

IALA Recommendation O - 143

On

Virtual Aids to Navigation

Edition 1

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Document Revisions

Revisions to the IALA Document are to be noted in the table prior to the issue of a revised document.

Date	Page / Section Revised	Requirement for Revision

IALA Recommendation on Virtual Aids to Navigation

(Recommendation O - 143)

THE COUNCIL

RECALLING that one of the aims of the association is to foster the safe, economic and efficient movement of vessels and the protection of the environment through the improvement and harmonisation of aids to navigation and Vessel Traffic Services;

RECOGNISING Regulation 13 of Chapter V of the SOLAS Convention 1974, as amended, on the establishment and operation of aids to navigation;

RECOGNISING ALSO Regulation 10 of Chapter V of the SOLAS Convention 1974, as amended, on ships routing measures;

RECOGNISING FURTHER Regulation 4 of Chapter V of the SOLAS Convention 1974, as amended, on navigational warnings;

NOTING that work carried out by IALA on shipborne automatic identification systems has facilitated the development and adoption of a suite of technical and operational publications by other bodies such as IMO, ITU, IHO and IEC;

NOTING ALSO that IALA has adopted:

- Recommendation A-123 on the Provision of Shore Based Automatic Identification Systems (AIS);
- Recommendation A-124 on AIS Shore Stations and Networking Aspects Related to the AIS Service;
- Recommendation A-126 on the Use of the Automatic Identification System (AIS) in Marine Aids to Navigation Services;
- Guideline 1062 on Establishment of AIS as an Aid to Navigation; and
- The IALA NAVGUIDE (5th Edition), which includes a section on the use of AIS as an aid to navigation.

CONSIDERING that various applications of AIS have been identified by IMO, ITU, IEC and IALA;

CONSIDERING FURTHER that AIS as an aid to navigation can be implemented in three separate ways – real, synthetic and virtual;

RECOMMENDS that:

- 1 National Members and other authorities providing marine aids to navigation consider deploying virtual aids to navigation (Virtual AtoN) as deemed practical and necessary and as the volume of traffic justifies and degree of risk requires;
- 2 National Members and other authorities providing marine aids to navigation take into account the provisions set forth in the Annex to this Recommendation when considering the use of virtual aids to navigation.
- 3 National Members and other authorities providing marine aids to navigation consider measures to raise awareness of the use and limitations associated with Virtual AtoN.

Table of Contents

1	INTRODUCTION	5
2	DEFINITION	5
2.1	Definition	5
2.2	Amplification	5
3	BACKGROUND	5
3.1	Real and Synthetic AIS AtoNs	5
3.2	Virtual AIS AtoN	6
4	PURPOSE	6
5	APPLICATION OF VIRTUAL AIDS TO NAVIGATION	6
6	RISKS, LIMITATIONS AND BENEFITS	6
6.1	Risks	6
6.2	Limitations	7
6.3	Benefits	7
7	SUMMARY	7

ANNEX

Virtual Aids to Navigation

1 INTRODUCTION

IALA recognises that there are various tools available for use by aids to navigation authorities to improve and enhance services to mariners. Among these are visual aids, radio aids and now, virtual aids to navigation.

This Recommendation offers national members and other authorities guidance on the provision of virtual aids to navigation (Virtual AtoN).

2 DEFINITION

2.1 Definition

A virtual aid to navigation does not physically exist but is a digital information object¹ promulgated by an authorised service provider that can be presented on navigational systems.

2.2 Amplification

Virtual AtoN can be used to inform the mariner about dangers to navigation as well as safe waterways, areas in which extra caution may be necessary and areas to be avoided.

They may be used to represent a line, area, position or other form that may be displayed graphically.

The information, including geographic position, carried by virtual aids to navigation may be fixed or may be changed over time (dynamic), depending on the intended purpose.

Virtual AtoN are used primarily where there is a time critical consideration. They may also be used in places where permanent physical aids to navigation cannot be sited. They should be reflected in Maritime Safety Information (MSI) or, if appropriate, be shown on the relevant nautical chart in due course.

Virtual AtoN are not intended to replace physical aids to navigation.

3 BACKGROUND

AIS (Automatic Identification System) is being used as an aid to navigation to improve and enhance services to mariners. IALA Recommendation A-126 (On The Use of the Automatic Identification System (AIS) in Marine Aids to Navigation Services) and IALA Guideline No. 1062 (On the establishment of AIS as an Aid to Navigation) provide technical details on the use of real, synthetic and virtual AIS aids to navigation.

AIS AtoN can currently be implemented in three ways - real, synthetic and virtual. In the future, methods other than AIS will also be available to generate virtual aids to navigation.

3.1 Real and Synthetic AIS AtoNs

A 'Real' AIS AtoN Station is a physical aid to navigation fitted with an AIS device.

For practical or economic reasons it may not be appropriate to fit an AIS to an AtoN. In this case, the 'Synthetic' AIS approach may be taken. There are two types of synthetic AIS AtoN, 'Monitored' and 'Predicted'.

- A 'Monitored Synthetic AIS AtoN' is transmitted from an AIS Station that is located remotely. The AtoN physically exists and there is a communication link between the AIS

¹ A digital item, or group of items, regardless of type or format that a computer can address or manipulate. In the context of Virtual AtoN they will convey information to the user.

Station and the AtoN. The communication between the AtoN and AIS shall confirm the location and status of the AtoN.

- A 'Predicted Synthetic AIS AtoN' is transmitted from an AIS Station that is located remotely. The AtoN physically exists but the AtoN is not monitored to confirm its location or status. Predicted Synthetic AIS AtoN should not be used for floating aids to navigation.

3.2 Virtual AIS AtoN

A Virtual AIS AtoN is transmitted from an AIS station to establish an aid to navigation that does not physically exist. In this case, a digital information object will appear on the navigational system for a specified location, even though there is no physical AtoN. A nearby base station or AtoN station could broadcast this message. The AIS message will clearly identify this as a Virtual AIS AtoN.

4 PURPOSE

The purpose of this Recommendation is to encourage National Members and administrations to consider the value and uses of virtual aids to navigation. This Recommendation may also assist marine electronics equipment manufacturers in designing the next generation of shipboard navigation display systems.

5 APPLICATION OF VIRTUAL AIDS TO NAVIGATION

There are numerous potential applications of virtual aids to navigation. They can be used not only to mark specific locations such as beacons or buoys do, but also to mark lines, areas and other forms. They are not intended to replace physical aids to navigation. However, they may be used to complement or supplement existing marks to improve the safety of navigation.

Virtual AtoN are particularly useful in time-critical situations and in marking/delineating dynamic areas where navigational conditions change frequently or in applications where the use of physical aids is not practical or possible. For example, it may be appropriate to create a virtual AtoN to mark hazards to navigation on a temporary basis (see IALA Recommendation O-133 Emergency Wreck Marking), until a more permanent AtoN can be established. Alternatively, virtual aids to navigation may be established to mark areas where navigation conditions (for example; channel boundaries, overhead clearance, ice, water levels) change frequently and would require dynamic marking.

The use of Virtual AtoN should be overseen by the appropriate authority. Notifications to mariners of the presence of Virtual AtoN, integrity monitoring and verification of the effectiveness of the virtual aid are essential elements of such oversight.

Virtual AtoN should be reflected in MSI or, if appropriate, be shown on the relevant nautical chart in due course.

6 RISKS, LIMITATIONS AND BENEFITS

6.1 Risks

A Virtual AtoN will not be visible on the displays of many ships and, if visible, the symbols may differ from one display to another. The consequences may be confusion, lack of information for the user and the undermining confidence in ECDIS, the chart and other systems. It is likely to take at least a decade to harmonise the provision of Virtual AtoN as a result of the 'grand-fathering' clauses in the carriage requirement program for ECDIS and the likely schedule for the adoption of IBS & e-Navigation.

Radar will only display Virtual AtoN as an overlay of a diamond with a V inside if they are compliant with IEC 62388. This test specification came into force in 2008. At the current rate of

fitting new equipment, 10-15 years appears to be a realistic timescale for the majority of ships to benefit from the provision of display of Virtual AtoN.

Navigational displays compliant with IEC 62288, which came into force in 2008 will show Virtual AtoN as an overlay of a diamond with a V inside.

ECDIS equipment fitted prior to 2009 will not show Virtual AtoNs until the equipment is upgraded or replaced, which is unlikely under the current “grand-fathering” arrangements. There is currently no provision for Virtual AtoNs in S-57, or a symbol in S-52, but this is capable of implementation. However, even when Virtual AtoNs are reflected in S-57 and S-52, existing ECDIS will only show an orange “?” upon encountering a Virtual AtoN object in the ENC database. The orange “?” can be interrogated for further detail.

The MKD should display AIS AtoNs, including the virtual flag, but it is known that some MKDs do not meet this requirement.

6.2 Limitations

In the short to medium term Virtual AtoN will not be visible on the displays of many ships and, if visible, the symbols may differ from one display to another.

Other limitations include:

- 1 GNSS vulnerability;
- 2 Susceptibility to spoofing and jamming;
- 3 AIS VDL capacity and FATDMA planning.

6.3 Benefits

Some of the potential benefits of Virtual AtoN in enhancing safety, environment and security are:

- Timely notification;
- Ease and accuracy of presentation, where displayed graphically;
- Ease and speed of deployment;
- Direct delivery to navigational systems; limited to relevant area;
- Information readily apparent to the user;
- Avoidance of misinterpretation through use of standardised symbology and IMO phraseology;
- Easily changed / amended;
- Low cost to install and maintain.

7 SUMMARY

Regulation 13 of Chapter V of SOLAS on the establishment and operation of aids to navigation allows authorities latitude in determining the appropriate mix of aids to navigation in order to deliver this essential service, taking into account IALA Recommendations and Guidelines.

Virtual AtoN are a new tool available to authorities to supplement and enhance existing systems. When properly administered and applied, Virtual AtoN can deliver improved services to users.

IALA encourages authorities to consider the use of Virtual AtoN in the design and delivery of future aids to navigation services in accordance with this recommendation and its associated guideline.