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

Reference number
IEC 61162-400:2001(E)

Publication numbering

As from 1 January 1997 all IEC publications are issued with a designation in the 60000 series. For example, IEC 34-1 is now referred to as IEC 60034-1.

Consolidated editions

The IEC is now publishing consolidated versions of its publications. For example, edition numbers 1.0, 1.1 and 1.2 refer, respectively, to the base publication, the base publication incorporating amendment 1 and the base publication incorporating amendments 1 and 2.

Further information on IEC publications

The technical content of IEC publications is kept under constant review by the IEC, thus ensuring that the content reflects current technology. Information relating to this publication, including its validity, is available in the IEC Catalogue of publications (see below) in addition to new editions, amendments and corrigenda. Information on the subjects under consideration and work in progress undertaken by the technical committee which has prepared this publication, as well as the list of publications issued, is also available from the following:

- **IEC Web Site (www.iec.ch)**

- **Catalogue of IEC publications**

  The on-line catalogue on the IEC web site (www.iec.ch/catlg-e.htm) enables you to search by a variety of criteria including text searches, technical committees and date of publication. On-line information is also available on recently issued publications, withdrawn and replaced publications, as well as corrigenda.

- **IEC Just Published**

  This summary of recently issued publications (www.iec.ch/JP.htm) is also available by email. Please contact the Customer Service Centre (see below) for further information.

- **Customer Service Centre**

  If you have any questions regarding this publication or need further assistance, please contact the Customer Service Centre:

  Email: custserv@iec.ch
  Tel: +41 22 919 02 11
  Fax: +41 22 919 03 00

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

© IEC 2001 — Copyright - all rights reserved

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

International Electrotechnical Commission 3, rue de Varembé Geneva, Switzerland
Telefax: +41 22 919 0300 e-mail: inmail@iec.ch IEC web site http://www.iec.ch

Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

PRICE CODE R

For price, see current catalogue

CONTENTS

FOREWORD 4
INTRODUCTION 5
1 Scope 6
1.1 General 6
1.2 Application area 6
1.3 Safety implications of using this protocol 6
1.4 Components of this standard 7
2 Normative references 8
3 Definitions 8
4 Overview and general principles 12
4.1 Introduction 12
4.2 Basic protocol functionality 12
4.3 Program modules 13
4.3.1 Physical modules 13
4.3.2 Protocol types 14
4.3.3 Protocol conformance classes 14
4.4 API versus protocol 15
4.5 Protocol level entities 15
4.6 Dependencies of actual API implementations 16
4.7 Companion standard entities 16
4.8 Relationship between specification components and products 18
5 A-profile functionality 18
5.1 Introduction 18
5.2 General principles 18
5.2.1 Separation between applications 18
5.2.2 Automatic configuration 19
5.2.3 Client-server architecture by the use of data objects 19
5.2.4 Connection oriented 19
5.2.5 Transaction oriented 19
5.2.6 Reliable transfers 19
5.2.7 Real-time properties 20
5.3 Application management 20
5.3.1 MAU states 20
5.3.2 System management 20
5.3.3 Time distribution 20
5.3.4 Load limitation 20
5.4 Data object connection management 21
5.4.1 Data object states 21
5.4.2 Server object definition 21
5.4.3 Client object connection request 21
5.4.4 Client MAU authentication 21
5.5 Message transfer 22
5.5.1 Transaction states 22
5.5.2 Basic transaction principles 22
5.5.3 Transfer mechanisms 22
5.5.4 Data marshalling 23
5.5.5 Authentication 23

5.6 Bulk transfer 23
5.6.1 Mechanism 23
5.6.2 Application level activation 24
6 T-profile functionality 24
6.1 Introduction 24
6.2 General overview of quality of service 24
6.3 The T-profile services 25
6.3.1 Network address look-up and mapping services 25
6.3.2 Reliable message service 25
6.3.3 Reliable stream service 25
6.3.4 Unreliable datagram service 25
6.3.5 System management 25
6.3.6 Time distribution 25
6.3.7 Exception handling and reporting 25
7 Companion standards 26
7.1 Introduction 26
7.2 The companion standard functionality 26
7.3 The companion standard language 26
7.4 Companion standard PFS components 27
7.5 Companion standard PFS structure 27
7.6 Companion standard application description 27
8 System configuration services 27
8.1 General 27
8.2 System configuration principles 27
8.3 Physical network configuration 28
8.4 Application configuration 28
8.5 Error monitoring and reporting 28
8.6 Load/performance monitoring and reporting 28
8.7 System inspection and configuration management 29
Annex A (normative) Typographical conventions and nomenclature 30
A.1 Use of typeface 30
A.2 Regular pattern 30
A.3 Constant representation 31
A.4 State machine descriptions 32
A.5 Context diagrams 32
A.6 Entity-relationship (ER) diagrams 33
A.7 Structure of service descriptions 33

Annex B (informative) Definition and description of the IEC 61162 series of standards 36
B.1 General 36
B.2 Rationale for specific marine standards 36
B.3 IEC 61162-1 summary 37
B.4 IEC 61162-2 summary 38
B.5 IEC 61162-3 summary 38
B.6 IEC 61162-4 series summary 38
B.7 Applicability of the different standards 39

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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.
2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

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.

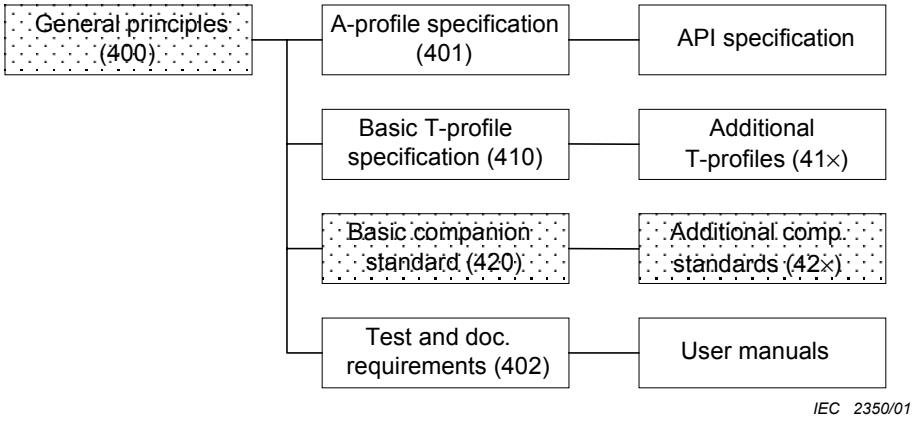


Figure 1 – Relationship between standard documents

The documents marked with a diagonal line pattern are not part of the 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

[1] To be published.