# INTERNATIONAL STANDARD

**IEC 61162-400**

First edition
2001-11

**Maritime navigation and radiocommunication equipment and systems –
Digital interfaces –**

**Part 400:
Multiple talkers and multiple listeners –
Ship systems interconnection –
(Introduction and general principles**

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

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## MARITIME NAVIGATION AND RADIOCOMMUNICATION EQUIPMENT AND SYSTEMS – DIGITAL INTERFACES –

## Part 400: Multiple talkers and multiple listeners – Ship systems interconnection – Introduction and general principles

## FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The 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 61162-400 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 |
|------|------------------|
| 80/309/FDIS | 80/324/RVD |

Full information on the voting for the approval of this standard 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 3.

The special typographical conventions and nomenclature used in this standard are defined in annex A, which forms an integral part of this standard. Annex B is for information only.

The committee has decided that the contents of this publication will remain unchanged until June 2005. At this date, the publication will be

• reconfirmed;

• withdrawn;

• replaced by a revised edition, or

• amended.

# INTRODUCTION

International Standard IEC 61162 is a four-part standard which specifies four digital interfaces for applications in marine navigation, radiocommunication and system integration.

The four parts are :

IEC 61162-1     Single talker and multiple listeners

IEC 61162-2     Single talker and multiple listeners, high speed transmission

IEC 61162-3     Multiple talkers and multiple listeners – Serial data instrument network

IEC 61162-4     Multiple talkers and multiple listeners – Ship systems interconnection

Part 4 of the standard is sub-divided into a number of individual standards with part numbers in the 400 series. This part of the standard, 400: Introduction and general principles, is the first part.

Relationship with the other parts of the IEC 61162 series of standards in defined in Annex B of the present standard.

**MARITIME NAVIGATION AND RADIOCOMMUNICATION
EQUIPMENT AND SYSTEMS –
DIGITAL INTERFACES –**

**Part 400: Multiple talkers and multiple listeners –
Ship systems interconnection – Introduction and general principles**

## 1  Scope

### 1.1  General

This standard series, IEC 61162-400 and upwards, specifies a communication protocol for use in interconnected maritime systems. It also specifies an interface description language for use together with the protocol, a set of rules for the use of this language and a set of standard interfaces described in the language. Finally, it also provides a test plan and list of required documents for equipment using this standard.

This part of IEC 61162 gives a general overview of the functionality of the protocol and provides definitions common to the other fragments of the standard.

### 1.2  Application area

This protocol is intended for use on the system level of an interconnected maritime navigation and radiocommunication system. It is designed to integrate various relatively large functional components, for example RADAR, ECDIS or conning display. As such, it complements other protocols on the instrument level (IEC 61162-1, IEC 61162-2 and IEC 61162-3 as referred to in annex B) and on the administrative level (mainly proprietary or de facto standard protocols).

Although this standard covers navigation and radiocommunication equipment on the system level, it is not limited to that. It could also find application on lower levels (process level) and in other application areas (general automation).

### 1.3  Safety implications of using this protocol

This standard does not define any safety related attributes that can be applied in the verification of the safety properties of a system using this protocol. The system safety properties will dependent on many factors, such as

a)  the protocol specification (this standard);

b)  the T-profile in use (may be specified by this standard);

c)  the protocol implementation (dependent on manufacturer);

d)  how the protocol is used by individual components (dependent on manufacturer);

e)  how the system uses the protocol (dependent on manufacturers and system integrators);

f)  maintenance and supervision of the system.

These items are only examples and do not constitute a complete list. The relevant authorities and the class societies will prescribe more detailed rules for the use of this protocol in integrated control systems.

## 1.4   Components of this standard

This standard consists of a number of documents (parts). This introduction contains a general description of the functionality of the standard and guidelines for the use of the other documents. The relationship between documents is indicated in the figure below.

Although this set of standard documents is collectively referred to as IEC 61162-4, the actual part numbers are in the 400-series. The part numbers are shown in the figure below.
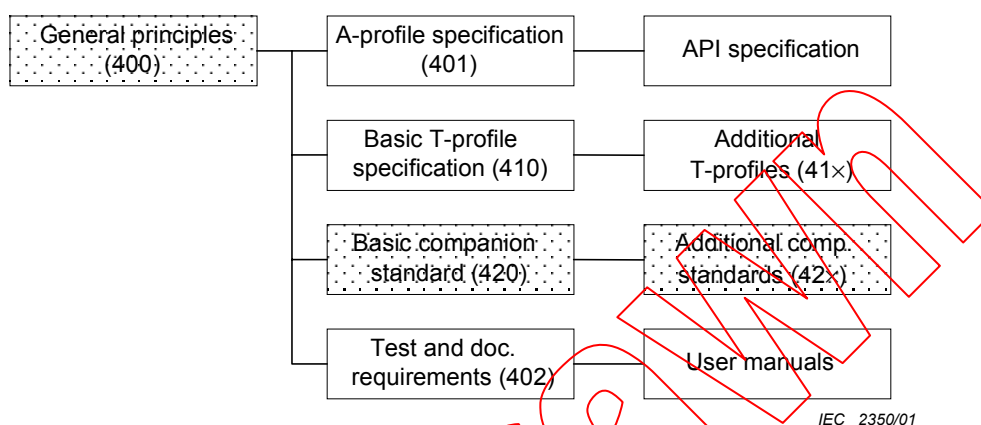


IEC   2350/01

**Figure 1 – Relationship between standard documents**

The documents marked with a diagonal line pattern are not part of any standard. They are required programmer or operator manuals provided by manufacturers of equipment or components using this standard.

The non-shaded documents give documentation required for designers of communication libraries implementing this standard. They are not required for manufacturers of equipment using existing communication libraries.

The companion standards documents (shaded) are required reading for designers and integrators of equipment using this standard. They are also of interest to those who specify equipment for ships.

The general principles are required reading for all users of the standard. The general principles give a high level of explanations to the various parts as shown in the table below.

**Table 1 – Parts of general principles document**

| Clause | Contents | Required for part |
|---|---|---|
| Scope | Purpose and overview | All |
| Overview and general principles | General description of application area and usage | All |
| A-profile functionality | General description of functionality of application level protocol | IEC 61162-420 Companion standard general principles, IEC 61162-401 A-profile |
| T-profile functionality | General description of requirements for implementation of this protocol on top of specific transport service | IEC 61162-401 A-profile IEC 61162-410 T-profile |
| Companion standard functionality | General description of purpose and functionality of companion standards | Companion standards, application descriptions |
| System configuration services | Requirements for integrating systems using this protocol | IEC 61162-401 A-profile IEC 61162-410 T-profile |

## 2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 61162. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of IEC 61162 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 61162-1:2000, *Maritime navigation and radiocommunication equipment and systems – Digital interfaces – Part 1: Single talker and multiple listeners*

IEC 61162-2:1998, *Maritime navigation and radiocommunication equipment and systems – Digital interfaces – Part 2: Single talker and multiple listeners, high speed transmission*

IEC 61162-3, *Maritime navigation and radiocommunication equipment and systems – Digital interfaces – Part 3: Multiple talkers and multiple listeners – Serial data instrument network* [1]

IEC 61162-401, *Maritime navigation and radiocommunication equipment and systems – Digital interfaces – Part 401: Multiple talkers and multiple listeners – Ship systems interconnection – Application profile*

IEC 61162-410, *Maritime navigation and radiocommunication equipment and systems – Digital interfaces – Part 410: Multiple talkers and multiple listeners – Ship systems interconnection – Transport profile requirements and basic transport profile*

IEC 61162-420, *Maritime navigation and radiocommunication equipment and systems – Digital interfaces – Part 420: Multiple talkers and multiple listeners – Ship systems interconnection – Companion standard requirements and basic companion standards*

ISO/IEC 7498, *Information processing systems – Open Systems interconnection – Basic Reference Model*

ISO/IEC 8859-1:1998, *Information technology – 8-bit single-byte coded graphic character sets – Part 1: Latin alphabet No. 1*

## 3 Definitions

For the purpose of this part of IEC 61162 the following definitions apply:

**3.1**
**A-profile**
communication protocol supplying application services (see OSI 5 to 7)

**3.2**
**ABC – anonymous broadcast (MAU)**
a mechanism by which a MAU can send or receive data with no defined peer or group of peers

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[1] To be published.

**3.3**
**accept**
this term (or server, see below) is used to define the *MAU* (or other entity associated with it) that has exported a *data object*

The term client (or connect), see below, is used about the *MAU* (or other entity associated with it) that use the *data object*.

**3.4**
**API – application programmer's interface**
one implementation of the required application services as defined in IEC 61162-401

NOTE   One API from one manufacturer may be different from another API, although the basic functionality is the same.

**3.5**
**bridge (in the context of a data network)**
a network bridge is used to connect two or more network segments together. It will normally do this on the data-link level, i.e. it will be able to isolate traffic internal to one segment from other segments, but it will not be able to perform more advanced filtering required for, for example fire-walls

**3.6**
**callback**
a subroutine in the application program called from a service provider library as a result of a previous service request

**3.7**
**character**
an octet containing a code from the set defined in ISO/IEC 8859-1. The null character (octet containing all zero bits) may have special meaning

**3.8**
**client**
(*connect* type entity) uses the services of an *accept* type entity

**3.9**
**companion standard**
the A-profile part of this standard defines a protocol for transport of data structures between nodes in an integrated ship control system. It does not in itself specify how to interpret these data structures, i.e. if it is a temperature measurement or a rudder angle. The interpretation of the data objects are defined by additional documents called companion standards or user layer specifications.

The companion standards-requirements part of this standard defines rules for the creation of companion standards and how to implement them. This part also defines some general companion standards, for example a mapping of IEC 61162-1 telegrams

**3.10**
**connect**
(*client*) uses the services of an *accept* type entity

**3.11**
**data marshalling**
this standard defines a transmission format for data records that is independent of computer architecture, network particulars, compilers and programming languages.

Data marshalling routines convert between this transport format and internal data representations used in different modules

**3.12**
**data object**
this standard is based on a simplified object-oriented client-server model. The term will be used in this standard to denote a logical entity that is characterized by the following:

– a data object has exactly one server (one logical network node – MAU). The object comes into existence when the information about the object is exported to the network by the server;

– a data object has zero or several clients (MAUs). Clients can connect to the object when the object comes into existence;

– exactly one client-available operation is defined for the object;

– the defined operation can be used by the client to be informed about state changes in the object and/or inflict state changes on the object.

It is a "virtual" object. The server does not export it to the network, it exports the identity of the object which points back to a physical data structure in the server. All operations on the object are performed locally by the server, the network will transfer information about these operations

**3.13**
**fire-wall (in the context of a data network)**
a device connecting two or more network segments together while performing certain safety related functions. These functions are, as a minimum, to limit the load from the fire-wall onto certain of the segments and do message filtering to ensure that only a specified sub-set of functions are made available from certain of the segments

**3.14**
**LNA – local network administrator**
the protocol processing module that interfaces the application unit (MAU) to the network. Each MAU has one LNA

**3.15**
**MAPI – MAU API**
a generic term for an API that allows an application program (MAU) to interface to its LNA

**3.16**
**message**
a fixed format sequence of octets that are exchanged between modules in an IEC 61162-4 system. All messages will be identified with a message code. All messages, their codes and formats are described in the A-profile part of this standard

**3.17**
**MAU – MiTS  application unit**
historical name (see MiTS)

**3.18**
**MCP – MAU connection point**
a reference to one side of a connection to a *data object*. A server that defines a data object requires one MCP to handle incoming transaction requests targeted at that object. Each client using the same data object will likewise require one MCP as a reference to the object

**3.19**
**MiTS – maritime information technology standard**
predecessor to this standard. Now superseded as a specification by the IEC 61162-4 series of standards (see also *PISCES*). The IEC 61162-4 series of standards are not compatible with MiTS, but the Internet T-profile defined in IEC 61162-410 is specified so that applications and host computers using MiTS can coexist with equipment using this international standard.