in IEC 61162-460 device access control.

Means shall be provided to replace or install updates to software/firmware in the ICS. The manufacturer shall implement appropriate security measures to protect against unwanted local access as specified in IEC 61162-460:2015, 6.2.3 and 6.2.4.

Manufacturers shall provide customers with timely access, at least by website, to ICS application software and firmware versions, compliance status and regulatory approvals for the listed configurations/versions, and operating system requirements. The procedures for this shall be part of the recognized quality system of the manufacturer.

4.7.2 Methods of testing and required test results

Confirm by observation that the current software and firmware versions can be displayed.

Confirm by inspection of documented evidence that replacement or installation of updates to software and firmware can be accomplished following information provided in the manufacturer’s documentation.

Confirm by observation that user authentication is provided as specified in IEC 61162-460 device access control.

Confirm by inspection of manufactures documentation that appropriate security measures are implemented.

Confirm by observation that the ICS is protected against unwanted local access as specified in IEC 61162-460:2015, 6.2.3 and 6.2.4.

Confirm by observation that the manufacturer's website leads to information that provides compliance status for regulatory approvals for manufacturer's ICS software/firmware versions.

Confirm by inspection of documented evidence that the manufacturer's recognized quality system includes procedures to maintain the list in a website.

5 Technical requirements

5.1 Network integrating the ICS

5.1.1 Requirements

The network integrating the ICS shall be designed to conform to IEC 61162-450. If applicable, a 460-compliant gateway as specified in IEC 61162-460 shall be provided as part of the ICS and configured to protect interfaces to uncontrolled networks.

If applicable, a 460-Forwarder as specified in IEC 61162-460 shall be provided as part of the ICS and configured to protect Interfaces of the ICS to controlled shipboard networks other than a 460-compliant navigation network (see Figure 3).

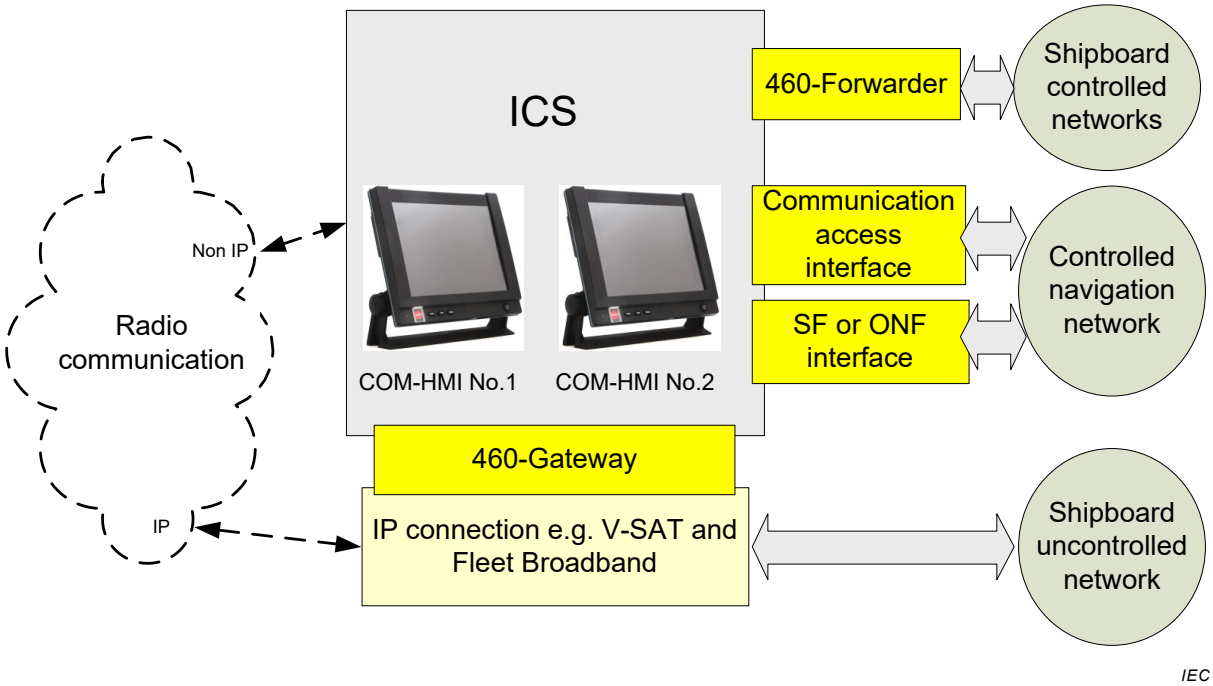

Figure 3 – ICS interfaces

The network nodes shall be designed as either system function (SF) or other network function (ONF) blocks.

The ONF equipment shall not use any IP multicast address reserved in IEC 61162-450.

The network capacity shall be in compliance with IEC 61162-460:2015, 5.4.2.

Documentation shall be provided specifying the maximum number of datagrams per second received, intended for and processed in the network in compliance with IEC 61162-450.

The ICS manufacturer shall provide installation documentation specifying connection only to an IEC 61162-460 compliant network infrastructure.

The ICS manufacturer shall provide documentation identifying the data parameters to be configured for service through a 460-Gateway.

The provided installation documentation shall require the tests specified in IEC 61162-460, as applicable, to confirm completion of a compliant installation.

5.1.2 Methods of testing and required test results

Confirm by inspection of documented evidence that the EUT is in compliance with IEC 61162-450 and with IEC 61162-460 requirements for 460-nodes.

If applicable, confirm by inspection that a 460-compliant gateway as specified in IEC 61162-460 is provided as part of the ICS and is configured to protect interfaces to uncontrolled network.

Confirm by inspection of documented evidence that the ICS complies with the test requirements specified in IEC 61162-460 for 460-Gateways.

Confirm by inspection of documented evidence that the ICS complies with the test requirements specified in IEC 61162-460 for 460-Forwarders.

Confirm by inspection of manufacturer provided documentation that:

a) installation documentation specifies connection only to a IEC 61162-460 compliant network infrastructure;
b) the documentation identifies the data parameters to be configured for service through a 460-Gateway;
c) the installation documentation identifies the applicable installation tests of IEC 61162-460 to be performed at installation of ICS to confirm completion of a compliant installation.

Confirm by inspection of the documentation provided by the manufacturer that network nodes are designed either as SF or ONF.

Confirm by analytic evaluation that no ONF equipment use any IP multicast address reserved in IEC 61162-450.

Confirm by inspection of manufacturer provided documented evidence that the network capacity is sufficient according to IEC 61162-460:2015, 5.4.2.

Confirm by inspection of documented evidence that the manufacturer has provided information about the maximum number of datagrams per second received, intended for and processed in the network as required by IEC 61162-450.

5.2 Malfunctions and restoration

5.2.1 Requirements

A failure of one part shall not affect the functionality of other parts except for those processes and functions directly dependent upon the information from the defective part. Any one

hardware failure in the IEC 61162-450 network shall not affect the availability of the remaining network functions.

Upon recovery of network functionality after network failure, the COM-HMI shall be updated from the individual equipment/functions with information received during the failure period, if the related equipment/function is required to have a storage function.

During complete ICS network failure, it shall still be possible to continue executing the following tasks by bypass or alternative means, if fitted, on a short range, and, if fitted, one long range system (see Figure 1):

- distress alerting;
- distress and safety communication;
- reception of MSI on at least one service (e.g. Navtex, HF MSI, SafetyNET).

If subjected to an orderly shutdown, the ICS shall, upon power on, come to an initial default state ready for operation. The orderly shutdown procedure, turn on procedure and the initial default state shall be described in the manufacturer's operating documentation.

After a power interruption, full functionality of the ICS shall be available after recovery of all subsystems. The ICS shall not increase the recovery time beyond that specified in any standards of the individual subsystem or its functions after power restoration unless operation is possible on the individual subsystem.

If subjected to a power interruption, the ICS shall, upon restoration of power, maintain the configuration and mode previously in use and continue operation as specified in any individual equipment standard.

5.2.2 Methods of testing and required test results

Confirm by analytic evaluation that failure of one part will not affect the functionality of other parts except for those processes and functions directly dependent upon the information from the defective part. Confirm by analytic evaluation that upon removal of any one network connection or node the remaining network functions will continue with a maximum recovery time of 10 s.

Confirm by analytic evaluation that upon recovery of network functionality after network failure the COM-HMI will be updated from the individual equipment/functions with information received during the failure period, if the related equipment/function is required to have a storage function.

Confirm by analytic evaluation that during complete ICS network failure it is still possible to continue executing the following tasks by bypass or alternative means, if fitted, on a short range, and, if fitted, one long range system:

- distress alerting;
- distress and safety communication;
- reception of MSI on at least one service (e.g. Navtex, HF MSI, SafetyNET).

Confirm by inspection of the manufacturer's documentation that the orderly shutdown procedure, the turn on procedure and the initial default state are described in the manufacturer's operating documentation.

Confirm by analytic evaluation that if subjected to an orderly shutdown, the ICS will, upon power on, come to an initial default state ready for operation.

Confirm by analytic evaluation that after a power interruption, full functionality of the ICS will be available after recovery of all subsystems.

Confirm by analytic evaluation that the ICS does not increase the recovery time beyond that specified in any standards of the individual subsystem or its functions after power restoration unless operation is possible on the individual subsystem.

Confirm by analytic evaluation that if subjected to a power interruption the ICS, upon restoration of power, maintains the configuration and mode previously in use and continues operation as specified in any individual equipment standard.

5.3 Accuracy and performance

5.3.1 Requirements

The ICS processing shall not degrade the mandatory information required to be provided by the subsystems below the accuracy or content as specified in any standard of the related individual subsystem.

The ICS shall ensure that essential sensor information (position and time) is distributed to the relevant parts of the system, applying a consistent common reference system.

The start-up time specified for the individual subsystems, including own HMI, shall not include the start-up for the COM-HMI in the ICS.

The start-up time specified for the individual subsystems not having its own HMI shall include the start-up time for the COM-HMI in the ICS.

The ICS shall ensure that

- all parts and displays are provided with the same type of data from the same source at any time,
- data are referenced to the same position and time, and
- it is clearly shown when a distress button is active.

5.3.2 Methods of testing and required test results

Confirm by analytic evaluation that the ICS processing does not degrade accuracy or content of the mandatory information required to be provided by the subsystems.

Confirm by analytic evaluation that the ICS ensures that essential sensor information (position and time) is distributed to the relevant parts of the system, applying a consistent common reference system.

Confirm by analytic evaluation that the start-up time specified for the individual subsystems, including own HMI, does not include the start-up for the COM-HMI in the ICS.

Confirm by analytic evaluation that the start-up time specified for the individual subsystems not having its own HMI does include the start-up time for the COM-HMI in the ICS.

Confirm by observation that the ICS ensures that

- all parts and displays are provided with the same type of data from the same source at any time,
- data are referenced to the same position and time, and
- it is clearly shown when a distress button is active.

5.4 Integrity monitoring

5.4.1 Requirements

The ICS shall support mode awareness by providing

- validation of data and function of the ICS and connected subsystems,
- indication of availability of subsystems within the ICS network,
- validity of subsystem and sensor information within the ICS network, and
- indications of subsystem status and modes of operation.

As a minimum, the COM-HMI in the ICS shall be capable of displaying the information given in Table 1 to the operator.

Table 1 – Minimum integrity/status information to be presented by COM-HMI

Parameter	Comment
For the whole ICS network:	
ICS Network load	On demand, indicator for ICS network conditions affecting subsystems including a network monitoring function (e.g. IEC 61162-460 Network load monitoring function).
Subsystem status	On demand, list of available subsystems. Indication of subsystem failures.
For each active subsystem:	
Subsystem name	For GMDSS equipment: "DSC VHF", "DSC-MF/HF", "VHF", "MF","HF", "NAVTEX" or "Inmarsat-C" etc. For non-GMDSS equipment: A brief descriptive name indicating the product /system type, e.g. "VSAT", "FleetBB" or similar.
Subsystem status	Indication showing whether the subsystem is currently available for communication.
Selected gateway	If applicable, name, position or other identifier for the selected/connected gateway to shore.
Selected satellite	If applicable, name, position or other identifier for the selected/connected satellite.
Received signal strength	If applicable, quality indicator for the shore-to-ship signal.
Transmitted signal strength	If applicable, quality indicator for the ship-to-shore signal (if available or applicable, e.g. transmitted power setting or measurement).

5.4.2 Methods of testing and required test results

Confirm by analytic evaluation that the ICS supports mode awareness by providing

- validation of data and function of the ICS and connected subsystems,
- indication of availability of subsystems within the ICS network,
- validity of subsystem and sensor information within the ICS network, and
- indications of subsystem status and modes of operation.

Confirm by observation that the COM-HMI of the ICS is capable of, on demand, displaying the information described in Table 1.

6 ICS alert management

6.1 Classification of alerts

6.1.1 Requirements

NOTE 1 The alarms and indications set out in the IMO performance standards for GMDSS equipment are given in Annex B. For the purpose of transferring these requirements into 3 priority classes as set out in resolution MSC.302(87) for BAM, the alarms are divided into three classes: alarms, warnings, and cautions, as given in Table 2.

NOTE 2 Many individual communication equipment performance standards require announcements related to the priority calls (i.e. distress, urgency, and safety). The alert management does not replace such requirements. The alert management complements such announcements by providing a standardized method to disseminate the information to the BAM.

The ICS shall use the relevant alert classification available in Table 2. The manufacturer shall provide a document listing all available alerts and their classification in the ICS.

Table 2 – Classification of GMDSS equipment alerts for alert management purposes

Source	Cause	Alarm	Warn.	Caut.	Categ. A	Categ. B	Unique [a] identifier at alert source
VHF DSC radio MF/HF DSC radio NAVTEX EGC Ship earth station	Receipt of distress or urgency call		x		x		310
VHF DSC radio MF/HF DSC radio	Receipt of calls other than distress or urgency			x		x	311
VHF DSC radio MF/HF DSC radio Inmarsat-C	No position data received by equipment			x		x	312
Automatic battery charger	Charging voltage or current out of limits			x		x	313
ICS subsystem failure	Subsystem not available for COM HMI			x		x	314
ICS network failure	No communication possible on the network			x		x	315

[a] Manufacturer specified unique identifiers at alert source are allowed with the range 10 000 to 9 999 999.

NOTE 1 The IMO requirement for "paper low" alarm for EGC equipment is restricted to a local indication which is not a part of BAM.

NOTE 2 Alerts related to the reception of distress and urgency calls are categorized as category A, as the officer of the watch (OOW) has to read the information in the received message before being in a position to acknowledge the alert.

6.1.2 Methods of testing and required test results

Confirm by inspection of the manufacturer’s documentation that the alert classification follows Table 2. Select randomly 3 examples and confirm by observation their classification on the COM-HMI.

6.2 Alert management

6.2.1 General

6.2.1.1 Requirements

The ICS shall provide alert management handling and an interface compliant with the requirements of BAM Modules A and C as further specified in the state diagram of IEC 61924-2:2012, Annex J (see Figure 4). Alert management requires:

a) classification of all alerts available in the EUT (see 6.1);

b) presentation of the alerts (see IEC 62288);

c) reporting of alerts in the BAM interface (see IEC 61924-2:2012, Clause 8);

d) handling of unacknowledged warnings (see 6.2.2);

e) functionality of remote acknowledge and remote silencing (see 6.2.3).

NOTE The performance standards for BAM implement the IMO Code on alerts and indicators to harmonize the priority, classification, handling, distribution and presentation of alerts on bridge equipment.

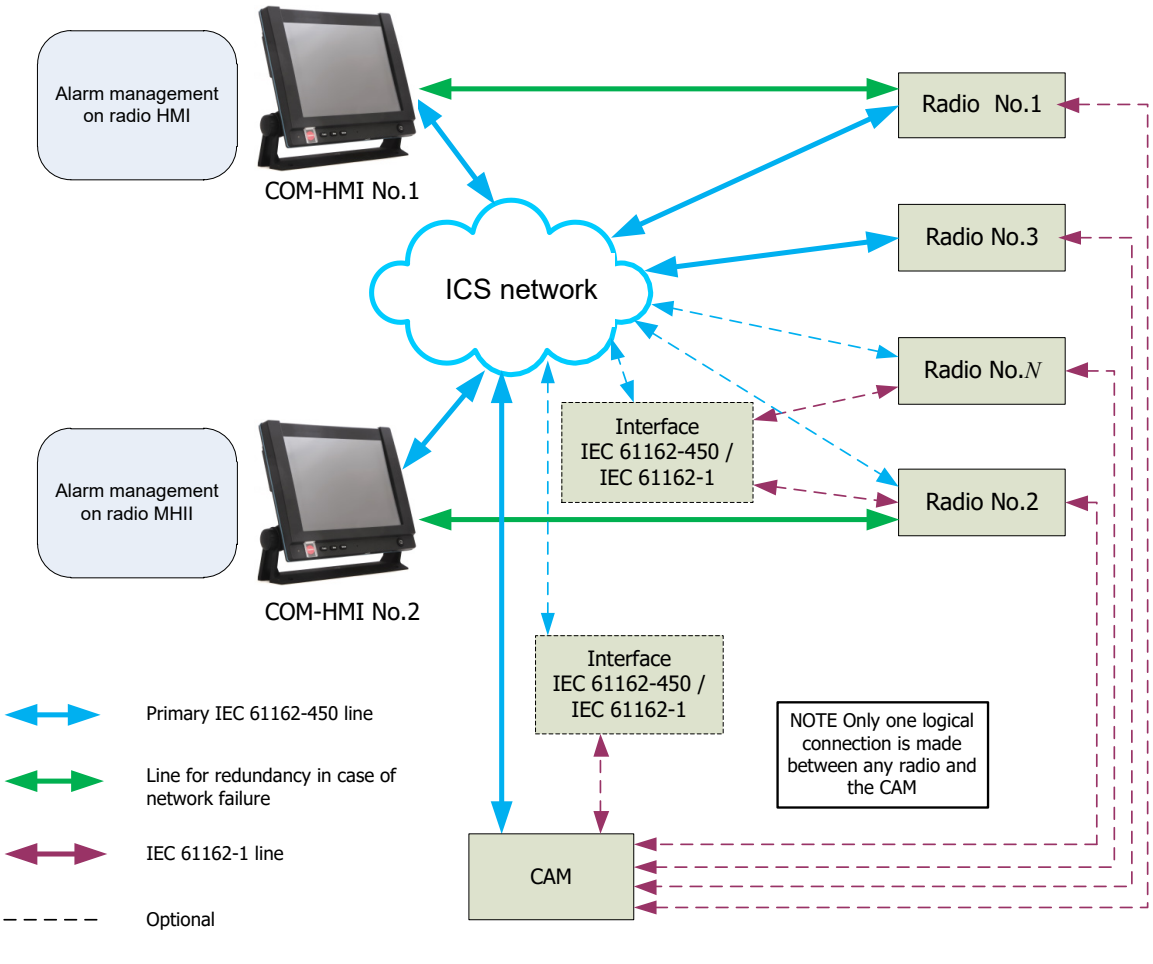

Figure 4 – Example of alert management in an ICS

6.2.1.2 Methods of testing and required test results

Confirm by observation that presentation of the alerts in the COM-HMI conforms to IEC 62288.

Confirm by analytic evaluation that reporting of alerts (ALF and ALC) in the BAM interface conforms to IEC 61924-2:2012, Clause 8.

6.2.2 Unacknowledged warnings

6.2.2.1 Requirements

An unacknowledged warning shall be repeated as a warning after a limited time period not exceeding 5 min. Unacknowledged warnings shall not be changed to alarm priority.

6.2.2.2 Methods of testing and required test results

Confirm by observation that an unacknowledged warning is repeated as a warning after a limited time period not exceeding 5 min.

Confirm by observation that an unacknowledged warning is not be changed to alarm priority.

6.2.3 Remote acknowledgement and silencing of alerts

6.2.3.1 Requirements

Remote temporary silencing and remote acknowledgement shall be provided via alert related communication according to the state diagram in IEC 61924-2:2012, Annex J.

Remote silencing of the relevant audible alarms of the GMDSS equipment shall be possible at any time.

6.2.3.2 Methods of testing and required test results

Perform the following tests using a BAM simulator.

Confirm by observation that remote temporary silencing and remote acknowledgement is provided via alert related communication according to the state diagram in IEC 61924-2:2012, Annex J.

Confirm by observation that remote silencing of the relevant audible alarms of the GMDSS equipment is possible at any time.

7 Interfacing

7.1 IEC 61162 interfaces

7.1.1 Requirements

The ICS shall be capable of at least transmitting and receiving data using the IEC 61162-1 sentences specified in Table 3 and Table 4.

Interfaces are shown in Figure 5.

Table 3 and Table 4 give the IEC 61162-1 sentences that shall be supported by the ICS.

Table 5 and Table 6 give the IEC 61162-1 sentences that shall be supported by the ICS if the related functionality is included in the ICS such as MSI and remote COM-HMI.

NOTE The manufacturer of the ICS selects which functionality is included in the ICS.

Table 7 and Table 8 give the IEC 61162-1 sentences that shall be supported by the ICS if the related equipment/function is included in the ICS, and Table 9 and Table 10 give IEC 61162-1 sentences that are optional.

Where IEC 61162-1 sentences are used by a data output interface, system data and other data checked for integrity, modified or generated by the ICS shall be transmitted with the talker identifier "IC"; otherwise, the talker identifier of the source shall be used.

The optional communication access interface is based on IEC 61162-450 (see details in 7.4).

The manufacturer shall describe the distribution and addressing of all interfaces between the subsystems of the EUT. Addressing shall include at least talker IDs, destination and source tag blocks.

NOTE Additional optional digital interface network IEC 61162-3 parameter group numbers equivalent to the specified network IEC 61162-1 sentences are described for information in Annex E.

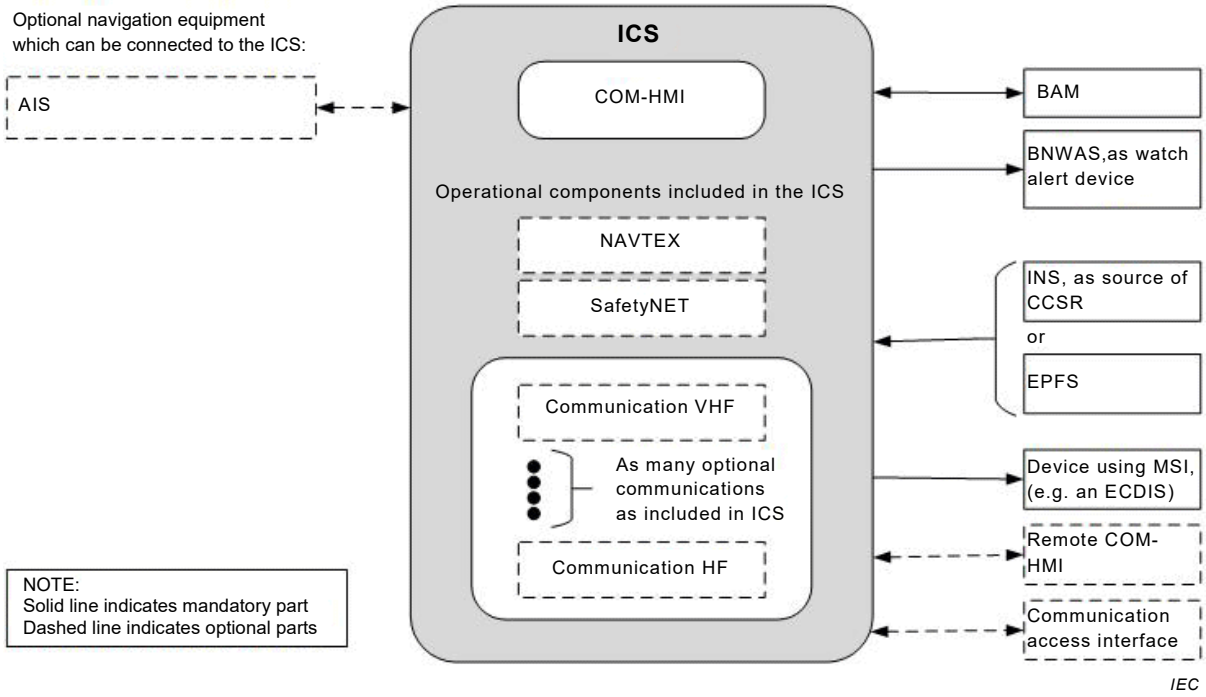

Figure 5 – Interfaces of an ICS

The full frame in Figure 5 shows the ICS as specified by the manufacturer. Equipment which can be interfaced to the ICS is shown to the left and right of the ICS box.

Where the VHF communications is included in the ICS, the audio from the VHF is required to be connected to the VDR.

Table 3 – Mandatory IEC 61162-1 sentences received by the ICS equipment

Mnemonic	Interface (see Figure 5)	Name	Comment
ACN	BAM	Alert command	Alert command, e.g. acknowledge
GLL GGA GNS RMC	INS, as source of CCRS or EPFS	Geographic position – latitude/longitude	
HBT	BAM	Heartbeat	Support reliable alert related communication Repeated once per 1 min
NSR	INS, as source of CCRS	Navigation status report	Plausibility and integrity of CCRS
ZDA	INS, as source of CCRS or EPFS	Time	

Table 4 – Mandatory IEC 61162-1 sentences transmitted by the ICS equipment

Mnemonic	Interface (see Figure 5)	Name	Comment
ALC	BAM	Cyclic alert list	List of current alert
ALF	BAM	Alert sentence	Details of a new alert
ARC	BAM	Alert command refused	Alert command not accepted
EVE	BNWAS, as watch alert device	Operator activity	Reset dormant period of the BNWAS
HBT	BAM	Heartbeat	Support reliable alert related communication

Table 5 – IEC 61162-1 sentences received by the ICS equipment from remote COM-HMI and from external devices using MSI

Mnemonic	Interface (see Figure 5)	Name	Comment
DSC DSE	Remote COM-HMI	Digital selective calling information	Initiates a call from a radiotelephone
FSI	Remote COM-HMI	Frequency set information	Used to control a radiotelephone
NRM	Device using MSI	NAVTEX receive mask	Used to program NAVTEX receiver
$--CRQ,NRM	Device using MSI	Query for current setup	Used to monitor current receive mask
SFI	Remote COM-HMI	Scanning frequency information	Used to set scanning frequencies
ABM BBM	Remote COM-HMI	AIS information	Used to initiate AIS addressed or broadcast safety-related messages

Table 6 – IEC 61162-1 sentences transmitted by ICS equipment to remote COM-HMI and to external devices using MSI

Mnemonic	Interface (see Figure 5)	Name	Comment
DSC DSE	Remote COM-HMI	Digital selective calling information	Transmits received and transmitted DSC calls from a radiotelephone
FSI	Remote COM-HMI	Frequency set information	Used to monitor a radiotelephone
VDM ABK	Remote COM-HMI	AIS information	Used to receive AIS broadcast and addressed safety-related messages
NRM	Device using MSI	NAVTEX receive mask	Criteria for suppression of MSI messages
NRX	Device using MSI	NAVTEX received message	
SM1 SM2 SM3 SM4 SMB	Device using MSI	Received SafetyNET messages	
VDM VDO	Device using MSI	AIS Application specific messages	Receives AIS ASM FI No. 22 and 23 Area Notice and European Multi-service Meteorological Awareness (EMMA) warning and other optional MSI information

Table 7 – IEC 61162-1 sentences received by ICS equipment from an external navigation equipment

Mnemonic	Interface (see Figure 5)	Name	Comment
VDM VDO ABK	AIS	AIS information	Used to receive AIS ASM FI No. 22 and 23, safety related messages and vessel information

Table 8 – IEC 61162-1 sentences transmitted by the ICS equipment to an external navigation equipment

Mnemonic	Interface (see Figure 5)	Name	Comment
ABM BBM	AIS	AIS addressed and broadcast information	Used to initiated AIS addressed or broadcast safety-related messages

Table 9 – Optional IEC 61162-1 sentences received by the ICS equipment from external equipment

Mnemonic	Interface (see Figure 5)	Name	Comment
ALC	Communication (for example VHF, MF, HF)	Cyclic alert list	List of current alert
ALF	Communication (for example VHF, MF, HF)	Alert sentence	Details of a new alert
ARC	Communication (for example VHF, MF, HF)	Alert command refused	Alert command not accepted
EVE	Communication (for example VHF, MF, HF)	Operator activity	Reset dormant period of the BNWAS
HBT	Communication (for example VHF, MF, HF)	Heartbeat	Support reliable alert related communication

Table 10 – Optional IEC 61162-1 sentences transmitted by ICS equipment to external equipment

Mnemonic	Interface (see Figure 5)	Name	Comment
ACN	Communication (for example VHF, MF, HF)	Alert command	Alert command, e.g. acknowledge
HBT	Communication (for example VHF, MF, HF)	Heartbeat	Support reliable alert related communication Repeated once per 1 min

7.1.2 Methods of testing and required test results

Confirm by a simulation environment that the sentences listed in Table 3 and Table 4 are supported by the ICS.

If functions related to the sentences described in Table 5 and Table 6 are provided, confirm by a simulation environment that these sentences are supported by the ICS.

If an interface for remote COM-HMI is provided, confirm by simulation that the sentences listed in Table 5 and Table 6 are supported by the ICS if the related equipment/functions are included in the ICS.

If the manufacturer has declared that the ICS supports optional navigation equipment which is external to the ICS, confirm by simulation that the sentences listed in Table 7, Table 8, Table 9, and Table 10 are supported.

Confirm by analytic evaluation that where IEC 61162-1 sentences are used by a data output interface, system data and other data checked for integrity, modified or generated by the ICS are transmitted with the talker identifier "IC"; otherwise, the talker identifier of the source is used.

7.2 BNWAS interface

7.2.1 Requirements

To provide user activity information to BNWAS, an EVE sentence as specified in IEC 61162-1 shall be output in response to user-interaction with the ICS from equipment or system physically located in areas of the bridge providing proper look out.

7.2.2 Methods of testing and required test results

Confirm by observation that the ICS outputs an EVE sentence under the condition described in the manufacturer's documentation.

Confirm by document inspection that the installation manual describes the installation location limitation for configuring the individual COM-HMI to reset the dormant period of the BNWAS.

7.3 INS/EPFS interface

7.3.1 Requirements

If available, the CCRS from the INS shall have priority over the direct EPFS.

7.3.2 Methods of testing and required test results

Confirm by analytic evaluation that the CCRS from the INS, if available, has priority over the direct EPFS.

7.4 Optional communication access interface

7.4.1 Requirements

The communication access interface, if provided, shall be implemented as described in Annex C.

NOTE The ICS communication system itself acts only as a transfer method between the receiver and/or transmitter of the data transfer outside the ICS and shore or another vessel (see Figure 6).

The onboard system that transfers data from the vessel shall provide the address of the recipient for the ICS.

The communication access interface shall support the HTTP protocol.

The manufacturer shall declare the data storage limit available for HTTP service.

The communication access interface shall record at least the last 100 activated direct connections. There shall be means to view these recordings.

NOTE 1 The most common use of the HTTP protocol is web browsing and service oriented file transfer. In this communication access interface, the HTTP protocol is used for file transfer.

NOTE 2 Additional cyber security measures, for example certificates, signatures, public-keys, private-keys, secret-keys, are implemented separately in the application level of those interfaced equipment where needed.

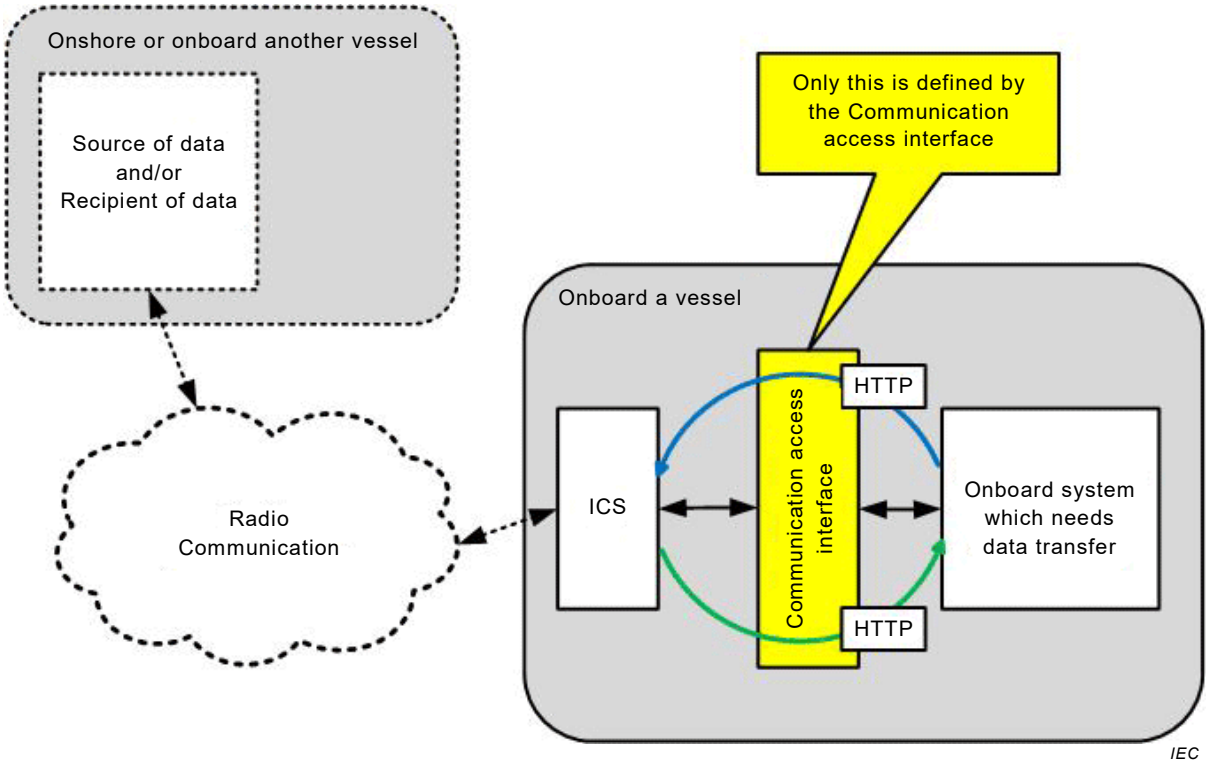

Figure 6 – Role of communication access interface

The manufacturer shall provide documentation on how to manage multiple client accounts for internal ship communication (e.g. ecdis1.ics).

The manufacturer shall provide documentation on the available radio systems that can be configured to transmit/receive files.

Optionally, a secure interface may be provided to other onboard systems with methods for authentication and data integrity checking (see 5.1).

NOTE Guidance for implementing a complete end-to-end communication solution is described in Annex D.

7.4.2 Methods of testing and required test results

Confirm by analytic evaluation that the interface meets the requirements of Annex C.

Confirm by analytic evaluation that if an illegal address is used during the file transfer, an error code is raised, for example 404 not found.

Confirm by inspection of the manufacturer provided documentation that the data storage limit of the HTTP service is specified.

Confirm by observation that means of viewing at least 100 past activated direct connections are provided.

Confirm by inspection of the manufacturer provided documentation on the user-interface that multiple client accounts can be set up for internal ship communication (e.g. ecdis1.ics) and that they can be added, deleted, emptied and managed (e.g. set an individual file storage limit).

Confirm by inspection of the manufacturer provided documentation that the available and relevant radio systems can be configured to transmit/receive files.

Annex A
(normative)

Distress alerting

Figure A.1 describes the flow chart for the distress alert procedure, and Figure A.2 describes the menu for the follow-up voice procedure.

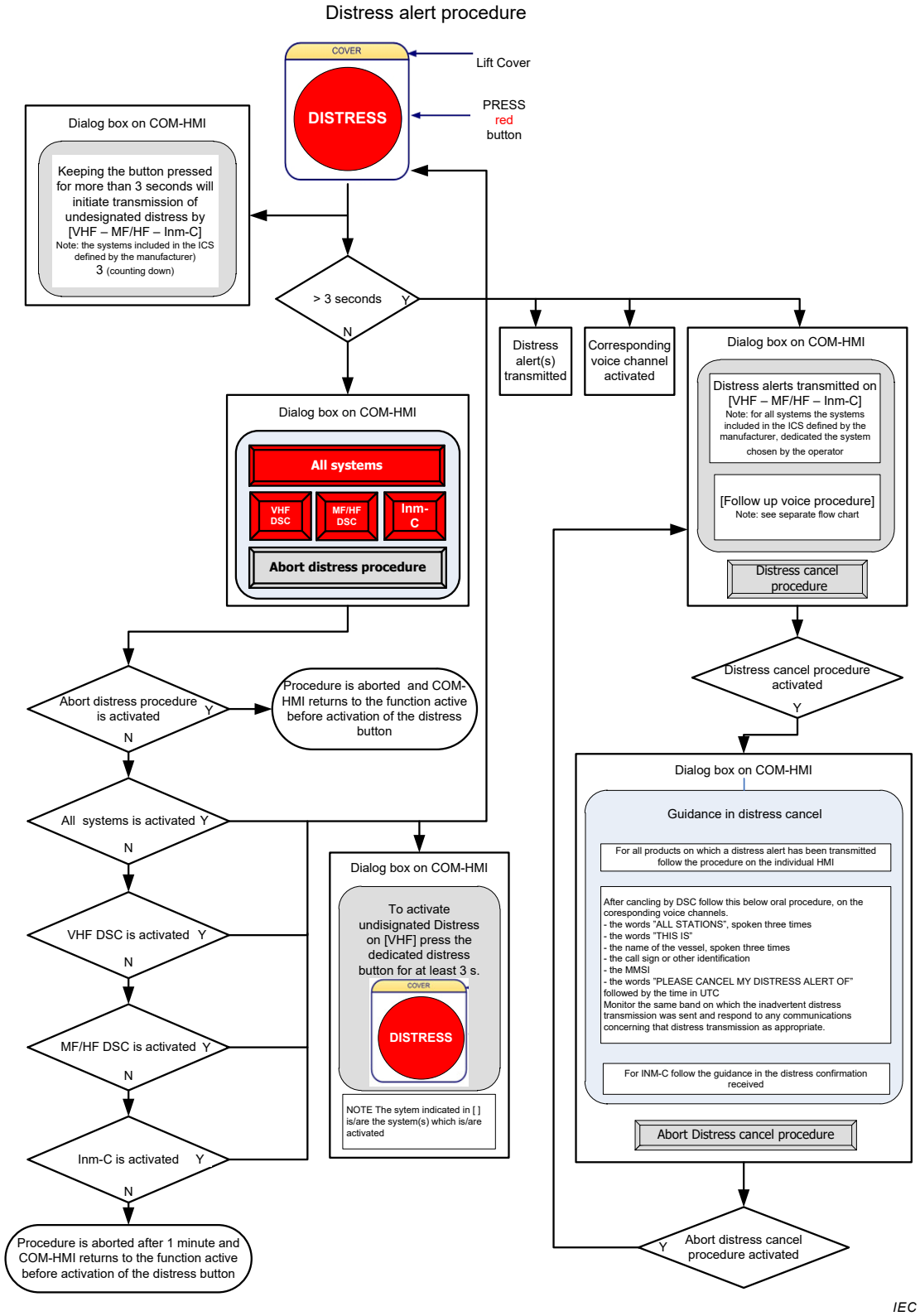

Figure A.1 – Distress alert procedure

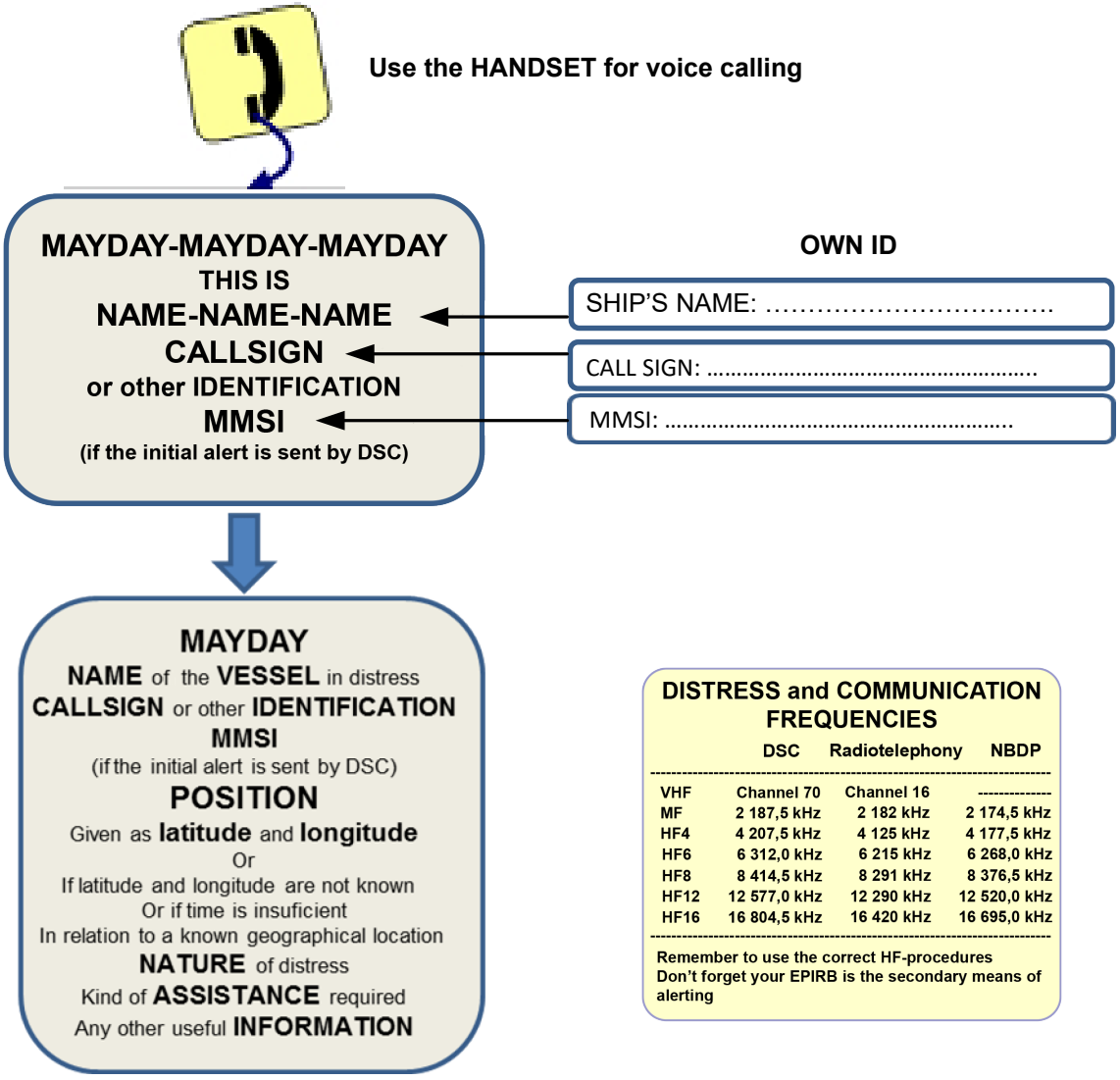

Figure A.2 – Follow up voice procedure

Annex B
(informative)

Extracts from IMO performance standards for alarms and indications

B.1 Alarms

B.1.1 VHF radio installations

Resolution A.803(19) as amended by Resolution MSC.68(68)

(11.2.7) *means to activate an alarm when no position data is received from the electronic position-fixing aid or, in the case of manual input, the position information is over 4 hours old.*

(11.8) *Provision should be made for:*

1) *a specific aural alarm and visual indication to indicate receipt of a distress or urgency call or a call having distress category. It should not be possible to disable this alarm and indication. Provision should be made to ensure that they can be reset only manually:*
2) *aural alarms and visual indication for calls other than distress and urgency.*

B.1.2 MF/HF radio installations

Resolution A.806(19) as amended by Resolution MSC.68(68)

(2.7) *means to activate an alarm when no position data is received from the electronic position-fixing aid or, in the case of manual input, the position information is over 4 hours old.*

(8) *Provision should be made for a specific aural alarm and visual indication to indicate receipt of a distress or urgency call or a call having distress category. It should not be possible to disable this alarm and indication. Provision should be made to ensure that they can be reset only manually.*

B.1.3 Inmarsat-C ship earth stations

Resolution A.807(19) as amended by Resolution MSC.68(68)

(3.10) *An alarm should be activated when no position data is received from the electronic position-fixing aid or, in the case of manual input, the position information is over 4 hours old.*

B.1.4 Inmarsat ship earth stations

Resolution MSC.130(75)

(3.3) *Where no other means of receiving distress, urgency and safety broadcasts or an addressed distress alert relay are provided and existing levels of aural signals produced by the telephone or printer are considered to be inadequate, the ship earth station equipment should provide an aural/visual alarm of appropriate level.*

B.1.5 NAVTEX

Resolution MSC.148(77)

(7.1) *The receipt of search and rescue information (B2 = D) should give an alarm at the position from which the ship is normally navigated. It should only be possible to reset this alarm manually.*

B.1.6 EGC equipment

Resolution MSC.306(87)

(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.*

(3.11) *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.*

B.1.7 Automatic battery chargers

COMSAR/Circ.32

(7.7.5) *Provisions should be made for an aural alarm and visual indication at the position from which the ship is normally navigated, indicating when the charging voltage or current is outside the limits given by the battery manufacturer. It should not be possible to disable this alarm and indication and it should only be possible to acknowledge and silence the alarm manually. Both the alarm condition and indication should reset automatically when normal charging condition has been restored.*

B.2 Indications

B.2.1 VHF radio installations

Resolution A.803(19)

(2.9) *The equipment should indicate the status of the distress alert transmission*.

(4.1.3) *An on/off switch should be provided for the entire installation with a visual indication that the installation is turned on.*

(4.1.4) *A visual indication that the carrier is being transmitted should be provided.*

(4.1.5) *The equipment should indicate the channel number, as given in the Radio Regulations, to which it is tuned.*

B.2.2 MF/HF radio installations

Resolution A.806(19)

(6.1) *Provision should be made for indicating the antenna current or power delivered to the antenna.*

(6.2) *Manually tuned equipment should be fitted with a sufficient number of indicators to permit accurate and rapid tuning.*

B.2.3 NAVTEX

Resolution MSC.148(77) NAVTEX

(5.2) *If a dedicated display device is used, the following requirements should be met:*

1) an indication of newly received unsuppressed messages should be immediately displayed until acknowledged or until 24 hours after receipt; and

2) newly received unsuppressed messages should also be displayed.

B.2.4 EGC equipment

Resolution MSC.306(87) EGC

(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.*

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

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

Annex C
(normative)

Communication access interface implementation details

C.1 HTTP communication

The ICS communication access interface uses HTTP (IETF RFC 2616) to transfer files between the ICS and on-board systems. The content and format of the files are not handled by the ICS in any other way than MIME type signalling of the file type by HTTP Content-Type request header field. Legal values for the Content-type header are given by IANA at http://www.iana.org/assignments/media-types/media-types.xhtml. See RFC 2616, sec. 14.17 for information on HTTP "Content-Type".

The ICS can handle both incoming (files originating outside the vessel destined to on-board systems) and outgoing files (files originating from on-board systems destined to on-shore systems or other vessels). The two cases are handled differently by the ICS:

Incoming:

File is received by the ICS by some mechanism. Depending on the source, destination, and receive path, the file is placed in a suitable directory.

The received file will now be contained in directory listings of the containing directory.

Outgoing:

File is received by the ICS by HTTP from an on-board system. The directory in which the file is put depends on the system manufacturer and type as well as the intended destination of the file.

The ICS will now internally start the procedure of transferring the file to on-shore systems (out of scope of this annex).

For each directory handled by the ICS, a directory index shall be supported. This index lists all files in the directory for which a GET request is performed, for example "GET /incoming/shore/acme.com/" for all incoming files for the shore entity communications named acme.com. The format of the index file shall be either HTML or XML. Each on-board system to use the ICS communication access interface will have to regularly retrieve directory indexes of the directories for which they have interest.

The expected index file format is specified by the client (the on-board system) through the HTTP "Accept" header – which contains the MIME types the client accepts from the ICS. The ICS shall send the index file on one of the formats given by the client. See RFC 2616, sec. 14.1 for information on HTTP "Accept" header. In case of HTML (MIME type text/html), the format shall contain every listed file in a HTML <a> element. An XML (MIME type application/xml) file shall contain an element called <directory> that holds every file listed as the text content of <entry> element. Example snippet of an XML file:

```
<?xml version="1.0" encoding="UTF-8"?>
<directory xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
         xmlns="http://www.acme.com/ICSDIR/1/0" version="1.0"
         xsi:schemaLocation="http://cirm.org/ics/ics-schema-directory-version-10.xsd">
  <directory>
    <entry>
      <filename>software 1 1 2.zip</filename>
      <timestamp>2015-06-20T20:33+00:00</timestamp>
      <dir>0</dir>
    </entry>
  </directory>
```

Information is given by the elements in Table C.1:

Table C.1 – Information elements HTTP communication

Element	Description	Format	Status	Comment
Directory	Directory listing		Mandatory	
Entry	A listing of one item		Mandatory if not a listing of an empty directory	A GET inquiry for an non-existing directory shall generate an error, e.g. 404 not found.
Filename	The name of the file or directory	String		
Timestamp	The file time is the time, the file was received in full or created by the ICS.	RFC 3339	Mandatory	If the ICS has no knowledge of the time, it shall set the timestamp to 2010-01-01T00:00+00:00 plus the approximate time since power on
Dir	Indicates a directory if not 0	Integer	Mandatory	

C.2 Paths, directories and URIs

Directories are given in Table C.2.

In HTTP terminology, a file is a resource addressed by a URI (uniform resource identifier) which is a local name for the resource. When in relation with a server address, it becomes a URL (uniform resource locator) and identifies a specific file on a specific server host.

In this annex, "path" and "URI" is to be used interchangeably. "directory" is one upper level part of a path or URI that contains other paths or URIs. See http://www.w3.org/Addressing/ for further information.

Table C.2 – Communication access interface directories

Directory	Contents	Access client	Access external
/system/	ICS Communication Access Interface specific files such as capabilities, status etc.	Read	Read
/outgoing/	Files to be sent to on-shore system or other vessel	Read/Write	Read
/outgoing/vessel/<vessel-id>/	Outgoing files to be sent to a vessel with the specified identifier (MMSI)	Read/write	Read
/outgoing/shore/<shore entity identifier>/	Outgoing files to be sent to the shore entity with the specified identifier	Read/write	Read
/incoming/	Files received from on-shore system or other vessel	Read	Write
/incoming/shore/<shore entity identifier>/	Incoming files related to the specified on-shore entity	Read	Write
/incoming/vessel/<vessel-id>/	Incoming files related to the specified vessel (MMSI)	Read	Write
NOTE Access client is access for clients (e.g. systems on the ship). Access external to the ship is information received from radio systems.			

C.3 Meta information for the file transport

For each outgoing directory handled by the ICS communication access interface, an XML file may be placed by the client, that contains meta information about the file. The file is named "icsmeta.xml" and placed (PUT) in the directory (e.g. /outgoing/shore/acme.com/).

The information shall include the specification of the specific ICS ship-shore communication channel(s) to be used, channel-specific addressing or other information and optionally a geographical area in which the system shall be in order to perform the transfer. The XML file shall be as according to this example:

```
<?xml version="1.0" encoding="UTF-8"?>
<icscai xmlns:xsi="http://www.w3.org/2001/XSchema-instance"
         xmlns="http://www.acme.com/ICSCAI/1/0" version="1.0"
         xsi:schemaLocation="http://cirm.org/ics/ics-schema-version-10.xsd">
  <meta file="">
    <transport>
      <protocol>
       http
      </protocol>
      <address>
        ics.chartprovider.gov.uk
      </address>
    </transport>
    <georestriction>
       nonpolar
    </georestriction>
  </meta>
<icscai>
```

Information is given by the elements in Table C.3:

Table C.3 – Information elements file transport

Element	Description	Format	Status	Comment
Transport	The transport method or protocol to be used as suggested by the client		Mandatory	
Protocol	Protocol identifier	String	Mandatory	
Address	Address associated with the protocol	String	Option	Optional for radio systems without addressing
(other elements under transport)	Protocol implementation specific			
Georestriction	A region identified by the ICS, where the communication is allowed	String of keywords separated by commas	Option	Using a list of keywords, that are defined geographically in the ICS such as "nonpolar", "highbandwidth", "celltower","satellite","asia"

C.4 Vessel-id and shore entity identifier

MMSI (maritime mobile service identity) is used to identify vessels in case of data being transferred from one vessel or via on-shore system to another vessel.

The shore-entity identifier is used to identity an on-shore software system entity. This would be equal to one application at one software or data provider. This identifier is a URI (uniform resource identifier, see IETF RFC 2141) that either addresses a file or a web service in the HTTP namespace. The exact meaning of the identifier is application specific and out of scope for this document. The identifier may or may not map directly to the internet hostname of "tracking.acme.com" that depends on the ship-to-shore communication channel being used.

Examples of shore entity identifiers are:

acme.com/maritime/files/charts/chart42.pkg

chartprovider.gov.uk/chart/

monitor.engines-co.com/parameters/

C.5 Access to files by multiple on-board systems

Files saved in the ICS by one on-board system can only be deleted by the same system or by either ICS operator action or ICS data retention period expiry. Files in a directory with read access can be read by other on-board systems as can directory indexes for such directories.

The HTTP method used for each operation on the interface is listed in Table C.4.

Table C.4 – Communications access interface operations

Operation	Node	HTTP method	Description
Enumerate files	On-board system	GET <directory>/	Retrieve the index of the directory
Get file	On-board system	GET <URI>	Retrieve the file specified by the URI
Send file	On-board system	PUT /outgoing/<identifier>	Pass a file to the ICS in order to have it sent to the specified off-board system. The file is contained as the HTTP request body (RFC 2616, sec. 9.6)

C.6 Authentication and authorization

Authentication is performed by HTTP digest authentication as defined by IETF RFC 7235. Authorization is determined by ICS configuration and covers usage of radio communications channels and file storage.

C.7 Implementation examples for data transfer scenarios

C.7.1 Ship system sends data to shore-system "TrackingSys" at "Acme"

The on-board system generates a file with the content. The file is sent to the ICS by a HTTP PUT request to the URI /outgoing/shore/trackingsys.acme.com/.

The ICS will select a suitable communication method and start transfer of the file to the on-shore system identified by "trackingsys.acme.com".

C.7.2 On-shore system "controlpanel-update" at GadgetCorp sends data to ship system "controlpanel"

A file is received by the ICS by mechanisms not covered by this document. The file is now available through the ICS HTTP interface in the directory URI /incoming/shore/controlpanel.gadgetcorp.com.

The next time a "GadgetCorp" control panel system does directory index retrieval (in this case a GETof /incoming/shore/controlpanel.gadgetcorp.com/), the returned index will contain the file received by the ICS. The on-board system can now request the file by issuing a GET request for the file as contained in the directory index.

C.7.3 Ship client (ECDIS) requests the latest chart from shore

This case is handled by the application layer at the on-board system and the on-shore system with the ICS having no knowledge of the request-response interaction taking place between the two systems. In practice, it is performed by the on-board system generating a file with the application specific request ("get1.request" Figure C.1). This file is sent to the on-shore system as described in that scenario. The on-shore system will respond to the request by sending a file back to the on-board system the same way as on-shore-to-ship system data transfer is described above.

NOTE In Figure C.1, the ICS to shore entity communication is described for illustration only.

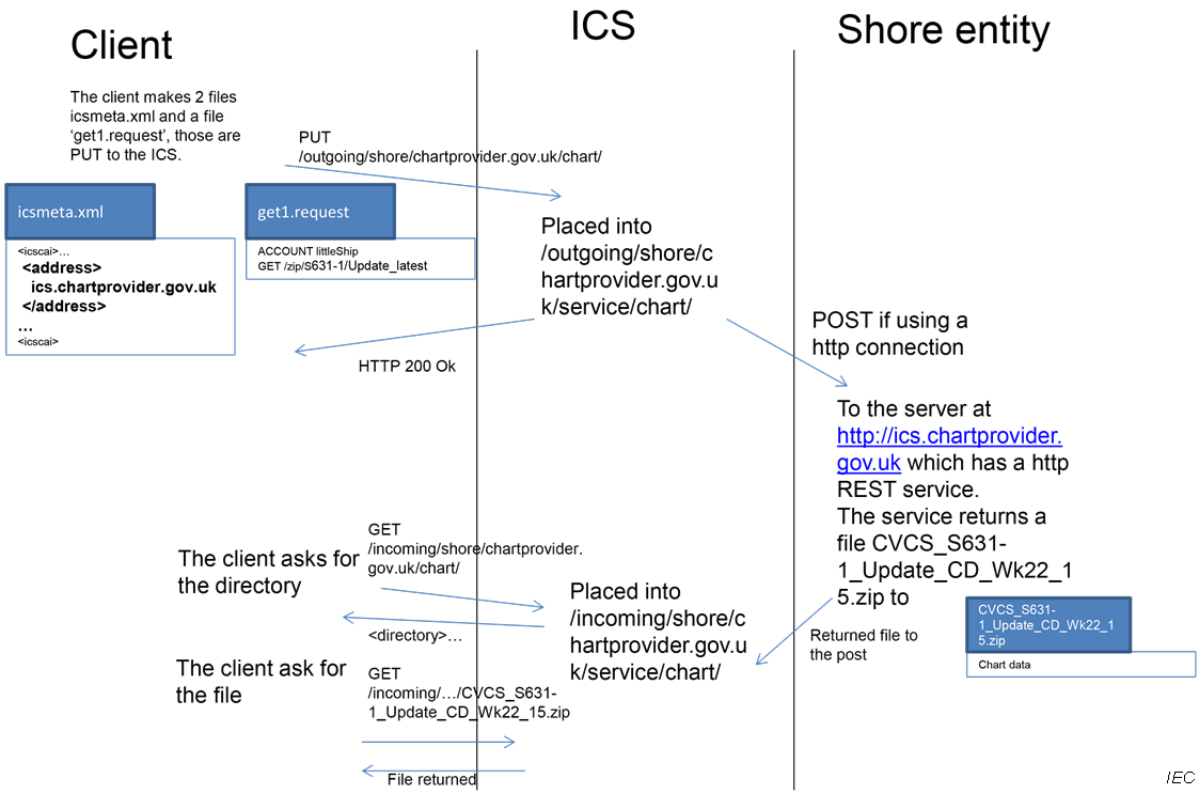

Figure C.1 – Example of a shore to ship transfer

Annex D
(informative)

Ship/shore and shore/ship communication implementation in support of e-navigation

D.1 General

Shore-based e-navigation service providers will probably use standard internet protocols, e.g. e-mail (i.e. SMTP, IMAP), FTP, HTTP and even streaming data (i.e. audio or video). Ships could therefore be required to support these protocols in order to support e-navigation between ship and shore (see Figure D.1).

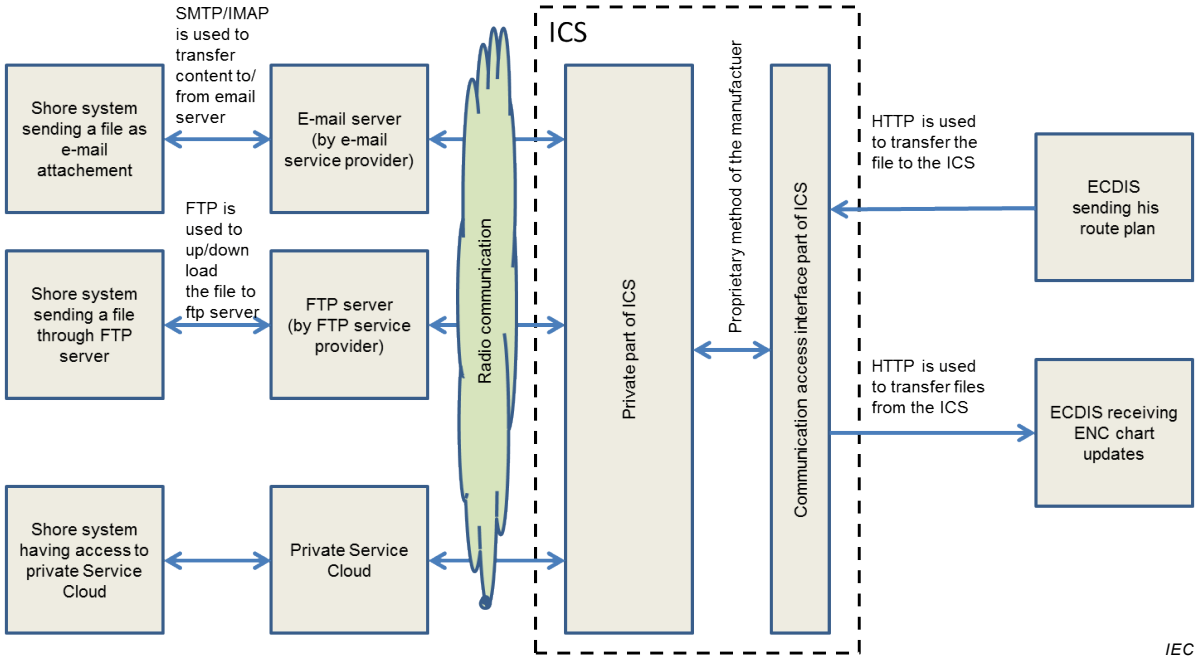

Figure D.1 – Example of communication for e-navigation

One fundamental difference between shore-based infrastructure and ship applications is low bandwidth resulting in long lag time and high cost of data exchange for ships. Ships also need secure communication.

This annex describes a way to add signatures and encryption to messages in a way that works well with cached content on the vessel.

D.2 One alternative for data transfer

D.2.1 General

Transfer of the files from ICS to/from on-shore or other vessel systems is performed by secure HTTP (HTTPS) employing the REST[1] architectural style for modelling of the data-models being interacted with.

1 http://en.wikipedia.org/wiki/Representational_state_transfer

A full client-server interaction can, depending on the data model and application-specific processing, involve multiple HTTPS requests.

A definition of individual data models used by e-navigation applications is not the object of this document, but is expected to be defined by service providers.

D.2.2 Vessel to shore data transfer

Data is sent from vessel to shore by HTTPS requests to the receiving server. It is assumed that no security measures prevent the HTTPS connection from the ICS to the onshore server to be established.

With regard to HTTPS semantics, the ICS is the client, and the on-shore system is the server.

D.2.3 Shore to vessel data transfer

The ICS on a vessel will, if configured to support shore to vessel data, request the data available at the server at regular intervals (see Figure D.2). The URL to use for this is governed by the REST based data-model. If data is available, the files will be downloaded to the ICS.

A system that provides data or files to the ICS could support a manifest file that describes the files available along with their locations (paths) on the server. The ICS will periodically or triggered by an event reload the manifest file. At processing of the manifest file, the ICS may decide that one or more of the listed files should be retrieved. This mechanism can transparently be extended to support a more real-time push transfer by employing Comet/AJAX push transfers.

It is up to the actual application implementers to decide if the propagation requirement of the data requires real-time push or if a regular check by the vessel ICS is sufficient.

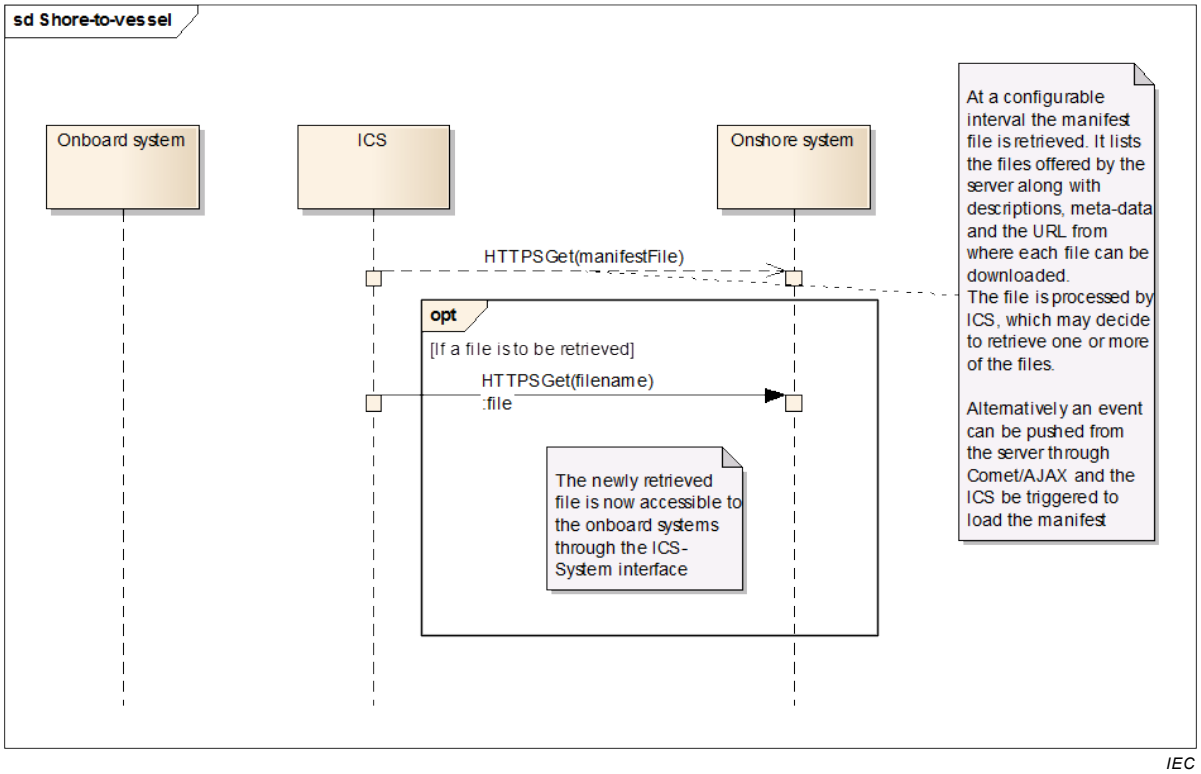

Figure D.2 – Shore to vessel data transfer

D.2.4 Vessel to vessel data transfer

With regard to HTTPS semantics, the ICS that initiates the communication is the client and the ICS being contacted is the server. To add application level security and confidentiality HTTPS with both server and client side certificates should be used. This requires that both parties have knowledge of each other before any data exchanging connection can be established. This is realised by the two parties exchanging the correct certificates though some out-of-band channel beforehand.

Incoming connections to the ICS are subject to access restrictions of the 460-Gateway as defined by IEC 61162-460.

D.3 Another alternative for data transfer

Using certificates for signing messages from shore or from vessels is expensive because of the required ship to shore communication. The vessels may have very long lag times that make queries from shore very time consuming and error prone.

A more suitable approach is to use something like pretty good privacy (pgp – see IETF RFC 4880) keys for signing data.

An advantage with Domain Name Service and static http pages is that they usually get cached on board. Local data storage is good for vessels with bad connectivity. If the data connections are down, the proxy servers may still provide the last good version of the data.

Annex E
(informative)

Digital interface sentence to parameter group number equivalence

Table E.1 gives digital interface network IEC 61162-3 parameter group numbers (PGN) equivalent to network IEC 61162-1 sentences.

Table E.1 – Digital sentence to PGN equivalence

IEC 61162-1 sentence	IEC 61162-3 PGN with description
GNSS/INS	
GLL	129025 Position, rapid update 129029 GNSS position data
GGA	129025 Position, rapid update 129029 GNSS position data
GNS	129025 Position, rapid update 129029 GNSS position data
RMC	129025 Position, rapid update 129026 COG and SOG, rapid update 129029 GNSS position data
ZDA	126992 System time 129033 Time and date
BAM/INS	
HBT	126993
ALC	127001 Alert List
ALF	126983 Alert PGN
ARC	126208 Acknowledge Group Function
ACK	126984 Alert response
ACN	126984 Alert response 127002 Responsibility Transfer PGN
GMDSS – NAVTEX, SafetyNET and DSC	
$--CRQ NRM	126208 Request Group Function 059904 ISO Request
DSC and DSE	129808 DSC Call information
FSI	129799 Radio frequency/mode/power

IEC 61162-1 sentence	IEC 61162-3 PGN with description
AIS	
ABM	129795 AIS addressed binary message 129801 AIS addressed safety related message 129811 AIS Single Slot binary message 129812 AIS Multi-slot binary message
BBM	129797 AIS binary broadcast message 129802 AIS broadcast safety related message 129811 AIS Single Slot binary message 129812 AIS Multi-slot binary message
ABK	129796 AIS Acknowledge
VDM and VDO	129038 AIS Class A position report 129039 AIS Class B position report 129040 AIS Class B extended position report 129041 AIS Aids to Navigation (AtoN) report 129792 AIS DGNSS broadcast binary message 129793 AIS UTC and date report 129794 AIS Class A static and voyage related data 129795 AIS addressed binary message 129796 AIS acknowledge 129797 AIS binary broadcast message 129798 AIS SAR aircraft position report 129800 AIS UTC /date Inquiry 129801 AIS addressed safety related message 129802 AIS safety related broadcast message 129803 AIS interrogation 129804 AIS assignment mode command 129805 AIS data link management message 129806 AIS channel management 129807 AIS group assignment 129809 AIS Class B "CS" static data report, Part A 129810 AIS Class B "CS" static data report, Part B 129811 AIS Single Slot binary message 129812 AIS Multi-slot binary message 129813 AIS Long Range Broadcast message

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