

7.4 Automatic Identification System (AIS) Class A fact sheet



Automatic Identification System (AIS) Class A

What is AIS?

The Automatic Identification System (AIS) is included in the International Convention for the Safety of Life at Sea (SOLAS), and large ships began fitting AIS in July 2002. AIS transmits, automatically and at set intervals, dynamic information relating to the ships course, speed and heading; static information related to the ships name, length, breadth; and voyage related details such as cargo information and status (underway, at anchor).

AIS is a Very High Frequency (VHF) radio broadcasting system that transfers packets of data over the VHF data link (VDL) and enables AIS equipped vessels and shore-based stations to send and receive identification information that can be displayed on a computer or chart plotter.

This information can assist in situational awareness and provide a means to assist in collision avoidance. In addition, AIS can be used as an aid to navigation, by providing location and additional information on buoys and lights.

The Types and Classes of AIS

There are two classes of AIS, Class A and Class B, as well as different types of AIS used for shore stations (AIS Base Stations), aids to navigation (AIS AtoN), AIS on search and rescue (SAR) aircraft and AIS search and rescue transmitters (AIS SART). See Table 1.

Shipborne AIS Equipment Description

Each AIS Class A station consists of one VHF transmitter, two VHF receivers (AIS 1 and AIS 2), one VHF DSC receiver (Ch. 70), a standard marine electronic communications link and sensor input from different onboard systems. Timing and positional information comes from a GNSS (global navigation satellite system – such as GPS).

How it Works

AIS works in an automatic, continuous manner regardless of where the vessel is located – the high seas, coastal waters or inland waterways. AIS uses a time-division multiple access (TDMA) scheme to share the VHF

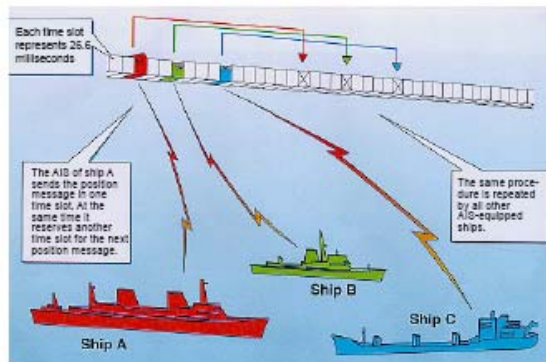
Table 1 – Types and Classes of AIS

AIS Class A	Class A has been mandated by the International Maritime Organization (IMO) for vessels of 300 gross tonnage and upwards engaged on international voyages, cargo ships of 500 gross tonnage and upwards not engaged on international voyages, as well as passenger ships (more than 12 passengers), irrespective of size.
AIS Class B	Class B provides limited functionality and is intended for non-SOLAS vessels. It is not mandated by the International Maritime Organization (IMO) and has been developed for non-SOLAS commercial and recreational vessels.
AIS Base Station	Base Stations are provided by an aids to navigation authorities to enable the ship to shore / shore to ship transmission of information. Networked AIS Base Stations can assist in providing overall maritime domain awareness.
AIS aids to navigation (AtoN)	AIS AtoN provide an opportunity to transmit position and status of buoys and lights through the same VDL, which can then show up on an electronic chart, computer display or compatible radar.
AIS SART	Search and Rescue Transmitters using AIS can be used to assist in determining the location of a vessel in distress.
AIS on Search and Rescue (SAR) Aircraft	Search and Rescue Aircraft may use AIS to assist in their operations.

frequency, also known as the VHF Data Link (VDL). There are two dedicated frequencies used for AIS – AIS 1 (161.975 MHz, also known as channel 87B) and AIS 2 (162.025 MHz, also known as channel 88B). Each of the frequencies are divided into 2250 time slots that are repeated every 60 seconds, and the AIS units send packets of information which are transmitted on these 'slots'. At the same time, AIS units in range are listening to the timeslots, and can receive the information.

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There are different technical means of transmitting in these slots. AIS Class A use a self-organised approach (STDMA or SOTDMA) while AIS Class B units may use a carrier-sense approach (CSTDMA). Base stations use fixed slots (known as FATDMA) while AIS Aids to Navigation have an option to use FATDMA or a random access process called RATDMA, depending on the type of unit.



Principles of SOTDMA

Functionality and Capability

The IMO Performance Standard for AIS requires that the system should be capable of operating:

- In the ship-to-ship mode, to assist in collision avoidance.
- As a means for littoral States to obtain information about a ship and its cargo.
- As a VTS tool, i.e. ship-to-shore (traffic management).

This functionality is further expanded in the Performance Standard to require the capability of:

- Operating in a number of modes:
 - an “autonomous and continuous” mode for operation in all areas. This mode should be capable of being switched to/from one of the following alternate modes by a competent authority;
 - an “assigned” mode for operation in an area subject to a competent authority responsible for traffic monitoring such that the data transmission interval and/or time slots may be set remotely by that authority; and
 - a “polling” or controlled mode where the data transfer occurs in response to interrogation from a ship or competent authority.
- Providing information automatically and continuously to a competent authority and other ships, without involvement of ship’s personnel.
- Receiving and processing information from other sources, including from a competent authority and from other ships.

- Responding to high priority and safety related calls with a minimum of delay.
- Providing positional and manoeuvring information at a data rate adequate to facilitate accurate tracking by a competent authority and other ships.

Message types and formats

AIS employs the principle of using a ship’s speed and manoeuvring status as a means of governing information update rates and ensuring the appropriate levels of positional accuracy for ship tracking. This is shown in Table 2. A similar process is applied to the content of ship information messages to ensure that the data being transferred is not encumbered with static or low priority information.

The different information types, identified as “static”, “dynamic” or “voyage related” are valid for different time periods and thus require a different update rate.

Information included in the various message types is:

- Static information: Every 6 minutes and on request
 - MMSI;
 - IMO number (where available);
 - Call sign & name;
 - Length and beam;
 - Type of ship; and
 - Location of the position-fixing antenna on the ship (aft of bow/ port or starboard of centreline).
- Dynamic information: Dependant on speed and course alteration (see Table 2)
 - Ship’s position with accuracy indication and integrity status;
 - Position time stamp (in UTC);
 - Course over ground (COG);
 - Speed over ground (SOG);
 - Heading;
 - Navigational status (e.g. at anchor, underway, aground etc. - this is input manually); and
 - Rate of turn (where available).
- Voyage related information: Every 6 minutes, when is data amended, or on request
 - Ship’s draught;
 - Hazardous cargo (type);
 - Destination and ETA (at masters discretion); and
 - Route plan (waypoints).
- Short safety-related messages:
 - Free format text message - sent as required.

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Dynamic data for AIS Class B units (message 18) is sent every 30 seconds if the speed over the ground (SOG) of the craft is greater than 2 knots or every 3 minutes if the SOG is equal to or less than 2 knots.

For both AIS Class A and AIS Class B static data is transmitted once every 6 minutes. [See the AIS Class B Fact sheet for more information.](#)

Table 2 - Reporting intervals for Dynamic Data on AIS Class A units

Ship's Manoeuvring Condition	Nominal Reporting Interval
Ships at anchor or moored and not moving faster than 3 knots	3 minutes
Ships at anchor or moored and moving faster than 3 knots	10 seconds
Ship 0-14 knots	10 seconds
Ship 0-14 knots and changing course	3 1/2 seconds
Ship 14-23 knots	6 seconds
Ship 14-23 knots and changing course	2 seconds
Ship >23 knots	2 seconds
Ship >23 knots changing course	2 seconds

Display Requirements

If there is navigational equipment capable of processing and displaying AIS information such as ECDIS, radar or an integrated system, then the AIS Class A mobile system may be connected to that system via the AIS Presentation Interface (PI). The PI (input/output) needs to meet the requirements of relevant IEC standards (latest edition of IEC 61162). At present, there are a number of AIS units that use the Minimum Keyboard Display (MKD) (Shown above) which provides text based or basic graphic display elements.



The revised IMO radar performance standards (IMO Resolution MSC.192(79) 2004) states that all new radars fitted to ships after July 2008 must be able to display AIS contacts. As AIS will be displayed on Radar, and may also be displayed on ECDIS, it is unlikely that the MKD will evolve, and it is more likely that radar and ECDIS will be used to display AIS data.

For AIS Class B, depending on the unit purchased, software is available to display AIS or it may be able to feed into an existing navigation display system.

Shore authorities have an option of a number of purpose built, off the shelf AIS display systems, as well as the ability to fuse with radar contacts to provide better tracking and overall situational awareness aspects.

For more information

To learn more about AIS, take the Australian Maritime Safety Authority's (AMSA) AIS interactive tutorial, found at www.amsa.gov.au/vesseltracking. Additional information is available from IMO and the International Association of Lighthouse Authorities (IALA).

In Australia, further information can be obtained from the following IMO related documents, or by contacting the Vessel Tracking Manager, AMSA.

[IMO Resolution A.917\(22\)](#)

[IMO Resolution A.956\(23\)](#)

[IMO SN Circ. 217](#)

[IMO SN Circ. 222](#)

[IMO SN Circ. 227](#)

[IMO SN Circ. 236](#)

[IMO SN Circ. 245](#)

[AMSA Marine Orders 21](#)

[AMSA Marine Notice 12/2005](#)

[AMSA Marine Notice 13/2005](#)