The History of Development and Standardization of the AIS system -and it´s Future ??

Dr. Håkan Lans

Automatic ID System (AIS)

- AIS Overview - What is AIS?
- How AIS Works
- What AIS Broadcasts
- Types of AIS
- AIS Certification
- Carriage Requirements
- AIS References
- AIS Notices
- Frequently Asked Questions
- Ask a Question or Report an AIS Problem

Primary Mission Areas:

- Global Positioning System
- Differential GPS
- Nationwide DGPS
- LORAN C
- Inland River Vessel Movement Center
- Civil GPS Service Interface Committee
- Automatic Identification System
- Electronic Navigation & Charting

Maritime Information:

- USCG "Homeport" Website
- Vessel Traffic Services
- Global Maritime Distress and Safety System
- CG Nat'l Distress System
- Digital Selective Calling
- Marine Safety Information Broadcasts
- VHF Channels & Freqs
- MF & HF Channels
- Digital Selective Calling
- Nav Pubs and Documents
- Radio Watch Requirements

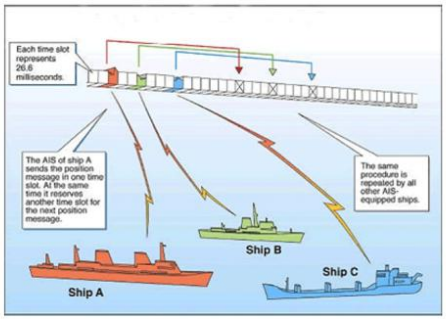
HOW AIS WORKS

How Does it Work?

Each AIS system consists of one VHF transmitter, two VHF TDMA receivers, one VHF DSC receiver, and standard marine electronic communications links (IEC 61162/NMEA 0183) to shipboard display and sensor systems (AIS Schematic). Position and timing information is normally derived from an integral or external global navigation satellite system (e.g. GPS) receiver, including a medium frequency differential GNSS receiver for precise position in coastal and inland waters. 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 could also be provided.

The AIS transponder normally works in an autonomous and continuous mode, regardless of whether it is operating in the open seas or coastal or inland areas. Transmissions use 9.6 kb GMSK FM modulation over 25 or 12.5 kHz channels using HDLC packet protocols. Although only one radio channel is necessary, each station transmits and receives over two radio channels to avoid interference problems, and to allow channels to be shifted without communications loss from other ships. The system provides for automatic contention resolution between itself and other stations, and communications integrity is maintained even in overload situations.

Each station determines its own transmission schedule (slot), based upon data link traffic history and knowledge of future actions by other stations. 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. Slot selection by an AIS station is randomized within a defined interval, and tagged with a random timeout of between 0 and 8 frames. When a station changes its slot assignment, it pre-announces both the new location and the timeout for that location. In this way new stations, including those stations which suddenly come within radio range close to other vessels, will always be received by those vessels.



The required ship reporting capacity according to the IMO performance standard amounts to a minimum of 2000 time slots per minute, though the system provides 4500 time slots per minute. The SOTDMA broadcast mode allows the system to be overloaded by 400 to 500% through sharing of slots, and still provide nearly 100% throughput for ships closer than 8 to 10 NM to each other in a ship to ship mode. In the event of system overload, only targets further away will be subject to drop-out, in order to give preference to nearer targets that are a primary concern to ship operators. In practice, the capacity of the system is nearly unlimited, allowing for a great number of ships to be accommodated at the same time.

The system coverage range is similar to other VHF applications, essentially depending on the height of the antenna. Its propagation is slightly better than that of radar, due to the 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. With the help of repeater stations, the coverage for both ship and VTS stations can be improved considerably.

The system is backwards compatible with digital selective calling systems, allowing shore-based GMDSS systems to inexpensively establish AIS operating channels and identify and track AIS-equipped vessels, and is intended to fully replace existing DSC-based transponder systems.

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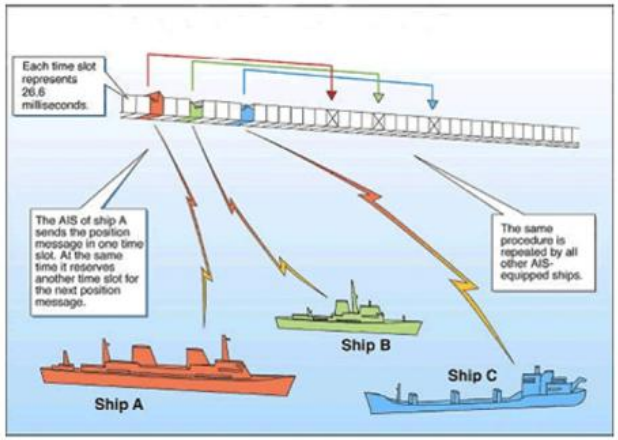

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Ship trackers 'vulnerable to hacking', experts warn

By Dave Lee
Technology reporter, BBC News

A system used globally to track marine activity is highly vulnerable to hacking, security experts have warned.

The researchers were able to spoof the route of boats

Weaknesses in outdated systems could allow attackers to make ships disappear from tracking systems - or even make it look like a large fleet was incoming.

Researchers at Trend Micro said their findings showed the danger of using legacy systems designed when security was not an issue.

But one vessel-tracking specialist said spoof attempts could be easily spotted.

Lloyd's List Intelligence's Ian Trowbridge said that in addition to the vulnerable technology - known as the Automatic Identification System (AIS) - other measures could be used to identify marine activity.

"The spoofing would immediately be identified by [Lloyd's List Intelligence] as a warp vessel," he said, "providing unexplained position reports outside of the vessel's speed/distance capability and thus subject to further investigation and validation."

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