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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
(IEC 61162-400:2001); German version EN 61162-400:2002, text in English

Matériels et systèmes de navigation et de radiocommunication maritime –
Interfaces numériques – Partie 400: Émetteurs multiples et récepteurs multiples –
Interconnexion des systèmes des navires – Introduction et principes généraux
(CEI 61162-400:2001); Version allemande EN 61162-400:2002, texte en anglais

Die Europäische Norm EN 61162-400:2002 hat den Status einer Deutschen Norm.

Beginn der Gültigkeit

Die EN 61162-400 wurde am 2002-03-01 angenommen.

Nationales Vorwort

Für die vorliegende Norm ist das nationale Arbeitsgremium K 738 „Elektronische Navigationsinstrumente“ der DKE Deutsche Kommission Elektrotechnik Elektronik Informationstechnik im DIN und VDE zuständig.

Das Präsidium des DIN hat mit Präsidialbeschluss 1/78 festgelegt, dass Deutsche Normen, deren Inhalt sich auf internationale Arbeitsergebnisse der IEC gründet, unter bestimmten Bedingungen allein in englischer Sprache veröffentlicht werden dürfen. Die Bedingungen sind für diese Norm erfüllt. Sie steht nicht in unmittelbarem Zusammenhang mit Rechtsvorschriften und ist nicht als Sicherheitsnorm anzusehen. Es kann davon ausgegangen werden, dass die Anwender über hinreichende englische Sprachkenntnisse verfügen. Für viele der verwendeten Benennungen existieren keine gebräuchlichen deutschen Benennungen, da sich die deutschen Anwender im Bereich der Seeschifffahrt in der Regel ebenfalls der englischen Benennungen bedienen.

Norm-Inhalt für die Teile 400, 401, 410 und 420 der Reihe DIN EN 61162-4 war veröffentlicht als E DIN IEC 80/175/CD:1998-10 und E DIN IEC 80/176/CD:1998-10.

Die enthaltene IEC-Publikation wurde vom TC 80 „Maritime navigation and radiocommunication equipment and systems“ erarbeitet.

Die Reihe DIN EN 61162 besteht aus 4 Teilen, wobei der Teil 4 in mehrere Einzelnormen unterteilt ist. Eine zusammenfassende Beschreibung der Normen dieser Reihe und eine Übersicht über deren unterschiedliche Anwendbarkeit ist in Anhang B dieser Norm enthalten.

Das IEC-Komitee hat entschieden, dass der Inhalt dieser Publikation bis Juni 2005 unverändert bleiben soll. Zu diesem Zeitpunkt wird entsprechend der Entscheidung des Komitees die Publikation

- bestätigt,
- zurückgezogen,
- durch eine Folgeausgabe ersetzt oder
- geändert.

Fortsetzung Seite 2
und 42 Seiten EN

DKE Deutsche Kommission Elektrotechnik Elektronik Informationstechnik im DIN und VDE
Normenstelle Schiffs- und Meerestechnik (NSMT) im DIN Deutsches Institut für Normung e.V.

Nationaler Anhang NA (informativ)

Zusammenhang mit Europäischen und Internationalen Normen

Für den Fall einer undatierten Verweisung im normativen Text (Verweisung auf eine Norm ohne Angabe des Ausgabedatums und ohne Hinweis auf eine Abschnittsnummer, eine Tabelle, ein Bild usw.) bezieht sich die Verweisung auf die jeweils neueste gültige Ausgabe der in Bezug genommenen Norm.

Für den Fall einer datierten Verweisung im normativen Text bezieht sich die Verweisung immer auf die in Bezug genommene Ausgabe der Norm.

Der Zusammenhang der zitierten Normen mit den entsprechenden Deutschen Normen ergibt sich, soweit ein Zusammenhang besteht, grundsätzlich über die Nummer der entsprechenden IEC-Publikation. Beispiel: IEC 60068 ist als EN 60068 als Europäische Norm durch CENELEC übernommen und als DIN EN 60068 ins Deutsche Normenwerk aufgenommen.

IEC hat 1997 die Benummerung der IEC-Publikationen geändert. Zu den bisher verwendeten Normnummern wird jeweils 60000 addiert. So ist zum Beispiel aus IEC 68 nun IEC 60068 geworden.

Navigations- und Funkkommunikationsgeräte und -systeme für die Seeschifffahrt – Digitale Schnittstellen – Teil 400: Mehrere Datensender und mehrere Datenempfänger – Schiffssystemzusammenschaltung – Einleitung und allgemeine Prinzipien
(IEC 61162-400:2001)

Maritime navigation and radiocommunication equipment and systems – Digital interfaces – Part 400: Multiple talkers and multiple listeners – Ship systems interconnection – Introduction and general principles
(IEC 61162-400:2001)

Matériels et systèmes de navigation et de radiocommunication maritime – Interfaces numériques – Partie 400: Émetteurs multiples et récepteurs multiples – Interconnexion des systèmes des navires – Introduction et principes généraux
(CEI 61162-400:2001)

Diese Europäische Norm wurde von CENELEC am 2002-03-01 angenommen. Die CENELEC-Mitglieder sind gehalten, die CEN/CENELEC-Geschäftsordnung zu erfüllen, in der die Bedingungen festgelegt sind, unter denen dieser Europäischen Norm ohne jede Änderung der Status einer nationalen Norm zu geben ist.

Auf dem letzten Stand befindliche Listen dieser nationalen Normen mit ihren bibliographischen Angaben sind beim Zentralsekretariat oder bei jedem CENELEC-Mitglied auf Anfrage erhältlich.

Diese Europäische Norm besteht in drei offiziellen Fassungen (Deutsch, Englisch, Französisch). Eine Fassung in einer anderen Sprache, die von einem CENELEC-Mitglied in eigener Verantwortung durch Übersetzung in seine Landessprache gemacht und dem Zentralsekretariat mitgeteilt worden ist, hat den gleichen Status wie die offiziellen Fassungen.

CENELEC-Mitglieder sind die nationalen elektrotechnischen Komitees von Belgien, Dänemark, Deutschland, Finnland, Frankreich, Griechenland, Irland, Island, Italien, Luxemburg, Malta, Niederlande, Norwegen, Österreich, Portugal, Schweden, Schweiz, Spanien, der Tschechischen Republik und dem Vereinigten Königreich.

CENELEC

Europäisches Komitee für Elektrotechnische Normung
European Committee for Electrotechnical Standardization
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Vorwort

Der Text des Schriftstücks 80/309/FDIS, zukünftige 1. Ausgabe von IEC 61162-400, ausgearbeitet von dem IEC TC 80 "Maritime navigation and radiocommunication equipment and systems", wurde der IEC-CENELEC Parallelen Abstimmung unterworfen und von CENELEC am 2002-03-01 als EN 61162-400 angenommen.

Nachstehende Daten wurden festgelegt:

- spätestes Datum, zu dem die EN auf nationaler Ebene durch Veröffentlichung einer identischen nationalen Norm oder durch Anerkennung übernommen werden muss (dop): 2002-12-01
- spätestes Datum, zu dem nationale Normen, die der EN entgegenstehen, zurückgezogen werden müssen (dow): 2005-03-01

Anhänge, die als "normativ" bezeichnet sind, gehören zum Norminhalt.
Anhänge, die als "informativ" bezeichnet sind, enthalten nur Informationen.
In dieser Norm sind die Anhänge A und ZA normativ und ist Anhang B informativ.
Der Anhang ZA wurde von CENELEC hinzugefügt.

Anerkennungsnotiz

Der Text der Internationalen Norm IEC 61162-400:2001 wurde von CENELEC ohne irgendeine Abänderung als Europäische Norm angenommen.

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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 is 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 depend 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.

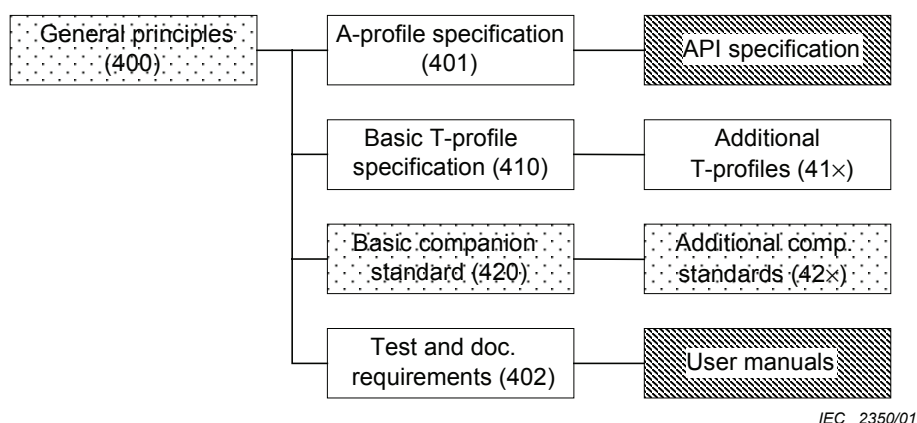


Figure 1 – Relationship between standard documents

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.

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.

By integrating one old and one new application on the same host computer, a gateway between the two protocols can be devised. To facilitate conversion of MiTS compliant software, this standard's application level services represent a superset of the services supplied by MiTS

3.20

MTU – maximum transmission unit

longest message length over a given T-profile

3.21

octet

an eight-bit data entity (or termed a byte). An octet is the smallest transmission unit that is discussed in this standard. Any data entity transported over the network will consist of an integral number of octets

3.22

open systems interconnection (OSI)

This standard makes references to the ISO/OSI standard reference model for open systems interconnection [ISO/IEC 7498], but it does not adhere to that standard with regard to the exact services provided. The ISO/OSI standard is sometimes used as a reference for the naming of the individual layers in the protocol stack (see figure 2)

The following conventions apply:

- with respect to functionality, the protocol definitions cover the session, the presentation and the application layers of the OSI model (the A-profile);
- the protocol requires a set of transport services. The services can possibly be supplied by any number of different transport protocol stacks (T-profiles). The standard transport protocols will be defined in part 410 of this standard;
- this standard does not describe the A-profile as layered. This standard merges all the upper three layers of the ISO/OSI model into one protocol;
- this standard refers to the companion standards or user layer as a distinct protocol layer on top of the application layer.

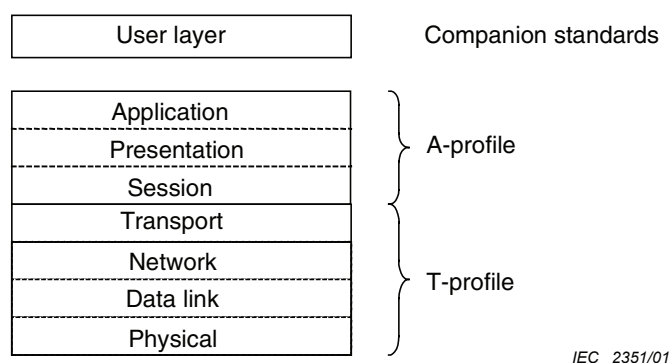


Figure 2 – Protocol layering

3.23

PFS – PISCES foundation specifications

standard set of companion standards, used to ensure a certain degree of vendor independent interoperability

3.24

PISCES

the name of a European Commission sponsored research and development project that contributed to the conversion of the former *MiTS* specification to this international standard