e-NAV14-17.2.3.1 Working Document

Agenda item 10.3

Task Number

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Innovative use of AIS going towards VDES

# Summary

This paper is intended to give an overview of the many innovative uses of AIS that are currently being deployed and how we may integrate those uses within the VHF Data Exchange System (VDES). The VDES is intended to provide the communication system necessary to support e-Navigation, and it is also necessary to maintain the collision avoidance aspects of AIS.

As with any communication system, the users of the system should not be concerned with the fidelity of the system. The task of IALA is to continually review our Recommendations and Guidelines to ensure that it will meet the user’s needs so that confidence in the system remains very high.

## Purpose of the document

The information in this document is intended to inform and expand the common understanding about (data) communication on the AIS system to the IALA members, and to demonstrate the benefits and needs of migrating certain AIS elements to the VDES to ensure that the AIS main functions are protected and maintained with future expansive use of AIS. It also seeks to make recommendations for innovative use of AIS now and other potential applications that may be used in the VDES in the future.

## Related documents

* e-nav14 10.3.2 Draft information Paper on VDES ver4.0;
* e-nav14 10.3.4 Technical Guidelines for VDES Implementation;
* e-nav14 10.3.9 ESA VDES Demonstration Objective;
* liaison note to COMSAR e-NAV10-26;
* liaison note to MSC e-NAV9-4;
* liaison note to MSC e-NAV7-4;
* Guideline (1095) on Implementation of Application Specific Messages;
* ITU-R M.1371

# Background

IALA WG3 and WG4 has been developing the technical requirements for a new communication system that will support e-Navigation services in the future, and will support e-Navigation. The VDES concept is the result of that work.

# Discussion

## Primary purpose of AIS

AIS is a mandated system on board ships that meet carriage requirements to provide collision avoidance and ship identification. It is also comprised of shore infrastructure to monitor and manage the VDL. The AIS system gives ships and shore authorities the ability to quickly identify ships and their movements with the intention to ensure safe passage of all vessels through their waters.

## Additional use of AIS

Although the primary purpose of AIS is collision avoidance and identification of ships, it also has additional capabilities. Currently AIS is also used for Aids to Navigation (AtoN), Search and Rescue (SAR), additional safety related information, and several other message types that share additional information about ships or shore infrastructure. The AIS system supports these functions including Application Specific Messages (ASM) that allow for free form data packet exchanges with limitations.

## Threats to AIS

Understanding the power and flexibility of ASMs, and the potential for significant growth in this area, we begin to understand the threat this will pose to the basic purpose of AIS, collision avoidance and identification. This is already a problem in some areas, however it will occur more and more frequently with the implementation of new AIS devices such as the increase of Class B use. The issue will increase further with the implementation of e-Navigation and regional programs , unless mitigation steps are taken.

The IALA WG3 and WG4 understand future VDL loading as a serious potential problem, and has taken steps to protect the primary purpose of AIS by developing the communication platform necessary (VDES) to support e-Navigation.

## Problems and possible solutions

In the last few years IALA e-Navigation WG3 and WG4 has analysed the use of AIS and the possible threats to the AIS system. Possible threats to AIS at the moment recognised are:

1. Intensive use of ASM’s now or in the near future;
2. Altering behaviour of AIS by authorities(AIS-Service Management);
3. Using AIS as a Short Message Service (SMS).
4. Use of AIS devices for applications outside the original purpose. It should be noted that, because of the versatility and flexibility of AIS, the market is producing AIS-like devices used to track fishing nets, very small vessels, icebergs, etc. These devices are causing significant disturbances to the AIS system. For example AIS MOB (man overboard) devices are being used for diving excursions. Such use is likely to cause undue distraction causing false alerts. In essence, AIS has become a victim of its own success.
5. Different national interpretation of approval requirements

By taking into account these threats, IALA e-Navigation Committee started by taking some actions to protect the AIS and also make the needed communication definitions to support e-Navigation. Some of the actions taken have been:

1. Made authorities aware of the threats. This was done with liaison note to COMSAR e-NAV10-26, liaison notes to MSC e-NAV9-4 and e-NAV7-4, which discussed the protection of the VDL. As a result IMO has issued Resolution MSC. 347(91).
2. Shared information about ASM’s. In addition to the standard messages in ITU-R M.1371series, there is also a collection of ASM’s. ([www.e-navigation.nl](http://www.e-navigation.nl));
3. Created a Guideline (1095) on Implementation of Application Specific Messages;
4. Frequencies were requested from ITU for the future and near future. ITU has fully supported this initiative and allocated frequencies for test use of the VDES;
5. Working toward a new robust communication system for maritime safety of navigation (VDES).

## Innovative uses of AIS

### Current and possible future e-Navigation applications may include: Persons on board

In some regions AIS is used to provide additional information about ships. Information about persons on board, for instance, so that if a calamity happens authorities can deploy the necessary resources capable of mitigating the calamity. This application is used in the Baltic Sea and also in the Netherlands with some of the fast ferries.

### Extended voyage information

In the Baltic Sea with the EfficienSea project, the authorities have tested, together with mariners, the ability to share additional information about the voyage. This information was also shared through AIS. With this information the ship could give information about the intended route to other ships and authorities. The shore authority could give information about the infrastructure, weather, water levels, wind, lock planning, lock order, route suggestion, etc.

In other regions AIS is also used for the Inland waterways. There are, of course, small differences in the information needed for instance the precision of the information. Examples of this are the Saint Lawrence Seaway and the Inland Waterways of Europe.

### Planning

AIS information is used for planning in some parts of the world. Combining AIS information with other information (i.e. lock information, water level, and etcetera) provides (Inland) skippers between Rotterdam and Antwerp the necessary tools to plan their journey. With information from AIS combined with lock availability information the skippers can better plan the time required to pass the lock, improving the efficiency of fuel consumption optimization and other cost saving advantages. It is envisioned that this could also been done for the Maritime ship when approaching a port.

### Vessel queuing

In restricted waterways such as English Channels, Bosporus, locks and canals (Suez, Panama) ships have to get instruction of entering order, could be assisted by the use of ASM.

### Other

Shore authorities have additional possibilities with a system capable of supporting higher data throughput like VDES, which could support the dissemination of updated bathymetry and ice charts, tide & current modelling results, squat calculations and recommended route based on projected fuel consumption, and etcetera.

## Future view

Although there are currently many ways to exchange data, most of these systems only work near shore infrastructure and need a subscription for the service so they are more expensive. Furthermore they require extra equipment on board and/or on shore.

As we progress toward a solution to the issues that we face, AIS will continue to be the inexpensive and widely available system until such a time that VDES is fully operational around the world.

For the time being, to protect the main purpose of AIS, it is proposed to move ASMs, and AIS-like devices, off of AIS1 and AIS2.. In the future the VDES is expected to resolve this problem.

## Antenna cloud/farm

Wireless communications are dominant around the world, resulting in new equipment requiring new antennas. Unfortunately this results in antenna clouds/farms both ashore and on ships. On shore, these sites can be very expensive to expand and maintain. On the ship side there is very limited space and sufficient separation between antennas is often very difficult to achieve.

It is envisioned that the VDES could allow for a combined AIS and VDE communications path. This will enable an increase in throughput without an increase in the area required for antenna placement.

# Action requested of the Committee

The Committee is asked to distribute this paper to the IALA members..