Ensuring the reliability of AIS data

The reliability of AIS data as a tracking tool has been called into question by some in the maritime industry, but issues with the insight it can offer are largely down to the way that data is collected and used, and by whom - an accurate picture of the actual situation can be created if you know how to look for it, *writes Argyris Stasinakis, Marine Traffic*

Doubts over the reliability of AIS data have been the subject of debate recently, with some commentators going so far as claiming that manipulated AIS data is responsible for rate rigging in certain shipping markets. But with AIS tracking facilities managing tens of thousands of vessels each day, some anomalies are bound to creep in - mercifully, these are few and far between.

Based on our own experience of AIS tracking we believe that less than 2 per cent of vessel positions are ambiguous and these are largely confined to non-commercial vessels such as small leisure craft operating in quiet corners of the globe.

There is no question - for professional AIS trackers - of taking raw, freshly transmitted AIS data and displaying an unfiltered visual representation directly on their sites.

Serious AIS facilities maintain teams of people supported by state-of-the-art technology to check each piece of data before it is published. Intelligent algorithms apply rigorous logic to reported positions and if, for example, a ship suddenly appears 300km away from the position it had reported just a few minutes before, an alert is generated.

But technology often requires a reality check and that is why the top AIS facilities employ teams of people with a sound understanding of the maritime world.

For example, a ship may suddenly receive orders to go full speed in the opposite direction to which it is heading in order to compete for a cargo. To a logic driven IT system, this could appear illogical and cause the system to report suspicious activity.

In reality, it might just be that the actions of commerce are simply being played out and it takes real people with real shipping experience to make that call. Logic driven systems have to be fine-tuned over time but they can 'learn' on-the-go.

To a large extent, the bigger the AIS facility, the quicker their internal systems will 'learn' and so become more effective.

Human error

A key threat to the accuracy of AIS data is human error. In some cases, the ship identifiers (MMSI number, IMO number, ship's name or call sign) on the AIS transponder will have been wrongly configured. This has the potential to generate ambiguity as to the true identity of the vessel or its journey parameters.

In such cases, the open nature of the AIS protocol does not discriminate between conflicting positions of vessels which may happen to report the same ship identifier. To resolve this, it is important to cross-reference reported AIS data with known vessel particulars to minimise these errors.

Algorithms should be continuously comparing previous positions with reported positions and checking course and speed declarations to ensure the vessel fits within a logical operating pattern. Anomalies should be highlighted and dealt with.

Although some AIS data is automatically transmitted - position coordinates, course and speed, for example - other information such as navigational status, destination and estimated time of arrival (ETA) is entered by the crew.

A vessel's destination, for example, is manually input by the crew in a free text format. If a ship's crew has been badly trained or simply cannot spell, it is possible for the destination to be incorrectly received. This can then affect the way in which a vessel tracking service provider's own software predicts and displays the track of a vessel towards its actual destination.

Most crews are able to correctly enter destination port names. For those who fail and misspell, for example writing 'bonny' in the place of 'Bonny' (a port on the Nigerian coast) good facilities will use an algorithm that deciphers the

Despite recent questions over the reliability of AIS data, less than 2 per cent of vessel positions recorded by reputable tracking companies are ambiguous

misspelt name and allocates the correct destination to the vessel.

Algorithms are between 75-90 per cent successful depending on the spelling accuracy of crew, however this rate is always improving as the algorithm itself is constantly learning. As a back-up, the 'power of the crowd' can resolve most other issues. If an AIS data provider has a large user community, it is never long before someone alerts them to an anomaly in a ship's position.

Deliberate interference

But sometimes there is a price to pay for popularity. Very occasionally hackers with no involvement in shipping like to 'have a go' at changing a vessel position. In the vast majority of cases, the forced change in position is so great that systems will detect it immediately and professional facilities generally report only a handful of these unwanted occurrences.

Even so, there is a real need for the relevant authorities and AIS tracking facilities to work together to implement a system that protects the integrity of data that is transmitted.

Currently, there is no mechanism to ensure the authenticity of AIS data and the tracking facilities and authorities should work together to ensure certainty that the originator of the data is known and that it is 100 per cent accurate. Digital signatures might provide the answer.

Even the most sophisticated technical systems and the most experienced internal teams cannot account for the fact that sometimes vessels will simply switch off their AIS transponder. This is technically illegal and is usually only done for bad reasons.

In terms of detecting wrong-doing, it is actually very informative as it can clearly be seen when the system was switched off. In addition, traces are left and so it is known in which area a ship was when the transponder was switched-off and then switched back on again. This information can be made available to the relevant authorities, if required.

Vessel tracking services with the right scale of coverage and technical systems in place to filter and interpret pure AIS data, along with competent staff and a good number of regular users are extremely unlikely to be presenting inaccurate data.

Human error is the greatest threat to the accuracy of AIS information but good AIS facilities are working hard to overcome these anomalies.

A coordinated approach by AIS trackers and relevant authorities to ensure the authenticity of transmitted data would also be significant step forward in maintaining accuracy. But by and large, vessel positions on leading AIS facilities that have invested in internal technology and teams of experienced people are likely to be 99 per cent accurate - at least.