

**4<sup>th</sup> IHO-HSSC Meeting**  
**Taunton, UK, 25-28 September 2012**  
**Paper for Consideration by HSSC**

**AIS aids to navigation and ENC**

<b>Submitted by:</b>	TSMAD Chair
<b>Executive Summary:</b>	This paper presents the need to include virtual AIS aids to navigation information in ENC and makes recommendations for how this can be achieved.
<b>Related Documents:</b>	<ol style="list-style-type: none"> <li>1. CL 70/2012 - 58th Session of the IMO Sub-Committee on Safety of Navigation</li> <li>2. IMO NAV56-11-1 - <i>New Symbol for AIS Aids to Navigation - Comment by IHO</i></li> <li>3. TSMAD 21 - 4.9.2 - <i>Proposals for the use of New Object</i></li> </ol>

### Introduction and Background

1. In 2010, the IHO submitted a comment to the 56<sup>th</sup> session of the IMO Sub Committee on Safety of Navigation (NAV) indicating its concern that symbology for Virtual Aids to Navigation was being discussed by the IMO when there had been no formal discussion within IMO on either the use of Virtual Aids-to-Navigation (Virtual AtoN) or on the circumstances under which they will be broadcast. The IHO also commented that:

- if permanent areas or routes are to be marked by Virtual AtoN then why not delineate them directly on to the chart as is done with TSS?
- there is the potential for confusion by mariners; do they take action in accordance with charted Virtual AtoN or received Virtual AtoN?
- Hydrographic Offices will have difficulty to reflect what could be an almost instantaneous change to a Virtual AtoN on paper charts and ENCs; and
- there is potential for confusion by mariners when the chart contains symbols for objects that not all vessels will be able to detect.

2. The IHO's comments were supported by a number of IMO Member States and IALA during the discussions at NAV56. As a result, NAV56 instructed its Correspondence Group that was dealing with symbology for AIS aids to navigation to also propose a policy. This work continues and has most recently been reported in IHO CL 70/2012.

3. Notwithstanding the comments made by the IHO at NAV56, the CSPCWG developed paper chart symbols both to help inform the IHO Correspondence Group on its development of suitable complementary symbols, but also to provide for instances where AIS AtoNs, including Virtual AtoNs were deployed in advance of any guidance from IMO. The symbols have been adopted by the IHO and are included in IHO S-4 at section B-489. This includes a note indicating that the IMO has yet to determine a policy on the use of such aids to navigation.

4. As anticipated, both physical and Virtual AtoN are already being deployed across the world. There are now at least 82 active Virtual AtoNs deployed.

5. A recent report received by the UKHO from a navigator has indicated that the lack of support for Virtual AtoNs in ENCs has caused some confusion during a passage when a physical mark was replaced by a Virtual AtoN. The change was notified by means of a temporary notice to mariners and the Virtual AtoN was visible on an AIS receiver (when the vessel was in range of the transmission). This leads to the questions, would safety of navigation be improved if Virtual AtoNs were depicted in ENCs and what level of information/training has been afforded to users in understanding the concept and use of Virtual AtoNs.

6. In the circumstances, even though the IMO has yet to define a policy for the use of Virtual AtoN, it may nevertheless be appropriate to provide guidance on how Virtual AtoN should be encoded in ENCs so that HO's can consistently encode these features if they choose to do so.

## Analysis/Discussion

7. Currently S-57 only provides guidance for physical and synthetic AIS aids to navigation which may be encoded in ENC using INFORM and stipulates that virtual AIS aids to navigation must not be encoded in ENC (S-57 UOC 3.0.0 12.14.1).

8. TSMAD has discussed this subject on several occasions and has, until now, concluded that until IMO has defined the policy for the use of and display mechanisms for Virtual AtoNs in ECDIS, the following issues will remain:

- unless a Virtual AtoN is permanent or a start and end date of deployment is known, the issue and delivery of appropriate ENC updates is problematic;
- Virtual AtoNs could potentially be moved or withdrawn on a regular basis, in which case updates would be pointless;
- when and if an ECDIS is integrated with AIS messaging then the Virtual AtoN symbol will clash with the ENC symbol; and
- if an ECDIS is integrated with AIS and an ENC does not include Virtual AtoNs, how will the mariner plan a route if the Virtual AtoN is not visible until the vessel is in range of the broadcast?

9. At TSMAD21 the UK presented a proposal (TSMAD 21 4.9.2) on how Virtual AIS AtoNs could be encoded and displayed using the New Object (NEWOBJ) feature that has been included in S-57 to address such new and emergent requirements. NEWOBJ was introduced to enable significant newly defined chart features, such as those resulting from new decisions of the IMO, to be encoded during the period when S-57 remains a “frozen” standard and before the introduction of S-101, the new ENC Product specification. TSMAD21 considered that it was too early to take such an approach, given that IMO was still considering the issue.

10. Now that AIS technology is increasingly being used for AtoNs in advance of a policy from IMO and an interim solution has been provided for paper charts, the stance taken by TSMAD21 may no longer be appropriate. HSSC should now consider implementing an interim solution, as has already been done for paper charts. Using NEWOBJ to encode AIS enabled AtoNs is the logical interim solution. This would bring ENCs in line with S-4 and nautical paper charts, although it will not be possible to provide dedicated symbology, as is the case with paper charts.

## Consultation

11. The IHB has discussed the proposals in this paper with the Chair of IMO NAV and senior representatives of the relevant Division of the IMO Secretariat. Both parties recognise the current situation and have no adverse or other significant comments to make.

## Conclusion

12. As an interim solution until such time as S-57 can be amended or S-100 based ENCs introduced, if HO's decide to include Virtual AtoNs and other AIS AtoNs in ENCs, then they should be encoded using the New Object (NEWOBJ) feature defined in S-57.

## Recommendations

13. The recommendations of this paper are as follows:

- a. To instruct TSMAD to develop either an Encoding Bulletin or a new S-57 Supplement that describes how to use “NEWOBJ” to encapsulate AIS AtoNs including Virtual AtoNs.

## Action Required of HSSC

14. The HSSC is invited to:

- a. **Note** the contents of this paper,
- b. **Agree** that the New Object (NEWOBJ) feature defined in S-57 should be used to enable Virtual AtoNs and other AIS AtoNs to be encoded in ENCs, and
- c. **Instruct** TSMAD to develop either an Encoding Bulletin or a new S-57 Supplement that describes how to encode AIS AtoNs.

## Annex A - Encoding Proposal for Virtual Aids to Navigation.

Encoders should note that if it is required to encode Virtual Aids to Navigation only the following object/attribute combinations should be used in accordance with S-57 Supplement 2. Virtual Aids to Navigation should only be encoded where they replace permanent Aids to Navigation.

If it is required to encode a Virtual Aid to Navigation, it must be done using the object class **NEWOBJ**. The only permitted geometric primitive is **Point**.

Geo object: New Object (**NEWOBJ**)

Attributes: CLSNAM    CLSDEF    DATEND    DATSTA    INFORM  
                   NINFOM    NOBJNM    OBJNAM    TXTDSC    NTXTDS  
                   SORIND    SORDAT    SYMINS

Only the following combinations of Mandatory Attributes may be used:

CLSNAM	CLSDEF	SYMINS
Virtual AtoN, North Cardinal	A Virtual object which indicates navigable water lies northwards	SY(BCNCAR01);SY(BRTHNO01);TX(INFORM,3,2,2'15110',2,0,CHMGD,0)
Virtual AtoN, East Cardinal	A Virtual object which marks the Eastern Limit of a hazard.	SY(BCNCAR02);SY(BRTHNO01);TX(INFORM,3,2,2'15110',2,0,CHMGD,0)
Virtual AtoN, West Cardinal	A Virtual object which marks the Western Limit of a hazard.	SY(BCNCAR04);SY(BRTHNO01);TX(INFORM,3,2,2'15110',2,0,CHMGD,0)
Virtual AtoN, South Cardinal	A Virtual object which marks the Southern Limit of a hazard.	SY(BCNCAR03);SY(BRTHNO01);TX(INFORM,3,2,2'15110',2,0,CHMGD,0)
Virtual AtoN, Isolated Danger	A Virtual object which marks an Isolated Danger	SY(BCNISD21);SY(BRTHNO01);TX(INFORM,3,2,2'15110',2,0,CHMGD,0)
Virtual AtoN, Port Lateral	A Virtual object marking the port side of a channel	SY(BCNLAT15);SY(BRTHNO01);TX(INFORM,3,2,2'15110',2,0,CHMGD,0)
Virtual AtoN, Starboard Lateral	A virtual object marking the starboard side of a channel	SY(BCNLAT16);SY(BRTHNO01);TX(INFORM,3,2,2'15110',2,0,CHMGD,0)
Virtual AtoN, Safe Water	A Virtual object marking safe water	SY(BOYSAW12);SY(BRTHNO01);TX(INFORM,3,2,2'15110',2,0,CHMGD,0)
Virtual AtoN, Special Purpose	A Virtual object used to mark a feature which is apparent from the chart	SY(BOYSPP11);SY(BRTHNO01);TX(INFORM,3,2,2'15110',2,0,CHMGD,0)

The attribute INFORM should be populated with the text 'V-AIS' where the AtoN is transmitted by AIS.

For reasons of backward compatibility the attribute TXTDSC must contain the values of CLSNAM and CLSDEF for the object.

Where known the attribute OBJNAM should be populated with the MMSI number of the AtoN in addition to its individual name. eg Nab Rock, MMSI 995031014

