## Why is AIS provided?

It is fitted on ships for identification of ships and navigational marks. However, it is only an aid to navigation and should not be used for collision avoidance. Vessel Traffic Services (VTS) ashore use AIS to identify, locate and monitor vessels. The Panama Canal uses the AIS as well to provide information about rain along the canal as well as wind in the locSOLAS Requirements

The IMO Convention for the Safety Of Life At Sea (SOLAS) Regulation V/19.2.4 requires all vessels of 300 GT and above engaged on international voyages and all passenger ships irrespective of size to carry AIS onboard.

## AIS Types

1. **Class A:** Mandated for all vessels 300 GT and above engaged on international voyages as well as all passenger ships
2. **Class B:** Provides limited functionality and intended for non SOLAS vessels. Primarily used for vessels such as pleasure crafts

AIS operates principally on two dedicated frequencies or VHF channels:

* AIS 1: Works on 161.975 MHz- Channel 87B (Simplex, for ship to ship)
* AIS 2: 162.025 MHz- Channel 88B (Duplex for ship to shore)

It uses Self Organizing Time Division Multiple Access (STDMA) technology to meet the high broadcast rate. This frequency has a limitation of line of sight which is about 40 miles or so.

**#**  **Components of an AIS device**

Each AIS Class A and Class B device consists of

* one VHF transmitter,
* two VHF receivers,
* one VHF DSC receiver (separate receiver for Class A and mostly shared on Class B devices)
* an internal positioning module based on a global navigation satellite system (GNSS), e.g., GPS, GALILEO, Baidu or GLONASS. On larger vessels with class A AIS, the internal positioning module is only used as a fallback and position and movement information are normally taken from dedicated sensors (GPS, compass) via the NMEA link, as they provide higher accuracy.

Additionally, each Class A device includes

* standard marine electronic communication links (IEC 61162/NMEA 0183) to sensors (such as a GPS receiver, gyrocompass or rate of turn indicator) and electronic chart displays (ECDIS),
* a minimum keyboard and display (MKD),
* and a standard communication link for the marine pilot (Pilot Plug).

## Working

How does AIS work exactly? How do we obtain all this data?

Originally, AIS was used terrestrially, meaning the signal was sent from the boat to land, and had a range of roughly 20 miles (also taking into account the curvature of the earth). As ships began sailing further and further away from land, they began sending the signal to low orbit satellites, which then relayed information back to land. This meant ships could sail as far as they like, and we’d always have peace of mind knowing exactly where they are, and how they’re doing.

The AIS system consists of one VHF transmitter, two VHF TDMA receivers, one VHF DSC receiver, and a standard marine electronic communications link to shipboard display and sensor systems. Position and timing information is normally derived from an integral or external GPS receiver. Other information broadcast by the AIS is electronically obtained from shipboard equipment through standard marine data connections.

Although only one channel is necessary, each station transmits and receives over two radio channels to avoid interference and to avoid communication loss from ships. A position report from one AIS station fits into one of 2250 time slots established every 60 seconds. AIS stations continuously synchronize themselves to each other, to avoid overlap of slot transmissions.

It’s pretty easy to install as well, as AIS is generally integrated with ship bridge systems or multifunctional display, but installing a standalone system is as straightforward as plugging in a couple of cables and switching on the plug.

Data Transmitted

**1. Static Information (Every 6 minutes and on request):**

* MMSI number
* IMO number
* Name and Call Sign
* Length and Beam
* Type of ship
* Location of position fixing antenna

**2. Dynamic Information (Depends on speed and course alteration)**

* Ship’s position with accuracy indication
* Position time stamp (in UTC)
* Course Over Ground (COG)

**3. Voyage Related Information (Every 6 minutes, when data is amended, or on request)**

* Ship’s draught
* Type of cargo
* Destination and ETA
* Route plan (Waypoints)

**4. Short safety related messages**

* Free format text message addressed to one or many destinations or to all stations in the area. This content could be such as buoy missing, ice berg sighting etc

### AIS as a surveillance tool

In coastal waters, shore side authorities may establish automated AIS stations to monitor the movement of vessels through the area. Coast stations can also use the AIS channels for shore to ship transmissions, to send information on tides, NTMs and located weather conditions. Coastal stations may use the AIS to monitor the movement of hazardous cargoes and control commercial fishing operations in their waters. AIS may also be used for SAR operations enabling SAR authorities to use AIS information to assess the availability of other vessels in the vicinity of the incident.

### AIS as an aid to collision avoidance

AIS contributes significantly to the safety of navigation. All the information that is transmitted and received enhances the effectiveness of navigation and can greatly improve the situational awareness and the decision making process. As an assistant to the OOW, the tracking and monitoring of targets by the AIS as well as determining information on the CPA and TCPA adds great value to the safety of navigation overall. However, the user should not solely rely on the information from the AIS for collision avoidance. AIS is only an additional source of information for the OOW and only supports in the process of navigating the vessel. AIS can never replace the human expertise on bridge!

## Limitations of AIS

As with all navigational and/or electronic equipment, the AIS has limitations:

1. The accuracy of AIS information received is only as good as the accuracy of the AIS information transmitted
2. Position received on the AIS display might not be referenced to the WGS 84 datum
3. Over reliance on the AIS can cause complacency on the part of the OOW
4. Users must be aware that erroneous information might be transmitted by the AIS from another ship
5. Not all ships are fitted with AIS
6. The OOW must be aware that AIS, if fitted, might be switched off by a certain vessel thereby negating any information that might have been received from such ship
7. It would not be prudent for the OOW to assume that the information received from other ships might not be fully accurate and of precision that might be available on own vessel

To sum it up, the AIS only improves the safety of navigation by assisting the OOW/VTS or whatever entity. It’s pretty easy to install as well, as AIS is generally integrated with ship bridge systems or multifunctional display, but installing a standalone system is as straightforward as plugging in a couple of cables and switching on the plug.

There’s a lot more to AIS than meets the eye, we delve more into depth with the accompanying handbook both for beginners, and for those more well-versed in the world of AIS.

Download the Definitive Handbook on AIS by [Big Ocean Data](http://www.bigoceandata.com/) below for information:

[Download the Guide to AIS here](https://www.marineinsight.com/wp-content/uploads/2016/11/AiS-Whitepaper.pdf)