# AIS OVERVIEW

Automatic Identification System (AIS) is a relatively recent tool implemented for safety and tracking the positions of ships.
An on-board AIS system, using VHF frequencies, continuously broadcasts the vessel's name, MMSI number, radio callsign, along with detailed parameters like length, beam, draft, and tonnage.
It also broadcasts the vessel's speed, course, rate of turn, destination, and ETA.

Full transmitting AIS systems are very expensive, but the transmitted information can be received by pleasure boat owners using radios such as the aisALERT with a warning system incorporated, and nearby ships positions then plotted on a "radar" type display on a laptop. Unlike a radar, the display is unequivocal i.e. rain, sea and weather do not display as targets. Of course, neither do land masses or vessels who are not transmitting an AIS signal.
Additionally, as the ships name, MMSI number and radio callsign are displayed, DSC or conventional radio calls can be correctly addressed.

## HOW DOES IT WORK
Each shipboard (or base station) 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 a global navigation satellite system (e.g. GPS) receiver. Other information broadcast by the AIS, if available, is electronically obtained from shipboard equipment through standard marine data connections.
Heading information and course and speed over ground would normally be provided by all AIS-equipped ships. Other information, such as rate of turn, angle of heel, pitch and roll, and destination and ETA can also be provided.
The AIS transmitter normally works in an autonomous and continuous mode, regardless of whether the vessel is operating in the open seas,coastal or inland areas, or in port. Although only one channel is necessary, each station transmits and receives identical information over two radio channels to avoid interference problems, and to allow channels to be shifted without communications loss from other ships.
Frequencies used are 161.975 and 162.025 mHz
The system provides for automatic contention resolution between itself and other stations, whereby all AIS stations continuously synchronize themselves to each other, to avoid overlap of individual transmissions. Each transmission is only 30/1000 of a second (30mS) long.
The system coverage range is similar to other VHF applications. Its propagation is slightly better than that of radar, due to the much longer wavelength, so it's possible to "see" around bends and behind islands if the land masses are not too high. A typical value to be expected at sea is nominally 20 nautical miles, and this is largely dependant on the height of both the transmitting antenna (ship) and receiving unit (yacht).

**WHAT IS BROADCAST BY AIS?**
A Class A AIS unit (see below) broadcasts the following information every 2 to 10 seconds whilst underway, dependant on ship speed and rate of turn, and every 3 minutes while at anchor, all at a power level of 12.5 watts.

**The information broadcast includes:**
MMSI NUMBER - unique referenceable identification
NAVIGATION STATUS - such as "at anchor","under way","not under command".
RATE OF TURN - right or left, 0 to 720 degrees per minute
SPEED OVER GROUND - 1/10 knot resolution from 0 to 102 knots.
POSITION - differential GPS or other.
LONGITUDE AND LATITUDE - to 1/10000 minute
COURSE OVER GROUND - relative to true north to 1/10th degree
TRUE HEADING - 0 to 359 degrees derived from gyro input
TIME STAMP - The universal time to nearest second that this information was generated.
In addition, the Class A AIS unit broadcasts the following information every 6 minutes:
MMSI number - same unique identification used above, links the data above to described vessel
IMO number - unique referenceable identification (related to ship's construction)
RADIO CALL SIGN - international call sign assigned to vessel.
NAME - Name of ship, 20 characters are provided
TYPE OF SHIP - cargo,passenger etc - there is a table of possibilities that are available
DIMENSIONS OF SHIP - to nearest meter
DRAUGHT OF SHIP - 1/10 meter to 25.5 meters
DESTINATION - 20 characters are provided
ETA - month, day, hour, and minute in UTC
Location on ship where reference point for position reports is located.
Type of position fixing device - various options from differential GPS to undefined

**WHAT VESSEL'S ARE EQUIPPED WITH AIS?**
All ships of 300 gross tonnage and upwards engaged on international voyages and cargo ships of 500 gross tonnage and upwards not engaged on international voyages and passenger ships and tankers irrespective of size shall be fitted with AIS not later than December 2004

ITU-R Recommendation M.1371-1 describes the following types of AIS:
Class A
Shipborne mobile equipment intended for vessels meeting the requirements of IMO AIS carriage requirement, and is described above.
Class B
Shipborne mobile equipment provides facilities not necessarily in full accord with IMO AIS carriage requirements. The Class B is nearly identical to the Class A, except the Class B:
Has a reporting rate less than a Class A (e.g. every 30 sec. when under 14 knots, as opposed to every 12 sec. for Class A)
Does not transmit the vessel's IMO number or call sign
Does not transmit ETA or destination
Does not transmit navigational status
Is only required to receive, not transmit, text safety messages
Is only required to receive, not transmit, application identifiers (binary messages)
Does not transmit rate of turn information
Does not transmit maximum present static draught
Search and Rescue Aircraft
Aircraft mobile equipment, normally reporting every ten seconds.

Aids to Navigation
Shore-based station providing location of an aid to navigation.  Normally reports every three minutes.  This may eventually replace the racon.

AIS base station.
Shore-based station providing text messages, time synchronization, meteorological or hydrological information, navigation information, or position of other vessels. Normally reports every ten seconds.

The above is a brief non-technical overview of the AIS system. For further in-depth information the internet contains many useful sites. Check out US Coastguard at http://www.navcen.uscg.gov/enav/ais/how_AIS_works.htm  or our Links page.