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Technology Focus

Creating virtual aids to navigation (ATONs)

Fleet operators are well-acquainted with the use of Automatic Identification System (AIS). They may be less aware, however, that shore-side users have also been taking advantage of AIS in recent years to enhance a wide variety of business activities.*

These AIS shoreside benefits range from market intelligence and process optimisation to training, compliance and customer service. Now, AIS is moving into yet another potential role - aids to navigation (ATON).

ATON typically refers to physical elements including lighthouses, buoys and beacons. However, the concept can also extend to using AIS data to create a 'virtual ATON'. By using AIS as a virtual ATON, an authority can transmit navigation information where no physical ATON exists.

This is possible because AIS provides the ability to send addressed messages to a specific bridge. These messages are addressed to the unique MMSID assigned to the vessel's AIS transponder. AIS safety-related messages can also be broadcast to all vessels that are within range of the broadcast base station.

The International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) has addressed the subject of virtual ATONs in its 2011 publication entitled - *The Use of the Automatic Identification System (AIS) in Marine Aids to Navigation Services*.

IALA recommended that those providers of marine aids to navigation services should use appropriate AIS units as part of their marine aid to navigation services. It was recommended that these AIS units be used for 1) the provision of information and data to shipping and, 2) monitoring and control purposes.

The authority also recommended that virtual AIS ATON be used where a physical installation is technically, or operationally difficult and to enable timely marking of new fixed, or dynamic hazards.

Although AIS-based virtual ATONs are a somewhat new concept, they have already been used in several applications within US waters. These include broadcasting weather and sea state information and notifying mariners regarding area whale migration activity.

Another application, which is being explored in the Gulf of Mexico, involves the use of AIS as a virtual ATON to alert vessels that may be slowing, or anchoring, in pipeline areas. These fixed underwater assets can be damaged by anchors and direct vessel impacts, especially in shallow water where the pipelines are most densely distributed.

An AIS-based virtual ATON network can create virtual pipeline markers and provide a system for warning approaching vessels. AIS-addressed messages can be sent directly to the vessels' bridges, warning them not to drop anchor and sent to a vessel's owner.

The use of AIS-based virtual ATON networks and warning systems can also be particularly important in areas where there are changing coastal conditions, due to erosion and other factors.

Its numerous benefits include eliminating the costs and deployment requirements of physical buoys and other monitoring devices. In addition by using AIS base stations, these can extend an area an ATON may serve - often more than 50 sq miles per station. Plus, since the AIS base station is typically deployed in a fixed location on land, or an offshore platform, they are typically less expensive to acquire and maintain than a physical ATON. The only requirement is that seafarers have the minimum equipment configuration.

There is another important benefit of AIS data in virtual ATON applications - the ability to access historical playback data related to vessel movements in selected areas. Today's AIS-based vessel-tracking systems provide real-time information about every commercial vessel in an area, as well as up to five years of historical data.

This data is often used in a forensic capacity to identify responsible parties after an incident, investigate the causes of these incidents and prepare cases for compensatory damage claims.

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