
Pomorska navigacijska in radiokomunikacijska oprema in sistemi - Digitalni vmesniki - 450. del: Več govorcev in poslušalcev - Povezovanje prek eterneta

Maritime navigation and radiocommunication equipment and systems - Digital interfaces - Part 450: Multiple talkers and multiple listeners - Ethernet interconnection

Navigations- und Funkkommunikationsgeräte und -systeme für die Seeschifffahrt - Digitale Schnittstellen - Teil 450: Mehrere Datensender und mehrere Datenempfänger - Ethernet-Verbund

Matériels et systèmes de navigation et de radiocommunication maritimes - Interfaces numériques - Partie 450: Émetteurs multiples et récepteurs multiples - Interconnexion Ethernet

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SECRETARIAT:

United Kingdom

SECRETARY:

Mr Kim Fisher

OF INTEREST TO THE FOLLOWING COMMITTEES:

PROPOSED HORIZONTAL STANDARD:

Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.

FUNCTIONS CONCERNED:

 EMC ENVIRONMENT QUALITY ASSURANCE SAFETY SUBMITTED FOR CENELEC PARALLEL VOTING NOT SUBMITTED FOR CENELEC PARALLEL VOTING**Attention IEC-CENELEC parallel voting**

The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting.

The CENELEC members are invited to vote through the CENELEC online voting system.

This document is still under study and subject to change. It should not be used for reference purposes.

Recipients of this document are invited to submit, with their comments, notification of

- any relevant patent rights of which they are aware and to provide supporting documentation,
- any relevant "in some countries" clauses to be included should this proposal proceed. Recipients are reminded that the enquiry stage is the final stage for submitting "in some countries" clauses. See AC/22/2007.

TITLE:

Maritime navigation and radiocommunication equipment and systems – Digital interfaces – Part 450: Multiple talkers and multiple listeners – Ethernet interconnection

PROPOSED STABILITY DATE: 2028

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**MARITIME NAVIGATION AND RADIOCOMMUNICATION
EQUIPMENT AND SYSTEMS –
DIGITAL INTERFACES –****Part 450: Multiple talkers and multiple listeners –
Ethernet interconnection**

FOREWORD

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International Standard IEC 61162-450 has been prepared by IEC technical committee 80: Maritime navigation and radiocommunication equipment and systems.

This third edition of IEC 61162-450 cancels and replaces the second edition published in 2018. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) clarification of serial to network gateway function (SNGF) in 4.5 with the addition of two new figures;
- b) addition of further destination multicast addresses and port numbers in 6.2;

- c) clarification of TAG block parameters in 7.2 together with Annex B, a new Annex H and associated tests in 8.9.4;
- d) clarification of the sender process for binary files in 7.3.6 and the receiver process for binary files in 7.3.7 with updated Figure 6 and Figure 7;
- e) clarifications of SFI collision detection and use of SRP sentence in 7.5 together with a new Annex G;
- f) revision of tests for handling malformed data received on the serial line in 8.5.5.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
80/xxx/FDIS	80/xxx/RVD

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

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

A list of all parts in the IEC 61162 series, published under the general title *Maritime navigation and radiocommunication equipment and systems -Digital interfaces*, can be found on the IEC website.

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

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

MARITIME NAVIGATION AND RADIOCOMMUNICATION EQUIPMENT AND SYSTEMS – DIGITAL INTERFACES –

Part 450: Multiple talkers and multiple listeners – Ethernet interconnection

1 Scope

This part of IEC 61162 specifies interface requirements and methods of test for high speed communication between shipboard navigation and radiocommunication equipment as well as between such systems and other ship systems that need to communicate with navigation and radio-communication equipment. This document is based on the application of an appropriate suite of existing international standards to provide a framework for implementing data transfer between devices on a shipboard Ethernet network.

This document specifies an Ethernet based bus type network where any listener can receive messages from any sender with the following properties.

- This document includes provisions for multicast distribution of information formatted according to IEC 61162-1, for example position fixes and other measurements, as well as provisions for transmission of general data blocks (binary file), for example between radar and VDR, and also includes provisions for multicast distribution of information formatted according to IEC 61162-3, for example position fixes and other measurements.
- This document is limited to protocols for equipment (network nodes) connected to a single Ethernet network consisting only of OSI level one or two devices and cables (Network infrastructure).
- This document provides requirements only for equipment interfaces. By specifying protocols for transmission of IEC 61162-1 sentences, IEC 61162-3 PGN messages and general binary file data, these requirements will guarantee interoperability between equipment implementing this document as well as a certain level of safe behaviour of the equipment itself.
- This document permits equipment using other protocols than those specified in this document to share a network infrastructure, provided that it is supplied with interfaces which satisfy the requirements described for ONF.
- This document includes provisions for filtering of the network traffic in order to limit the amount of traffic to manageable level for each individual equipment.

This document does not contain any system requirements other than the ones that can be inferred from the sum of individual equipment requirements. An associated standard, IEC 61162-460, further addresses system requirements.

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 60825-2, *Safety of laser products – Part 2: Safety of optical fibre communication systems (OFCS)*

- 47 IEC 60945, *Maritime navigation and radiocommunication equipment and systems – General*
48 *Requirements – Methods of testing and required test results*
- 49 IEC 61162-1, *Maritime navigation and radiocommunication equipment and systems – Digital*
50 *interfaces – Part 1: Single talker and multiple listeners*
- 51 IEC 61162-3:2008, *Maritime navigation and radiocommunication equipment and systems –*
52 *Digital interfaces – Part 3: Serial data instrument network*
- 53 IEEE Std 802.3-2015, *IEEE Standard for Ethernet*
- 54 ISOC RFC 768, *User Datagram Protocol, Standard STD0006*
- 55 ISOC RFC 791, *Internet Protocol (IP), Standard STD0005 (and updates)*
- 56 ISOC RFC 792, *Internet Control Message Protocol (ICMP), Standard STD0005 (and updates)*
- 57 RFC 793:1981, *Transmission Control Protocol (TCP)*
- 58 ISOC RFC 826, *An ethernet Address Resolution Protocol*
- 59 ISOC RFC 1112, *Host Extensions for IP Multicasting, Standard STD0005 (and updates),*
60 *(include IGMP version 1)*
- 61 ISOC RFC 1918, *Address Allocation for Private Internets, Best Current Practice BCP0005*
- 62 ISOC RFC 2236, *Internet Group Management Protocol, Version 2*
- 63 ISOC RFC 2474, *Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6*
64 *Headers*
- 65 ISOC RFC 3376, *Internet Group Management Protocol, Version 3*
- 66 ISOC RFC 5000, *Internet Official Protocol Standards, Standard 0001*
- 67 ISOC RFC 5227, *IPv4 Address Conflict Detection*
- 68 ISOC RFC 5424, *The Syslog Protocol*
- 69 NOTE The standards of the Internet Society (ISOC) are available on the IETF websites <http://www.ietf.org>. Later
70 updates can be tracked at <http://www.rfc-editor.org/rfcsearch.html>.

71 **3 Terms and definitions**

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

73 **3.1**

74 **ASCII**

75 printable 7 bit character encoded in one byte

76 **3.2**

77 **binary file**

78 data block without formatting known to this protocol, i.e., non IEC 61162-1 formatted data,
79 that can be transmitted with the protocol defined in 7.3 or in 7.5

80 Note 1 to entry: The term "binary file" is used to differentiate the general data transfer protocol (which may or may
81 not be in ordinary text format) from the transmission of sentences that is always in 7 bit ASCII format.

82 3.3

83 byte

84 group of 8 bits treated as one unit

85 Note 1 to entry: This corresponds to what is also sometimes called an octet.

86 3.4

87 command-response pair

88 CRP

89 messages exchanged between parties that synchronize state changes on both sides through
90 the exchange

91 Note 1 to entry: CRP are defined in Annex A.

92 Note 2 to entry: Both the command and the reply message may also be used as a sensor broadcast message in
93 some cases. Thus, the implementation of the semantics of the message exchange is somewhat different between
94 different users of the exchange.

95 3.5

96 datagram

97 atomic UDP transmission unit on the Ethernet as defined in ISOC RFC 768 and as
98 constrained elsewhere in this document

99 3.6

100 Ethernet

101 carrier sense, multiple access collision detect (CSMA/CD) local area network protocol
102 standard as defined in IEEE Std 802.3 and later revisions and additions to IEEE 802

103 Note 1 to entry: The types of Ethernet media that can be used for implementation of this document are defined in
104 Clause 5.

105 3.7

106 function block

107 specified functionality implemented by equipment

108 Note 1 to entry: Equipment normally implements multiple function blocks. Requirements to equipment are the sum
109 of requirements to the function blocks it implements. Function blocks are defined in Clause 4.

110 3.8

111 Internet Group Management Protocol

112 IGMP

113 communications protocol used by hosts and adjacent routers on IPv4 networks to establish
114 multicast group memberships

115 Note 1 to entry: The IGMP is an integral part of IP multicast.

116 3.9

117 IGMP snooping

118 process of listening to Internet Group Management Protocol (IGMP) network traffic

119 3.10

120 Internet assigned number authority

121 IANA

122 global coordination of the Domain Name Server (DNS) Root, IP addressing, and other Internet
123 protocol resources, including UDP and TCP port numbers

124 Note 1 to entry: The currently assigned numbers are listed in <http://www.iana.org/assignments/port-numbers>.

- 125 **3.11**
126 **Internet protocol**
127 **IP**
128 signalling protocol used and defined in ISOC RFC 791 (and updates)
- 129 **3.12**
130 **message**
131 collection of one or more sentences that are grouped by mechanisms internal to the sentence,
132 for instance by sequence numbers as in the TXT sentence
- 133 Note 1 to entry: A stand-alone sentence is a message.
- 134 **3.13**
135 **message type**
136 classification of IEC 61162-1 sentence formatters into SBM, MSM and CRP types
- 137 Note 1 to entry: SBM, MSM and CRP types are defined in Annex A.
- 138 Note 2 to entry: This document defines different requirements to the transmission of different message types.
- 139 **3.14**
140 **multi-sentence message**
141 **MSM**
142 logical group of messages and/or sentences where the full meaning of the group is dependent
143 on the receiver reading the full group
- 144 Note 1 to entry: Multi-sentence messages that are grouped together with a TAG construct are also a sentence
145 group.
- 146 Note 2 to entry: MSM are defined in Annex A.
- 147 **3.15**
148 **network**
149 physical Ethernet network with one Internet address space, consisting only of the network
150 nodes, switches, cables and supporting equipment such as power supply units
- 151 **3.16**
152 **network function block**
153 **NF**
154 function block responsible for physical connectivity to the network and connectivity to the
155 transport layer as described in 4.3
- 156 **3.17**
157 **network infrastructure**
158 part of the network that provides a transmission path between network nodes
- 159 Note 1 to entry: The network nodes are not part of the network infrastructure.
- 160 **3.18**
161 **network node**
162 physical device connected to the network and which have an Internet address
- 163 Note 1 to entry: It is also called an Internet host.
- 164 Note 2 to entry: A network node will normally correspond to equipment. "Equipment" is used in this document.
- 165 **3.19**
166 **other network function block**
167 **ONF**
168 function block that interfaces to the network, but which is not using the protocol definition in
169 Clauses 5, 6 and 7

170 Note 1 to entry: For example, real time streaming of radar and CCTV image transfer, or VDR sound transfer.

171 Note 2 to entry: Requirements as defined in 4.7 ensure that an ONF can co-reside with SF network nodes and
172 function blocks that make use of this document's protocol.

173 3.20

174 PGN to network gateway function block

175 PNGF

176 function block that enables transfer of sentences between the network and devices that are
177 compliant with the IEC 61162-3 serial data instrument network interface

178 3.21

179 PGN message

180 parameter group number message

181 message consisting of an 8-bit or 16-bit number that identifies each parameter group

182 Note 1 to entry: The parameter group number (PGN) is analogous to the three-character sentence formatter in
183 IEC 61162-1. By definition, parameter groups identified by 16-bit parameter group numbers are broadcast to all
184 addresses on the network. Parameter groups identified by 8-bit parameter group numbers may be used to direct
185 data for use by a specific address.

186 [SOURCE: IEC 61162-3:2008, 3.1.21, modified – The word "message" has been added to the
187 term, and the definition has been rephrased.]

188 3.22

189 sensor broadcast message

190 SBM

191 message consisting of only one sentence

192 Note 1 to entry: SBMs are sent with a sufficiently high update rate to ensure that the receiver can maintain the
193 correct status even in environments where some messages may be lost.

194 Note 2 to entry: SBMs are defined in Annex A.

195 3.23

196 sentence

197 standard information carrying unit as described in IEC 61162-1

198 3.24

199 sentence group

200 logical group of sentences (which may consist of only one) that need to be processed together
201 to give full meaning to the information contained in the sentence(s)

202 Note 1 to entry: The grouping of sentences into sentence group is done by TAG block mechanisms.

203 Note 2 to entry: This document allows the explicit grouping of sentences by using coding in a datagram. This
204 document does not enforce any relationship between datagram and sentence group. Thus a datagram may contain
205 more than one sentence group, or a sentence group may be split over two or more datagrams.

206 3.25

207 serial to network gateway function block

208 SNGF

209 function block that enables transfer of sentences between the network and devices that are
210 compliant with the IEC 61162-1 and IEC 61162-2 serial line interface

211 Note 1 to entry: One SNGF may contain several system function blocks which each have their own SFI.
212 Furthermore, the SNGF itself has an SFI for administrative purposes.

213 3.26

214 system function block

215 SF

216 function block, identified by a unique system function ID (SFI), that is the only function block
217 that can send information in a datagram format as defined in Clause 7