

INTERNATIONAL STANDARD



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

Document Preview

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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**

FOREWORD

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

This third edition cancels and replaces the second edition published in 2018 and Amendment 1:2020. This edition constitutes a technical revision.

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

- a) term application server in the 460-Gateway has been changed to application service and application services have been clarified;
- b) based on field experience the alert limit of the network monitoring load has been changed from 80 % to 90 %;

- c) default time for escalation of a warning to an alarm has been changed from max 60 seconds to max 5 minutes as allowed by IMO BAM rules and escalation from caution to warning has been removed from the use of direct access;
- d) recorded event size in network monitoring function has been changed from 1 000 bytes to 1 472 bytes (i.e. size of an ethernet datagram in the network);
- e) requirements have been incorporated for cyber resilience given by the International Association of Classification Societies (IACS) in their documents UR E26 and UR E27. A new Annex H has been added giving a cross reference between the IACS documents and this document.

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

Draft	Report on voting
80/1103/FDIS	80/1112/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

This International Standard is to be used in conjunction with IEC 61162-450:2023.

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.

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- reconfirmed,
- withdrawn, or
- revised.

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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 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 61162-450:2023, *Maritime navigation and radiocommunication equipment and systems – Digital interfaces – Part 450: Multiple talkers and multiple listeners – Ethernet interconnection*

IEC 62923-1, *Maritime navigation and radiocommunication equipment and systems – Bridge alert management – Part 1: Operational and performance requirements, methods of testing and required test results*

IEC 62923-2, *Maritime navigation and radiocommunication equipment and systems – Bridge alert management – Part 2: Alert and cluster identifiers and other additional features*

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

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

ISOC RFC 792, *Internet Control Message Protocol (ICMP), Standard STD0005 (and updates)*
Available at <https://tools.ietf.org/html/rfc792>

ISOC RFC 1112, *Host Extensions for IP Multicasting*
Available at <https://www.ietf.org/rfc/rfc1112.txt>

ISOC RFC 1157, *A Simple Network Management Protocol (SNMP)*
Available at <https://tools.ietf.org/html/rfc1157>

ISOC RFC 2021, *Remote Network Monitoring Management Information Base Version 2*
Available at <https://tools.ietf.org/html/rfc2021>

ISOC RFC 2236, *Internet Group Management Protocol, Version 2*
Available at <https://tools.ietf.org/html/rfc2236>

ISOC RFC 2819, *Remote Network Monitoring Management Information Base*
Available at <https://tools.ietf.org/html/rfc2819>

ISOC RFC 3411, *An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks*
Available at <https://www.ietf.org/rfc/rfc3411.txt>

ISOC RFC 3577, *Introduction to the Remote Monitoring RMON family of MIB modules*
Available at <https://tools.ietf.org/html/rfc3577>

ISOC RFC 4604, *Using Internet Group Management Protocol Version 3 (IGMPv3) and Multicast Listener Discovery Protocol Version 2 (MLDv2) for Source-Specific Multicast*
Available at <https://tools.ietf.org/html/rfc4604>

ISOC RFC 5424, *The Syslog Protocol*
Available at <https://tools.ietf.org/html/rfc5424>

3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://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 exchange data streams between a 460-Network and other controlled networks including other 460-Networks

3.3

460-Gateway

network infrastructure device that connects to 460-Networks and to uncontrolled networks or controlled 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**

high-priority alert, condition requiring immediate attention and action by the bridge team, to maintain the safe navigation and safe operation of the ship

[SOURCE: IEC 62923-1]

3.10**backdoor**

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

3.11**controlled network**

any network that has been designed to operate such that authorities are satisfied by documented evidence that the network minimises the 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).

3.12**controlled shutdown**

defined way to switch off equipment under normal operating conditions

Note 1 to entry: For example, via the power button to initiate orderly shutdown without data loss or corruption using Advanced Control Power Interface (ACPI).

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

[SOURCE: IEC 62923-1]

3.14**caution**

lowest-priority alert, 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

[SOURCE: IEC 62923-1]

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

physical or logical sub-network that contains and exposes an organization's external-facing services to a larger and untrusted 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 port number

3.18**external data source****EDS**

network or non-network data source, including, but not limited to REDS, excluding 460-Network for which the equipment belongs [IEC 61162-460:2024](https://standards.iteh.ai/catalog/standards/iec/7b5a8077-635b-4009-a577-30c098f21a03/iec-61162-460-2024)

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3.19**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

3.20**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.

3.21**firewall**

logical or physical barrier that monitors and controls incoming and outgoing network traffic controlled via predefined rules

[SOURCE: IACS UR E27]

3.22**internet control message protocol****ICMP**

protocol according to ISOC RFC 792

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

3.23
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.

3.24
least privilege

security concept in which a user is given the minimum levels of access or permissions needed to perform their work

3.25
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.

3.26
malware
malicious code

software used or created to compromise computer operation

3.27
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).

3.28
maximum transmission rate

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

3.29
multi-factor authentication

authentication using two or more distinct factors to achieve authentication

Note 1 to entry: Factors are: 1) something you know (e.g., password/personal identification number); 2) something you have (e.g., cryptographic identification device, token); and 3) something you are (e.g., biometric).

3.30
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.

3.31
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)