IEC 62320-2

Edition 1.0 2008-03

INTERNATIONAL STANDARD

Maritime navigation and radiocommunication equipment and systems – Automatic identification system (AIS) – Part 2: AIS AtoN Stations – Operational and performance requirements, methods of testing and required test results

IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland
Email: inmail@iec.ch
Web: www.iec.ch

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

PRICE CODE XD

ICS 47.020.70

ISBN 2-8318-9620-7

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

MARITIME NAVIGATION AND RADIOCOMMUNICATION EQUIPMENT AND SYSTEMS – AUTOMATIC IDENTIFICATION SYSTEM (AIS) –

Part 2: AIS AtoN Stations – Operational and performance requirements, methods of testing and required test results

FOREWORD

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International Standard IEC 62320-2 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
80/507/FDIS	80/518/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 2.

A list of all parts of IEC 62320 series, under the general title: *Maritime navigation and radiocommunication equipment and systems – Automatic Identification System (AIS)* can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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- withdrawn,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

A bilingual version of this publication may be issued at a later date.

MARITIME NAVIGATION AND RADIOCOMMUNICATION EQUIPMENT AND SYSTEMS – AUTOMATIC IDENTIFICATION SYSTEM (AIS) –

Part 2: AIS AtoN Stations – Operational and performance requirements, methods of testing and required test results

1 Scope

This part of IEC 62320 specifies the operational and performance requirements, methods of testing and required test results for AIS AtoN Stations compatible with the performance standards adopted by IMO Res. MSC.74(69), annex 3, Universal AIS. It incorporates the technical characteristics of non-shipborne AIS AtoN equipment, included in Recommendation ITU-R M.1371 and IALA Recommendation A-126. Where applicable, it also takes into account the ITU Radio Regulations. This standard takes into account other associated IEC International Standards and existing National Standards, as applicable.

This standard is applicable for Automatic Identification System (AIS) installations on Aids to Navigation (AtoN).

2 Normative references

The following referenced documents are indispensable for the application 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 61108-1, *Maritime navigation and radiocommunication equipment and systems – Global navigation satellite systems (GNSS) – Part 1: Global positioning system (GPS) – Receiver equipment – Performance standards, methods of testing and required test results*

IEC 61108-2, *Maritime navigation and radiocommunication equipment and systems – Global navigation satellite systems (GNSS) – Part 2: Global navigation satellite system (GLONASS) – Receiver equipment – Performance standards, methods of testing and required test results*

IEC 61108-4, *Maritime navigation and radiocommunication equipment and systems – Global navigation satellite systems (GNSS) – Part 4: Shipborne DGPS and DGLONASS maritime radio beacon receiver equipment – Performance requirements, methods of testing and required results*

IEC 61162-1, *Maritime navigation and radiocommunication equipment and systems – Digital interfaces – Part 1: Single talker and multiple listeners*

IEC 62287-1, *Maritime navigation and radiocommunication equipment and systems – Class B shipborne equipment of the automatic identification system (AIS) – Part 1: Carrier-sense time division multiple access (CSTDMA) techniques*

ITU Radio Regulations, Appendix 18, *Table of transmitting frequencies in the VHF maritime mobile band*

ITU-R Recommendation M.1371, *Technical characteristics for an automatic identification system using time division multiple access in the VHF maritime mobile band*

ITU-T Recommendation O.153, *Basic parameters for the measurement of error performance at bit rates below the primary rate*

IALA Recommendation A-126, *The Use of Automatic Identification System (AIS) in Marine Aids to Navigation*

3 Terms, definitions and abbreviations

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

3.1 Definitions

3.1.1
Aids to Navigation
(AtoN)
device or system external to vessels that is designed and operated to enhance the safe and efficient navigation of vessels and/or vessel traffic

3.1.2
Message 21
AtoN report transmitted on the VHF data link by an AIS station

3.1.3
Real AIS AtoN
AIS AtoN station which is physically located on the AtoN

3.1.4
Synthetic AIS AtoN
Message 21 transmitted from an AIS station located remotely from the AtoN

3.1.5
Virtual AIS AtoN
Message 21 transmitted from an AIS station for an AtoN which does not physically exist

3.2 Abbreviations

AES	Advanced Encryption Standard
AIS	Automatic Identification System
BIIT	Built-in Integrity Tests
BT	Bandwidth Time Product
CSTDMA	Carrier Sense Time Division Multiple Access
DGNSS	Differential Global Navigation Satellite System
EPFS	Electronic Position Fixing System
EUT	Equipment Under Test
FATDMA	Fixed Access Time Division Multiple Access
GNSS	Global Navigation Satellite System
IMO	International Maritime Organisation
MAC	Medium Access Control
MMSI	Maritime Mobile Service Identity
NRZI	Non-Return to Zero Inverted

PER	Packet Error Rate
PI	Presentation Interface
RAIM	Receiver Autonomous Integrity Monitoring
RATDMA	Random Access Time Division Multiple Access
RF	Radio Frequency
Rx	Receive
SBAS	Satellite-Based Augmentation System
SOTDMA	Self Organizing Time Division Multiple Access
TDMA	Time Division Multiple Access
Tx	Transmit
UTC	Universal Time Co-ordinated
VDL	VHF Data Link
VSWR	Voltage Standing Wave Ratio

NOTE Abbreviations related to IEC 61162 series are not included in the above list. For their meaning refer to that International Standard.

4 Description

4.1 Types of AIS AtoN Stations

There are three types of AIS AtoN Stations as defined in Table 1. The AIS AtoN Stations may optionally include additional capabilities as defined in the “Alternatives” column.

Table 1 – Description of AIS AtoN Stations

Requirements	Type 1 AIS AtoN Station	Type 2 AIS AtoN Station	Type 3 AIS AtoN Station	Alternatives
VDL receiver	No receiver	Receiver for control functions only	Two receiving processes for autonomous mode	
Transmitted messages	21			21 plus one or more of 6, 8, 12, 14, 25 and other appropriate messages (Types 1, 2 and 3) plus 7, 13 (Type 3 only)
Access mode for Message 21	FATDMA			FATDMA and RATDMA (Type 3 only)
Access Mode for messages other than 21, if implemented				FATDMA (Types 1 and 2) One or more of FATDMA, RATDMA or CSTDMA (Type 3)
Configuration / communication method	Defined by manufacturer			Defined by the manufacturer with standard sentences (Types 1, 2 and 3)

Table 1 *(continued)*

Requirements	Type 1 AIS AtoN Station	Type 2 AIS AtoN Station	Type 3 AIS AtoN Station	Alternatives
Physical communication interface	None			The electrical and physical characteristics shall be defined by the manufacturer. (Types 1, 2 and 3)
Transmit power	12,5 W			As defined by the manufacturer (Types 1, 2 and 3)
Transmitter capability	Dual channel			Single channel (Types 1, 2 and 3)
Synthetic and Virtual AtoN	No			Yes (Types 1, 2 and 3)
Positioning device	EPFS and surveyed position			Surveyed position only (no EPFS) (Types 1, 2 and 3)
UTC synchronisation	Direct only			Direct, indirect or semaphore (Type 3)
Assignment	Shall not respond to assignment Messages 16 and 23			
Interrogation	Shall not respond to interrogation Message 15			

4.2 Type 1 AIS AtoN Station

Type 1 AIS AtoN Station has no receiver. It transmits on FATDMA slots given in its configuration. Figure 1 shows the functional block diagram of a Type 1 AIS AtoN Station.

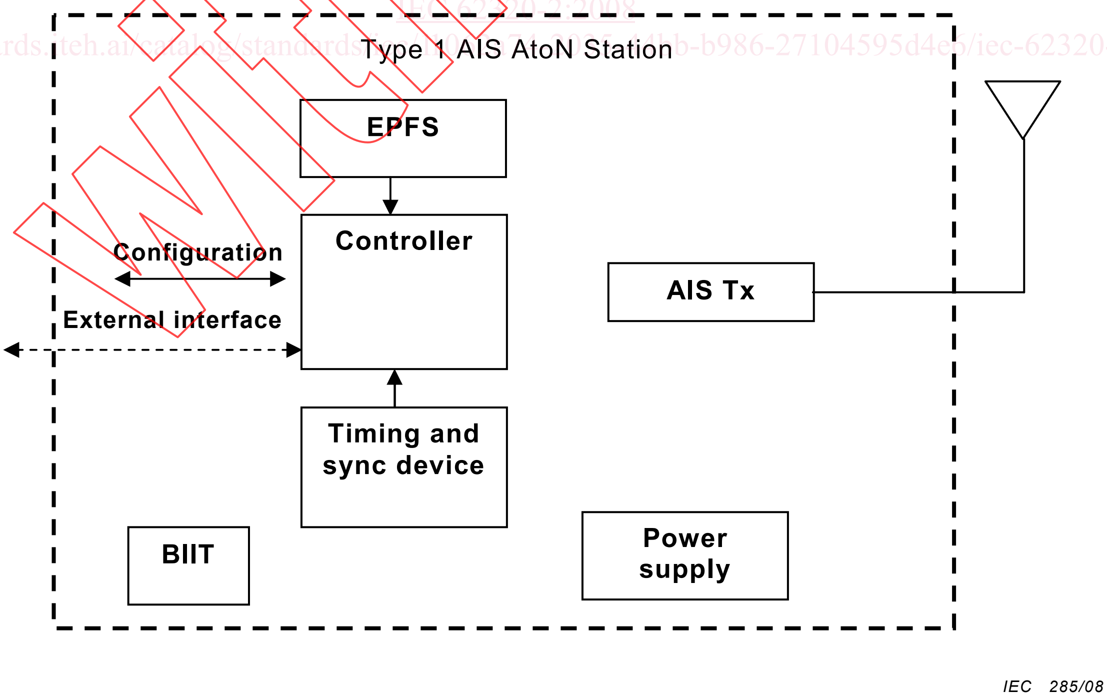

Figure 1 – Functional block diagram of a Type 1 AIS AtoN Station

4.2.1 Type 1 AIS AtoN Station characteristics

The characteristics of the Type 1 AIS AtoN Station are:

- transmits using FATDMA;
- no receive capability, therefore:
  - cannot be configured via the VDL,
  - cannot synchronise to other stations;
- configuration interface as defined by the manufacturer;
- 12,5 W transmitter power;
- dual channel transmission.

4.2.1.1 Controller

The controller composes Message 21 and ensures the correct operation of the AIS AtoN Station on the VDL.

4.2.1.2 Timing and synchronisation device

This device provides the time and synchronisation for the controller.

4.2.1.3 Power supply

The power supply generates the internal voltages.

4.2.1.4 BIIT

The Built-in Integrity Tests (BIIT) shall provide integrity monitoring.

4.2.1.5 EPFS

Electronic Position Fixing System (EPFS) provides the current position of the AtoN.

4.2.1.6 Configuration

The interface used to configure the AIS AtoN Station.

4.2.2 Capability

Type 1 AIS AtoN Station is capable of transmitting Message 21 using FATDMA.

4.2.3 Type 1 AIS AtoN Station – Alternatives

4.2.3.1 Additional controller capability

In addition to Message 21, the controller shall compose optional output messages to the VDL using FATDMA as described in Table 2.