

# INTERNATIONAL STANDARD



**Maritime navigation and radiocommunication equipment and systems –  
Digital interfaces –  
Part 460: Multiple talkers and multiple listeners – Ethernet interconnection –  
Safety and security**

IEC 61162-460:2018

<https://standards.iteh.ai/catalog/standards/iec/9c93783f-3271-47fd-a70f-a9fbd27b6ffd/iec-61162-460-2018>



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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**MARITIME NAVIGATION AND RADIOCOMMUNICATION  
EQUIPMENT AND SYSTEMS –  
DIGITAL INTERFACES –****Part 460: Multiple talkers and multiple listeners –  
Ethernet interconnection – Safety and security**

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International Standard IEC 61162-460 has been prepared by IEC technical committee 80: Maritime navigation and radiocommunication equipment and systems.

This second edition of IEC 61162-460 cancels and replaces the first edition published in 2015. This edition constitutes a technical revision.

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

- a) 460-Switches and 460-Forwarders are required to implement IGMP snooping;
- b) connection between secure and non-secure areas requires a 460-Forwarder as an isolation element;
- c) SFI collision detection added as function of network monitoring;
- d) 460-Gateway and 460-Wireless gateway are no longer required to report to the network monitoring;
- e) all alerts from network monitoring have standardized alert identifiers.

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

FDIS	Report on voting
80/879/FDIS	80/884/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.

This International Standard is to be used in conjunction with IEC 61162-450:2018.

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

## Part 460: Multiple talkers and multiple listeners – Ethernet interconnection – Safety and security

### 1 Scope

This part of IEC 61162 is an add-on to IEC 61162-450 where higher safety and security standards are needed, for example due to higher exposure to external threats or to improve network integrity. This document provides requirements and test methods for equipment to be used in an IEC 61162-460 compliant network as well as requirements for the network itself and requirements for interconnection from the network to other networks. This document also contains requirements for a redundant IEC 61162-460 compliant network.

~~This standard extends the informative guidance given in Annex D of IEC 61162-450:2011.~~  
This document does not introduce new application level protocol requirements to those that are defined in IEC 61162-450.

### 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 61162-450:2014 2018, *Maritime navigation and radiocommunication equipment and systems – Digital interfaces – Part 450: Multiple talkers and multiple listeners – Ethernet interconnection*

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*

IEEE 802.1D-2004, *IEEE Standard for Local and metropolitan area networks: Media Access Control (MAC) Bridges*

IEEE 802.1Q-2005, *IEEE Standard for Local and metropolitan area networks: Virtual Bridged Local Area Networks*

INTERNET SOCIETY (ISOC). RFC 792, *Internet Control Message Protocol (ICMP), Standard STD0005 (and updates) [online]*. Edited by J. Postel. September 1981 [viewed 2018-01-08]. Available at <https://tools.ietf.org/html/rfc792>

INTERNET SOCIETY (ISOC). RFC 1112, *Host Extensions for IP Multicasting* [online]. Edited by S. Deering. August 1989 [viewed 2018-01-08]. Available at <https://www.ietf.org/rfc/rfc1112.txt>

INTERNET SOCIETY (ISOC). RFC 1157, *A Simple Network Management Protocol (SNMP)* [online]. Edited by J. Case et al. May 1990 [viewed 2018-01-08]. Available at <https://tools.ietf.org/html/rfc1157>

INTERNET SOCIETY (ISOC). RFC 2021, *Remote Network Monitoring Management Information Base* [online]. Edited by S. Waldbusser. January 1997 [viewed 2018-01-08]. Available at <https://tools.ietf.org/html/rfc2021>

INTERNET SOCIETY (ISOC). RFC 2236, *Internet Group Management Protocol, Version 2* [online]. Edited by W. Fenner. November 1997 [viewed 2018-01-08]. Available at <https://tools.ietf.org/html/rfc2236>

INTERNET SOCIETY (ISOC). RFC 2819, *Remote Network Monitoring Management Information Base* [online]. Edited by S. Waldbusser. May 2000 [viewed 2018-01-08]. Available at <https://tools.ietf.org/html/rfc2819>

INTERNET SOCIETY (ISOC). RFC 3411, *An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks* [online]. Edited by D. Harrington. December 2002 [viewed 2018-01-08]. Available at <https://www.ietf.org/rfc/rfc3411.txt>

INTERNET SOCIETY (ISOC). RFC 3577, *Introduction to the RMON family of MIB modules* [online]. Edited by S. Waldbusser. August 2003 [viewed 2018-01-08]. Available at <https://tools.ietf.org/html/rfc3577>

INTERNET SOCIETY (ISOC). RFC 4604, *Using Internet Group Management Protocol Version 3 (IGMPv3) and Multicast Listener Discovery Protocol Version 2 (MLDv2) for Source-Specific Multicast* [online]. Edited by H. Holbrook et al. August 2006 [viewed 2018-01-08]. Available at <https://tools.ietf.org/html/rfc4604>

INTERNET SOCIETY (ISOC). RFC 5424, *The Syslog Protocol* [online]. Edited by R. Gerhards. March 2009 [viewed 2018-01-08]. Available at <https://tools.ietf.org/html/rfc5424>

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61162-450 and the following 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

##### 450-Node

device compliant with IEC 61162-450 and which satisfies additional requirements specified in this document

Note 1 to entry: This also includes nodes only implementing the ONF function block.

**3.2****460-Forwarder**

network infrastructure device that can safely exchange data streams between a 460-Network and other controlled networks including other 460-Networks

**3.3****460-Gateway**

network infrastructure device that connects 460-Networks and uncontrolled networks and which satisfies the safety and security requirements as specified in this document

**3.4****460-Network**

network which consists of only 460-Nodes, 460-Switches, 460-Forwarder, 460-Gateway and 460-Wireless gateway as well as 450-Nodes

**3.5****460-Node**

device compliant with the requirement of a 450-Node and which satisfies the safety and security requirements as specified in this document

**3.6****460-Switch**

network infrastructure device used to interconnect nodes on a 460-Network and which satisfies the safety and security requirements as specified in this document

**3.7****460-Wireless gateway**

network infrastructure device that connects a 460-Network and wireless networks and which satisfies the safety and security requirements as specified in this document

**3.8****advanced encryption standard****AES**

symmetric-key block cipher algorithm which is based on a substitution-permutation network (SPN) and does not use the data encryption standard (DES) Feistel network

Note 1 to entry: This note applies to the French language only.

**3.9****alarm**

highest priority of an alert, announcing a situation or condition requiring immediate attention, decision and, if necessary, action by the bridge team, to maintain the safe navigation of the ship

**3.10****application level gateway**

network infrastructure device that connects 460-Networks with other networks and which satisfies the safety and security requirements as specified in this document

**3.11****backdoor**

installed program allowing remote access to a computer by providing a method of bypassing normal authentication

**3.12****controlled network**

any network that has been designed to operate such that authorities are satisfied by documented evidence that the network does not pose any security risks to any connected network nodes

Note 1 to entry: For example, any IEC 61162-450 compliant network that is approved by classification society, flag state or recognized organization (RO).

**3.13**  
**category B alert**

alert where no additional information for decision support is necessary besides the information which can be presented at the central alert management HMI

**3.14**  
**caution**

lowest priority of an alert

Note 1 to entry: "Caution" raises a bridge team's awareness of a condition which does not warrant an alarm or warning condition, but still requires attention out of the ordinary consideration of the situation or of given information.

**3.15**  
**demilitarized zone**  
**DMZ**

physical or logical sub-network that contains and exposes an organization's external-facing services to a larger and un-trusted network, usually Internet

Note 1 to entry: This note applies to the French language only.

**3.16**  
**denial of service**  
**DoS**

attempt to prevent legitimate users from accessing a machine or network resource

Note 1 to entry: This note applies to the French language only.

**3.17**  
**flow**

combination of the following information: source and destination MAC address, source and destination IP address, protocol, source and destination ~~UDP/TCP~~ port number

**3.18**  
**failure mode and effects analysis**  
**FMEA**

method as specified in IEC 60812 for the analysis of a system to identify the potential failure modes, their causes and effects on system performance

**3.19**  
**failure mode, effects and criticality analysis**  
**FMECA**

analytic method as specified in IEC 60812 that includes a means of ranking the severity of the failure modes

Note 1 to entry: FMECA extends FMEA by including a criticality analysis, which is used to chart the probability of failure modes against the severity of their consequences.

**3.20**  
**internet control message protocol**  
**ICMP**

protocol according to ISOC RFC 792

Note 1 to entry: This note applies to the French language only.

### 3.21 internet group management protocol IGMP

protocol according to ISOC RFC 1112 (version 1), ISOC RFC 2236 (version 2) and ISOC RFC 4604 (version 3)

Note 1 to entry: This note applies to the French language only.

### 3.22 loss rate

amount of lost data by the receiving device of a flow as lost packets per total amount of packets, measured at the input port of a device

Note 1 to entry: The loss rate is expressed in percent.

### 3.23 malware malicious code

software used or created to disrupt computer operation

### 3.24 maximum network load

cumulative maximum amount of all traffic from all network nodes and network infrastructure components of a single 460-Network

Note 1 to entry: The maximum network load is measured in bytes per second (B/s).

### 3.25 maximum transmission rate

maximum number of bytes per second that can be transmitted by a network node or network infrastructure equipment

### 3.26 multiple spanning tree protocol MSTP

protocol, according to IEEE 802.1Q, which is an extension of RSTP for VLANs

Note 1 to entry: This note applies to the French language only.

### 3.27 neighbour MAC address

MAC (media access control) address of connected 450-Node or 460-Node as seen by 460 Switch and as reported by SNMP (simple network management protocol)

### 3.28 network infrastructure component

device that connect at least two nodes in a 460-Network and two different networks, such as 460-Switch, 460-Forwarder, 460-Gateway and 460-Wireless gateway

### 3.29 nominal network capacity

network capacity as a byte rate which is based on the configuration

Note 1 to entry: The capacity is the lowest capacity of any switch in the network to route all traffic.

Note 2 to entry: This is used for specifying capabilities of equipment.

### 3.30 other network function ONF

function block that interfaces to the network as specified in IEC 61162-450