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THE NAVIGATOR

Inspiring professionalism in marine navigators

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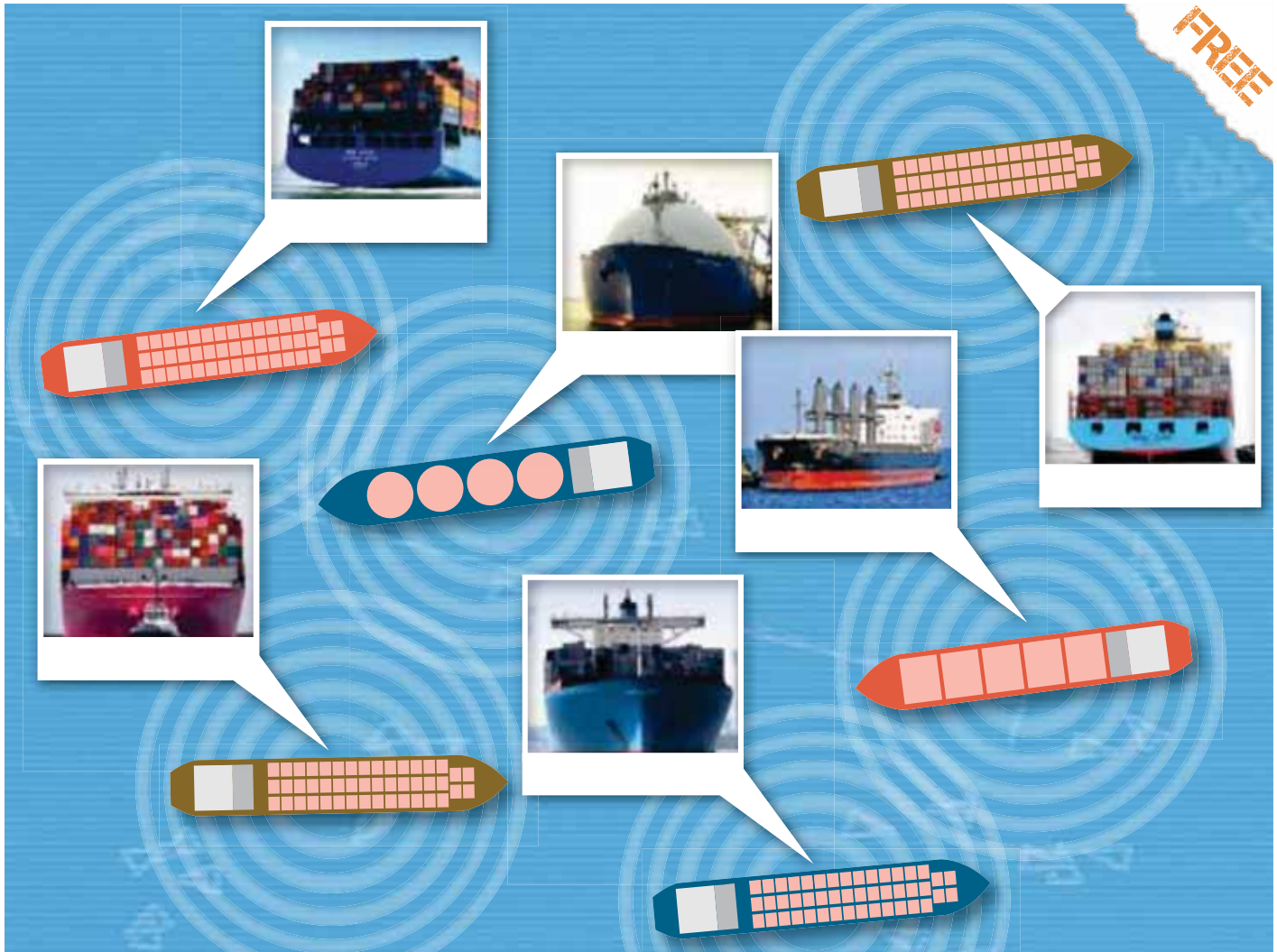

All about AIS

What AIS can do – and what it can't

A free publication by **The Nautical Institute** in association with the **Royal Institute of Navigation**

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NAV BRIEF

David Patraiko FNI
Director of Projects, The Nautical Institute

All about AIS

Automatic Identification System (AIS) has been a transformative technology for the shipping industry and navigators alike. Before AIS, it was common for a ship trying to hail another ship on VHF to try to describe them by location or range and bearing. This was an imperfect situation that often led to more confusion than conclusion.

Today, if you 'see' a ship you can clearly identify it by its AIS transmission. By clicking on the AIS symbol on the radar or ECDIS, a navigator can not only ascertain the vessel's name, but additional information like course, speed, and destination. All this may be useful information, but it must be considered alongside other data sources. As with all tools and techniques, a good navigator must understand the strengths and weaknesses in order to make good decisions.

AIS has significant strengths but also some key weaknesses. Strengths include being able to positively identify ships, even in poor visibility or when they are obscured by land. Weaknesses, however, stem from the fact that AIS is reliant on GNSS and VHF, can contain poor information that has been manually input and remains susceptible to either intentional or unintentional jamming and spoofing.

AS WITH ALL TOOLS AND TECHNIQUES, A GOOD NAVIGATOR MUST UNDERSTAND THE STRENGTHS AND WEAKNESSES OF AIS IN ORDER TO MAKE GOOD DECISIONS

Intentional GPS jamming can be the result of a wide range of reasons, including workers trying to avoid their vehicle being tracked or someone trying to create a 'quiet zone'. Unintentional jamming can come from solar flare activity or other electronic transmissions 'drowning out' a GPS signal in a local area. Spoofing is an intentional act where someone feeds false information to a GPS or AIS receiver that purposely gives a false position or incorrect data. There are quite a few reports of these kinds of activities available on the internet and YouTube.

Perhaps an even greater problem is the over-reliance that some people place on AIS to help them assess risk of collision. Rule 5 of the Colregs stipulates that a look out should be by 'all available means'. This should include AIS, of course, but AIS alone is not enough. Many navigation risks, such as small craft and other objects, do not have it. There is also a risk that if only AIS is overlaid on ECDIS, other objects such as radar targets might be overlooked.

In summary, AIS has undoubtedly become a valuable tool for the navigator; however, it should be properly understood and not over relied upon. Making the best use of AIS is an excellent topic to discuss with your bridge team, and we hope this edition of *The Navigator* is useful in starting some conversations.

INSIDE THIS ISSUE

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ALL AT SEA

Emma Ward

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We welcome your news, comments and opinions on the topics covered in *The Navigator*. We reserve the right to edit letters for space reasons if necessary. Views expressed by letter contributors do not necessarily reflect those held by The Nautical Institute

All about AIS

Anyone keen to learn more about AIS and its impact on today's navigators, is invited to take a look at the following resources.

If you spot any broken links, or would like to suggest resources that we have not included here, please do get in touch!

AIS 101

An extremely useful website that offers a huge amount of information about AIS and how it works in clear, simple language. It's also a great resource for technical information, AIS standards and FAQs.

You can take a look at it here: http://www.allaboutais.com/index.php/en/

Intelligent information from IALA

Follow this link to the website of IALA – the International Association of Marine Aids to Navigation and Lighthouse Authorities. Here, you will find extensive information about aids to navigation, including AIS, and updates and insights around many related issues.

Check it out: https://www.iala-aism.org/about-iala/

Paltry PPU position predictor

"The pilot's PPU was obtaining information from the vessel's AIS, which was subject to GPS 'smoothing'. As a result, the predicted vessel positions displayed on the PPU were not accurately reflecting the vessel's future positions, but the pilot was unaware of this."

Check out this vessel grounding report on The NI's website:
https://www.nautinst.org/resources-page/202332-paltry-ppu-position-predictor.html

Spoofing on the high seas

This YouTube video looks at a spoofing experiment carried out by a radio navigation team from the Cockrell School's Department of Aerospace Engineering and Engineering at the University of Texas. Find out how a custom-made GPS spoofing device was able to coerce a hypothetical 213-foot superyacht off its course.

Check it out at: https://www.youtube.com/watch?v=ctw9ECgJ8L0

AIS in America

Read up on the US Coast Guard requirements for AIS and make sure you are fully informed and up-to-date on this important issue. This comprehensive information centre also provides multiple vital resources for navigators and anyone with responsibility for maritime safety

More information here: https://www.navcen.uscg.gov/ais-requirements

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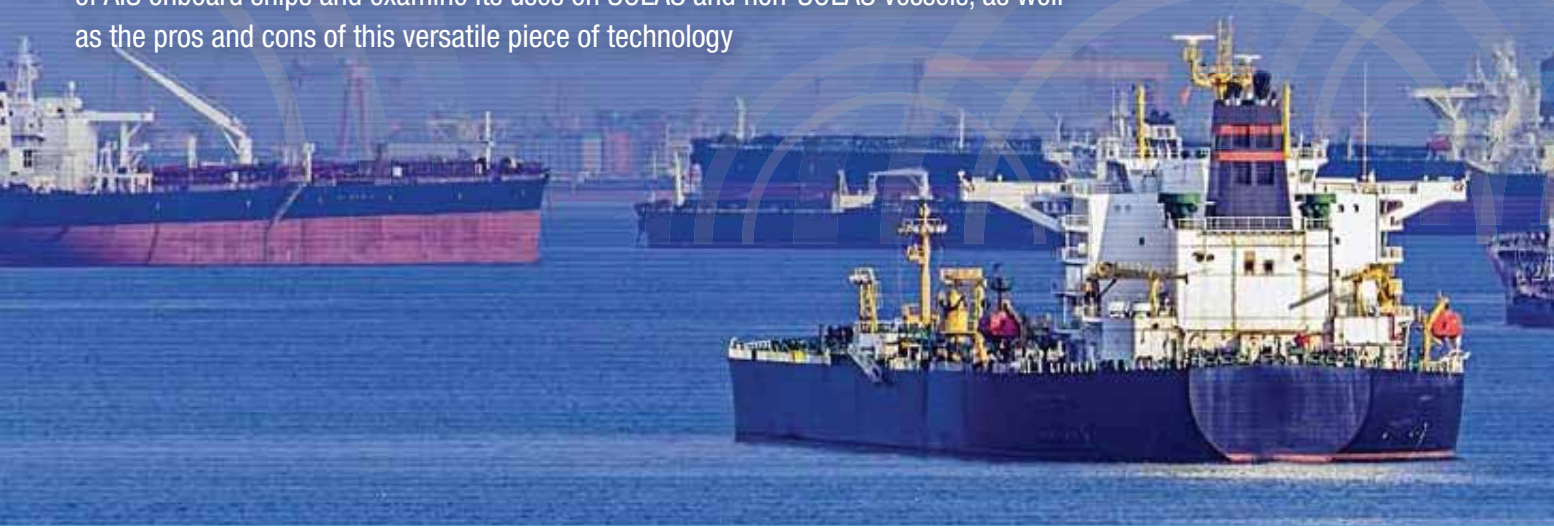
How AIS works and what it does

IALA regulates the global usage of AIS. Here, IALA Deputy Secretary-General **Omar Frits Eriksson** and Technical Operations Manager **Minsu Jeon** look at the evolution of AIS onboard ships and examine its uses on SOLAS and non-SOLAS vessels, as well as the pros and cons of this versatile piece of technology



Automatic Identification System (AIS) is a communications system that uses four worldwide channels in the VHF maritime mobile band to exchange navigation data. It came into being as a direct result of the need for heightened safety at sea. Following several maritime accidents, it became clear that a mechanism that could provide precise location details of ships was sorely needed, especially in traffic-intense zones or adverse weather conditions.

AIS automatically transmits key details about a vessel, including dynamic information, such as vessel position, heading, speed and rate of turn, provided by sensors onboard the vessel, plus static information, such as the ship's name, cargo and destination. There are numerous AIS devices, known as stations, which are identified by a unique Maritime Mobile Service Identity (MMSI)2. Each one uses an international open standard to communicate.

AIS stations are designed to operate autonomously, without requiring human interaction, whether from ship or from shore personnel. They may be instructed to transmit in a different manner – for example, they may be interrogated (polled), or be commanded to transmit more regularly, or on a different frequency (assignment).

Legal aspects of AIS

Carriage of AIS is mandated under SOLAS. In addition, AIS is required domestically on non-SOLAS vessels by some administrations.

AIS on SOLAS vessels must provide:

- Information exchange between vessels within VHF range of each other, to increase situational awareness
- Information exchange between a vessel and a shore station, such as a VTS, to improve traffic management in congested waterways
- Automatic reporting in areas of mandatory and voluntary reporting
- Exchange of safety related information between vessels, and between vessels and shore station(s).

The development of AIS has expanded to include such devices as AIS for marine aids to navigation (AIS AtoN), AIS on search and rescue aircraft and AIS search and rescue transmitters4 (AIS-SART).

SOLAS vessels

SOLAS vessels must carry a Class A AIS transponder.

These operate using SOTDMA broadcast mode (*see break-out box*) and transmit at a power level of 12.5 watts. Dynamic information, such as position and course, is transmitted every two to 10 seconds while underway, and every three minutes while at anchor.

Static and voyage related information, such as the vessel's name and cargo, is transmitted every six minutes.

Class A AIS transponders must have a DSC (156.525 MHz) receiver, external GPS, heading and rate of turn indicator, and can also transmit and receive safety-related text messages.

Non-SOLAS vessels

Non-SOLAS vessels may carry Class B AIS transponders.

These operate using CSTDMA broadcast mode and transmit at a power level of two watts. Dynamic data is transmitted every 30 to 180 seconds, while static data is transmitted every six minutes.

A DSC receiver and heading are optional. Transmitting safety-related text messages is also non-compulsory, and only available if pre-configured into the Class B AIS transponder.

Due to the fact that position data is updated less frequently, it may be less accurate for these ships than for SOLAS vessels. Bear in mind that, while many non-SOLAS vessels (including yachts and fishing boats) do carry AIS transponders, many do not. Even if they do, they may be switched

off, for example to keep fishing grounds a secret. Do not rely on AIS data to make decisions – it is there to help you, but you should use the radar and the window as your principal sources of information!

Benefits of AIS

> Enhanced safety: AIS assists in collision prevention. OOWs and maritime traffic managers can track the trajectory of proximate vessels, anticipate potential collision areas and take preventive measures in good time.
> Traffic management: AIS is invaluable for ports and harbours as it assists in organising incoming and outgoing traffic. This guarantees efficient berth allocation and refines traffic movements.
> Search and rescue: Should a ship face distress, AIS signals can direct rescue teams accurately, potentially saving lives.
> Data collection: Being digital, AIS data can be archived and studied, aiding in route refinement, fuel conservation and other maritime analyses.

Limitations and considerations

> VHF limitations: Given its dependence on VHF, AIS has a typical range of up to 20 nautical miles and in some circumstances more. However, satellite integrations are bridging this gap, introducing Satellite-AIS or S-AIS.
> Data precision: The accuracy of static AIS information hinges on the data input by the ship's personnel. Incorrect inputs yield inaccurate broadcasts.
> Over-reliance: Relying excessively on AIS can breed negligence. AIS should enhance, not replace, traditional navigation methods and watchfulness.

Types of AIS transmission

AIS uses various transmission types, tailored to different AIS products and their functionalities. Here's a concise breakdown:

Self-Organised Time Division Multiple Access (SOTDMA): Designed for Class A units, these reserve space in the AIS slot map

Carrier Sense Time Division Multiple Access (CSTDMA): Tailored for Class B units, these scan for available space in the AIS slot map

Fixed Access Time Division Multiple Access (FATDMA): Primarily used by AIS base stations and AIS aids to navigation

Random Access Time Division Multiple Access (RATDMA): Employed mainly by aids to navigation that are not under transmission space control by base stations. These scan for available space in the AIS slot map

Pre-Announced Time Division Multiple Access (PATDMA): Exclusively designed for search and rescue

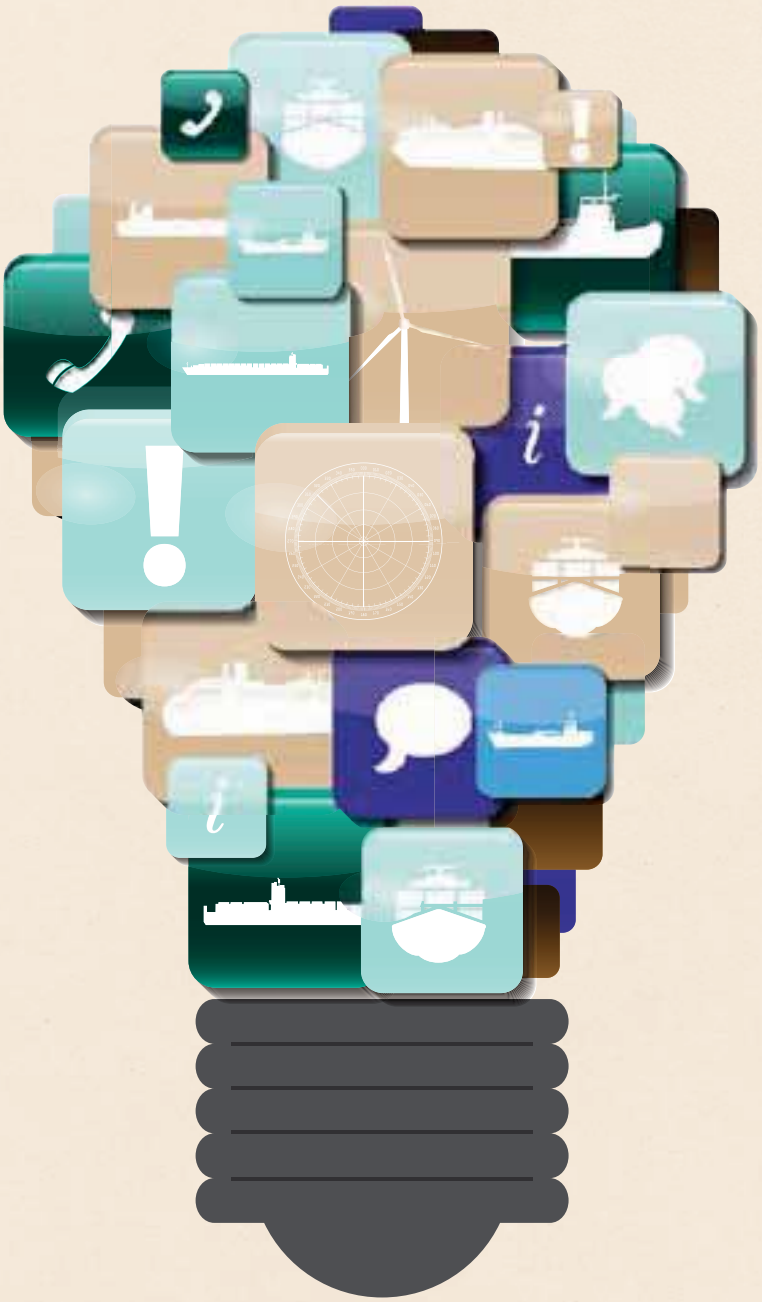
Incremental Time Division Multiple Access (ITDMA): Used by AIS devices to pre-announce their AIS data transmissions.

Into the future

AIS has proven instrumental in enhancing maritime safety, assisting in SAR missions and serving many other purposes. Nonetheless, it is imperative to recognise its limitations, such as constraints related to VHF range, vulnerability for cybersecurity and occasional data inaccuracies.

That said, AIS remains a shining example of how technology can revolutionise maritime operations. It underscores the sheer magnitude of technological potential in fostering safer and more efficient global transportation.

The evolution of AIS is driven persistently by technological breakthroughs. Satellite-AIS, for instance, has expanded its operational extent remarkably. On the horizon, VDES emerges as the next evolutionary step, announcing as AIS 2.0 for a future-ready maritime world.



Above and beyond:

Practical ways to use AIS on board ship

Gregor Stevens (Senior Manager Nautical) and **Arvind Natrajan** (Senior Marine Advisor Crewing and Training), of the International Chamber of Shipping, look at some of the ways in which AIS can be used on board ship – and a few points to bear in mind

Possibly the biggest benefit of AIS is the ability to identify ships by name and callsign. This can be helpful to the OOW in areas of increased traffic, such as coastal passage and port approaches. When the AIS output is interfaced with radar, the OOW can label targets of interest on the radar, such as anything that could turn into a collision risk. Coupled with information about the destination and ETA of the target, this assists immensely in improving situational awareness.

The advantage of interfacing the AIS with ECDIS is that, from an OOW's point of view, ECDIS will not only display own ship's progress in real-time, but will also display the progress of all the targets. This enables the OOW to look ahead towards the traffic density in other areas in the passage plan, possibly planning their own ship's progress more efficiently.

Both radar and AIS can be interfaced with ECDIS. If there is an inherent error on the target ship, the AIS symbol and radar echo of the target will not match. In such situations, *always* rely on the target's radar echo, whether on the radar or the ECDIS display, not on the AIS.

Data and situational awareness

Performance standards for AIS specify that transmission of data should take place with minimum involvement by the ship's personnel. Navigating officers are expected to use the information from the AIS to supplement data from other bridge equipment and enhance situational awareness.

For example, seeing the destination and ETA of a nearby vessel provided by AIS may help the Officer of the Watch (OOW) in predicting how that vessel is navigating, especially in a Traffic Separation Scheme (TSS) or restricted waters. However, remember that this information is only as good as the source it has been taken from – and this source may not be entirely accurate. AIS should never be used as the primary means of navigation; it should only ever be used as an aid.

AIS and visual lookout

Another AIS function is to provide the OOW with rate of turn (RoT) information of the target (depending on target ship size). On a radar, the heading information of a target is updated only when the radar processing unit has interpreted a series of consecutive echoes. In other words, heading information on a radar is accurate as long as the target is maintaining a constant heading. When a target is altering its heading (whether for collision avoidance or as part of a planned course manoeuvre), the heading information provided by the radar may be unreliable for several minutes. Since information from the target on the AIS is received via its GPS, the OOW can interpret the RoT information faster in order to understand if the target is manoeuvring.

In normal visibility, visual observation of the target's heading provides clearer evidence than the heading information given by the radar. This fact supports the important principle of maintaining a look out by 'all available means'. However, in the event of restricted visibility, this is a good example of how AIS can be used to enhance situational awareness.

It is also important to understand that AIS provides ground track information for the target. Even when a vessel has stopped its engine, AIS will still be able to show its progress due to prevalence of tide or current. The significance of this when manoeuvring in close proximity of other vessels or fixed-to-ground objects, such as navigation aids or shore objects, cannot be over-emphasised.

AIS and collision risk

Rule 5 of Colregs says that a vessel should use "sight and hearing" and "all available means" to assess the risk of collision.

The OOW should use AIS to help them appraise the situation. However, AIS should not be relied on solely when making decisions about collision avoidance. It should be considered an aid to navigation and should always be used together with sight, hearing, radar etc.

There have been some serious marine casualties in which the use of AIS by the OOW for collision avoidance purposes has been found to be a significant contributing factor.

Strengths and weaknesses of AIS

AIS is a carriage requirement for all vessels 300GT and above sailing on international voyages (SOLAS V). AIS must be active at all times, unless the Master has a specific reason to switch it off. Traditionally this would be in the case of a security threat to the vessel. However, we are seeing more occasions of AIS being turned off to make it harder to track vessels and their operations. The vast majority of merchant vessels do have an operating system that is switched on. However, the information that AIS transmits is only as good as the inputs that it receives. This means that it is not entirely reliable 100% of the time.

Despite this, AIS does give some very valuable information that may not be available from other sources. A ship's static information, including length, breadth, name and callsign, is always being transmitted. Voyage data, such as draught, cargo and distance, should be regularly updated by the OOW. The range of AIS is also much greater than radar, and it can be detected at distances of up to 60NM depending on circumstance. This allows it to play a vital role in search and rescue operations, for example.

AIS transponders are often fitted to small craft like yachts and fishing boats that may not be easily picked up by radar – although bear in mind that many small vessels do not carry AIS, and it is important to keep a sharp lookout. AIS can also be used in river navigation in situations where vessels may be hidden by radar due to the landscape, but can still be tracked with AIS. All of the above enhances overall situational awareness.

Conversely, AIS does have some weaknesses that must be taken into account. As already discussed, the data it produces can only be as accurate as the inputs from the other vessel. If the other vessel has a GPS error, it will transmit a position incorrectly and the radar return and AIS target will not overlay correctly. Erroneous inputs would also display CPA and TCPA's that do not correlate with the ARPA calculations.

Want to know more?

The following resources offer further insights and information around the subject of AIS and its use onboard ship:

Resolution A.1106(29) – *Guidelines for the onboard operational use of shipborne automatic identification systems (AIS)*

Resolution MSC.74(69) includes Recommendation on Performance Standards for Universal Automatic Identification System (AIS)

International Chamber of Shipping: *Bridge Procedures* guide

WATCH-OUT

In this series, we take a look at maritime accident reports and the lessons that can be learned

Erroneous AIS data led to a two-ship collision in poor visibility

What happened?

A containership and a gas carrier collided in dense fog, causing damage to both ships, but no injuries or pollution. The collision occurred in the early hours of the morning in a busy shipping area. The containership had come to a complete halt after receiving instructions to do so by local Pilots. The gas carrier was travelling forward, making its way towards a transfer position nearby.

The gas carrier's Master altered course to starboard, intending to pass the other vessel astern. Although he could not visibly see the containership, he used AIS data to inform his assessment of the situation. Unfortunately, he did not realise that the containership was not moving, as this was not detectable by the AIS. The Master's course change put his own vessel in direct line to collide with the other ship, which it did shortly after the alteration was made. Corrective action of applying full starboard rudder was attempted, however this happened too late to prevent the collision from happening.

Why did it happen?

- Despite the poor visibility and high levels of traffic in the area, the gas carrier's Master solely used AIS data to inform his course alterations. This was in spite of the official requirement to only use AIS to support safe navigation in strict compliance with the COLREGS. The Master's decisions about collision avoidance should have been based primarily on systematic visual and/or radar observations, not just on AIS.
- The AIS data received from the stationary vessel did not include sufficient information to reveal to the gas carrier that it was not moving forward. This caused the Master to input the wrong course alteration, as he believed the other ship to be in motion. Whenever a shipping situation requires analysis to determine the risk of collision, radar target and ARPA data should be used in preference to the received AIS information.
- Neither bridge team fully appreciated the risk of collision in sufficient time to take any meaningful action to avoid the incident. In addition, neither vessel received a collision warning from anyone ashore, despite the location being a designated vessel traffic service area.
- VHF radio conversations were taking place on the gas carrier at the time, proving a significant distraction to those on the bridge while the situation was unfolding.

What changes have been made?

- Both vessels have carried out internal audits and safety reviews following the collision and taken steps to prevent a recurrence.
- Both vessels have issued articles and circulars about the issues raised to their wider fleet, including safety requirements for navigating in restricted visibility.
- Additional training in the use of AIS and other collision avoidance techniques has been provided to bridge members involved in the incident.

THE MASTER'S DECISIONS ABOUT COLLISION AVOIDANCE SHOULD HAVE BEEN MADE ACCORDING TO THE COLREGS, I.E. BASED PRIMARILY ON SYSTEMATIC VISUAL AND/OR RADAR OBSERVATIONS, NOT JUST ON AIS

The Nautical Institute's Mariners' Alerting and Reporting Scheme (MARS) - *https://www.nautinst.org/resource-library/mars.html* - comprises a fully searchable database of incident reports and lessons, updated every month. If you have witnessed an accident or seen a problem, email Captain Paul Drouin at mars@nautinst.org and help others learn from your experience. All reports are confidential – we will never identify you or your ship.

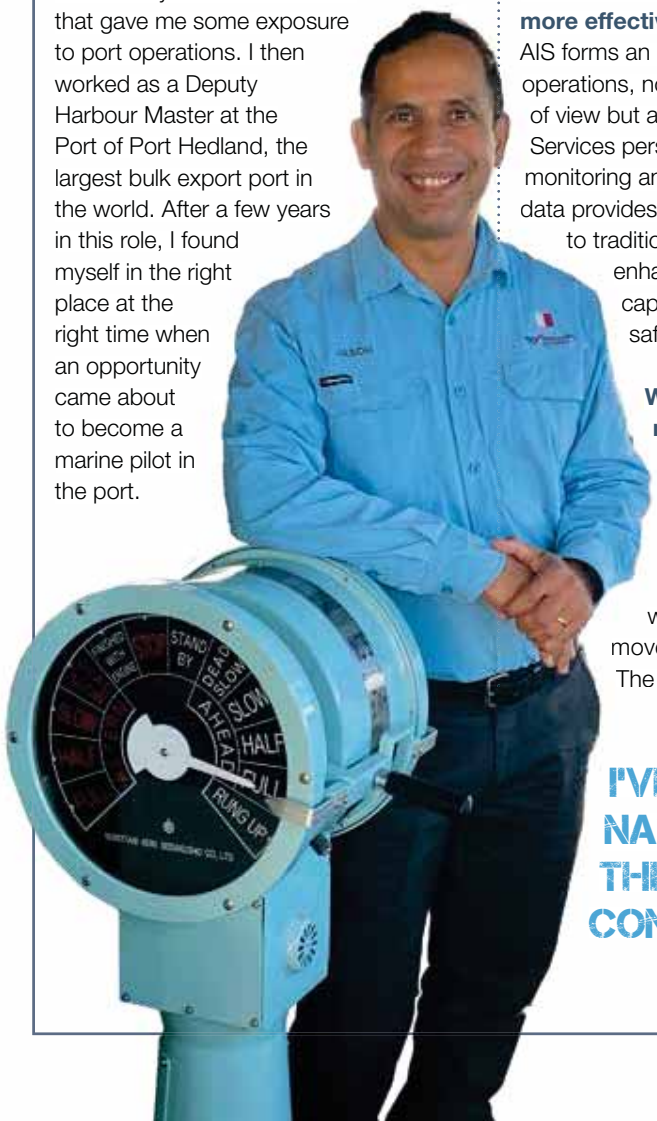
The right place at the right time

Marine Pilot **Jason Rebello AFNI** talks about his life as a pilot in Western Australia and how AIS forms an integral part of his role, from both a pilotage and VTS perspective

What career path led you to your current role?

I migrated to Australia immediately after marriage with hopes of starting our new life together in a whole new a whole new country. Before then, I was a content sailor at sea, having spent over two decades sailing on different types of ships, and in various ascending roles until I became a ship's Master.

I then spent a few years as a VTS operator at Reef VTS (in Townsville) followed by a stint in Brisbane that gave me some exposure to port operations. I then worked as a Deputy Harbour Master at the Port of Port Hedland, the largest bulk export port in the world. After a few years in this role, I found myself in the right place at the right time when an opportunity came about to become a marine pilot in the port.



What do you like best about working as a pilot?

I've always loved the dynamic nature of a navigator's role, and the thrill and satisfaction that comes with ship handling; becoming a marine pilot gives me the opportunity to do this on a daily basis and allows me to interact with ship crew regularly. I am honoured to be a part of an ancient tradition that goes back to the ancient Graeco-Roman empire.

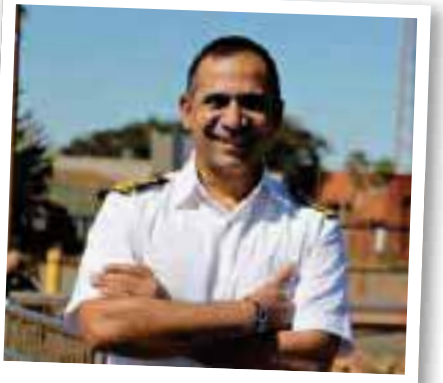
How does AIS help you do your job more effectively?

AIS forms an integral part of port operations, not just from a pilotage point of view but also from a Vessel Traffic Services perspective, in terms of traffic monitoring and vessel assistance. AIS data provides supplementary information to traditional radars and greatly enhances the decision-making capabilities, and in effect, port safety and efficiency.

What do you think are the main advantages and disadvantages of AIS?

Advantages include better decisions and better location tracking and information sharing, which means safer vessel movements and fewer collisions. The data is useful for vessel assistance and search and rescue scenarios, as well as for vessel tracking by port systems and maritime authorities.

As with all navigation equipment, users should remember that the system is not infallible and can give erroneous or spurious data at times. Mariners should be aware of the pitfalls of overreliance on external data and should always validate the information by cross-referencing from other sources and visual means. The loss of situational awareness during navigation, due to an overload of information and alarms, especially in dense traffic areas, is a matter of concern as well.



Name: Jason Rebello

Current position: Marine Pilot, Port Hedland, Western Australia

I'VE ALWAYS LOVED THE DYNAMIC NATURE OF A NAVIGATOR'S ROLE, AND THE THRILL AND SATISFACTION THAT COMES WITH SHIP HANDLING

George Shaw FRIN

‘Applying Information Safely’ – an alternative meaning for AIS

George Shaw from the Royal Institute of Navigation looks at how to use AIS safely and explores some of the risks that must be overcome to ensure its ongoing value

AIS has an intentionally open design, and data is unsecured, due to insufficient bandwidth. This means more vessels are likely to use it – but it can also leave users open to cybersecurity threats. These data security issues require mariners to use information provided by AIS with caution, and in conjunction with other information.

In isolation, the standalone picture presented by AIS can be untrustworthy, so mariners must use ‘all available means’ to assess vessel encounters. Unlike AIS, radar/ARPA is not easily jammed or spoofed and provides accurate relative information based on vessels’ movements through the water. You should base your avoidance actions primarily on radar data and frequent observation through the window, cautiously supplemented by AIS.

Is that vessel really there?

Since information transmitted by AIS is not authenticated, AIS signals can be easily spoofed to create false information, either creating non-existent vessels or misreporting positions of ships located elsewhere. In 2021, spoofed AIS reports of HMS *Defender* infamously appeared to show the vessel approaching Sevastopol while it was actually moored in Odessa.

Criminals can readily falsify AIS reports to offset own vessel positions away from sensitive areas. Inaccurate information can also occur unintentionally, due to mis-typed manual data entry or sensor errors. In addition, quality of data will vary according to the type and accuracy of sensors on the reporting vessel.

Crucially, positioning information on AIS is almost totally dependent on input from Global Navigational Satellite Systems (GNSS), which also have cybersecurity issues. GNSS are highly vulnerable to natural and deliberate interference. Low levels of jamming can introduce position offsets, sufficiently misleading to present a severe risk to the safety of navigation – with no alarm raised. Higher levels of jamming may prevent position fixing entirely, triggering bridge alarms, while subsequent drift in dead-reckoning may rapidly increase the uncertainty in position estimates.

IN 2021, SPOOFED AIS REPORTS OF HMS DEFENDER INFAMOUSLY APPEARED TO SHOW THE VESSEL APPROACHING SEVASTOPOL WHILE IT WAS ACTUALLY MOORED IN ODESSA

GNSS positioning can also be spoofed, potentially inducing gradual position offsets that are difficult to detect. Such position errors can be widely transmitted over AIS to multiple vessels, affecting their situational awareness, CPA calculations and collision alarms.

Treading cautiously

Digital services are expanding the use of AIS, for example in virtual aids-to-navigation that provide a valuable rapid response to incidents before physical intervention can take place. However, mariners must treat virtual indications cautiously, especially where there is no physical entity to cross-check. Additionally, the limited data capacity within AIS risks being overloaded by the rapid growth in maritime services. One solution currently under discussion at the IMO is the future VHF Data Exchange System (potentially ‘AIS2.0’), which would offer more data bandwidth, authentication and cyber resilience.

The inherent limitations of AIS are currently compounded by cyber vulnerabilities and may result in incomplete, uncertain data. These include:

- Vessels that are not fitted with AIS – and vessels legitimately switching off AIS in risk areas – are simply not visible.
- VHF transmissions are essentially line-of-sight, limiting reception to around 15-20NM, depending on antenna heights.
- Signals can be blocked by headlands and infrastructure, (although they may reach some radar blind spots).
- In heavy traffic, overload of message slots may prevent reception of in-range AIS reports.
- Unless there are specific ASM Area Notices, AIS will not warn of mammals crossing the vessel’s path.
- Consequently, mariners must treat AIS information with caution, always assessing and comparing all available sources of information.

TAKE 10

AIS is a hugely important tool for vessel safety and navgation, and its evolution is both rapid and ongoing. Here are ten important things to remember about AIS.

1
AIS transformation
AIS has been a transformative technology, both as a tool to help identify risk of collision but also aiding security and logistics.

2
Strengths
AIS is a powerful tool that allows ships to be better identified and seen in poor visibility or behind land. It is particularly useful when combined with radar and visual observations.

3
Weaknesses
AIS is completely reliant on GNSS (GPS) and VHF, so any disruption to those systems will affect it. The quality of AIS transmission depends on the accuracy (or not!) of manually entered data.

4
Beware over reliance
Navigators should never solely rely on AIS for making critical decisions. Remember that Rule 5 of the Colregs requires the use of all available means to assess collision risk.

5
What else is out there?
AIS is only mandatory for vessels of 300GT on international voyages. This means that many smaller vessels, including fishing boats and leisure craft, may not appear. Other navigation hazards, such as rocks and beacons that will be seen by radar or visually, will not be picked up by AIS.

6
Search and rescue
The range of AIS is much greater than radar. It can be detected up to 60NM away, and can play a vital role in search and rescue operations.

7
The off switch
AIS can be turned off with the explicit permission of the Master. Traditionally, this would be in the case of a security threat to the vessel. However, we are seeing more and more occasions of AIS being turned off simply to make it harder to track vessels and their operations.

8
Looking ahead
There are a number of AIS tracking websites available. These can be very useful for looking ahead, identifying congested areas and assisting with passage planning.

9
Into the future
The evolution of AIS is driven by technological breakthroughs. Satellite-AIS has remarkably expanded its operational extent. VHS Data Exchange System (VDES) is also emerging as the next evolutionary step, described as AIS 2.0.

10
Information sharing
When you have an opportunity, discuss with your bridge team how they use AIS and debate its pro and cons. Help new officers fully understand the strengths and weaknesses of AIS.

LIKE OUR TOP 10 TIPS?

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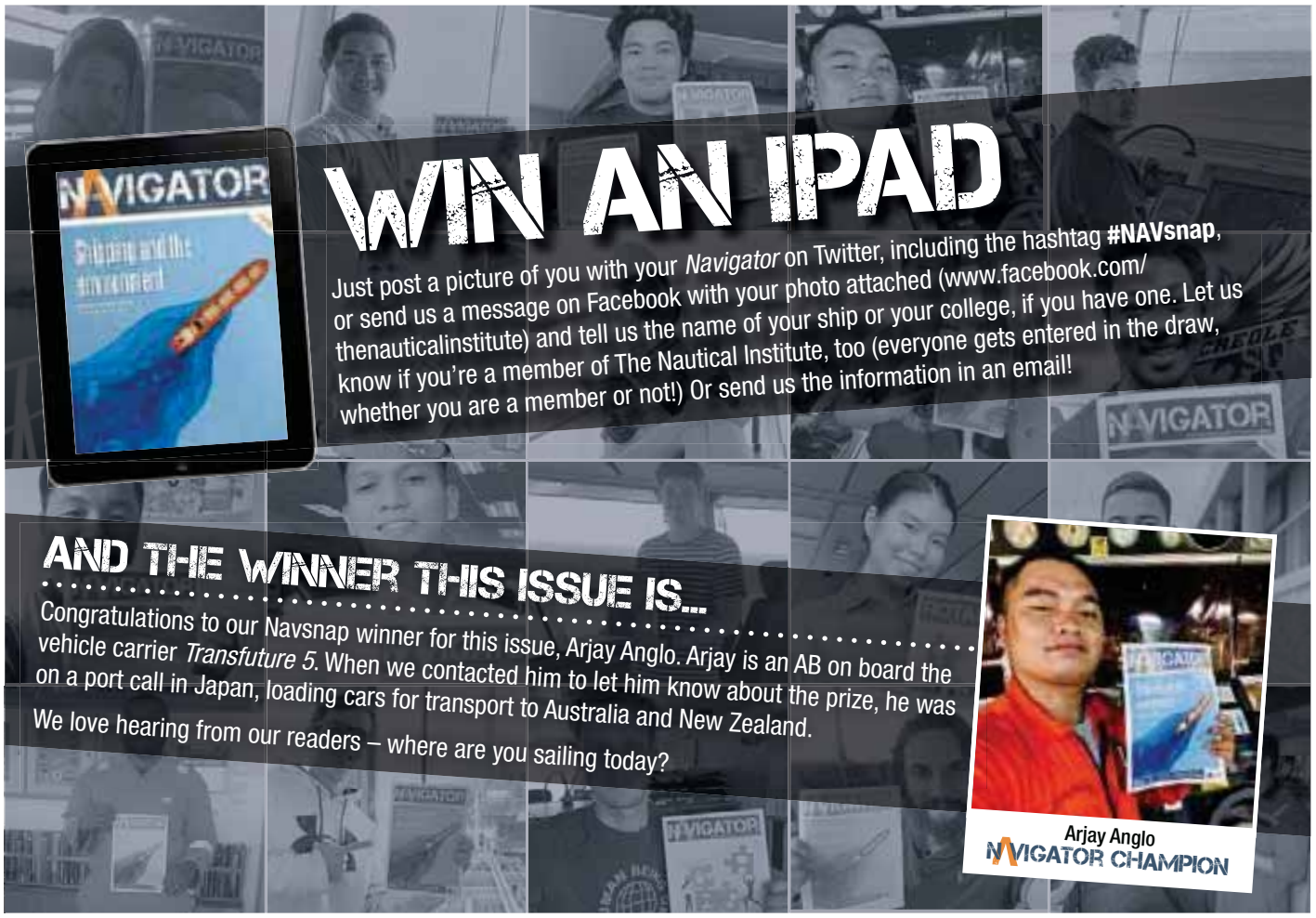
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AND THE WINNER THIS ISSUE IS...
Congratulations to our Navsnap winner for this issue, Arjay Anglo. Arjay is an AB on board the vehicle carrier *Transfuture 5*. When we contacted him to let him know about the prize, he was on a port call in Japan, loading cars for transport to Australia and New Zealand.
We love hearing from our readers – where are you sailing today?
Arjay Anglo
NAVIGATOR CHAMPION


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