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Establishing a Regional AIS Application Specific Message Register

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ABSTRACT

The goal of the Regional AIS Application Specific Message Register is to provide awareness of what applications exist, facilitate harmonization, and promote proper binary messaging for regional applications. To be hosted on the IALA website, establishing the Register will be a 3-step process:

- 1) Compile all existing AIS binaries into a "collection."
- 2) Convert the "collection" into a Register.
- 3) Develop IALA guidance on best practices for creating and using AIS Binary Messages.

Recommendations are provided in regard to:

- Benefit of a web-based HTML user interface for input/output.
- Use of XML to organize/format register applications in a consistent manner.
- Having the collection/registration become a "loop" process.
- Conforming to ISO standards to organize and manage the Register.
- Benefit of a joint IMO-IALA register for both international and regional applications.

RÉSUMÉ

Le but du registre des messages spécifiques des applications régionales AIS est d'informer sur les applications existantes, de faciliter l'harmonisation, et de promouvoir l'adéquation des messages binaires aux applications régionales. Afin d'être accueilli sur le site web de l'AIMS, la constitution du Registre se fera en trois étapes :

- 1) *La compilation de tous les (messages) binaires de l'AIS en une « collection ».*
- 2) *La conversion de la « collection » en un Registre.*
- 3) *Le développement d'un guide de l'AIMS sur les meilleures pratiques pour la création et l'utilisation des messages binaires de l'AIS.*

Des recommandations sont formulées en ce qui concerne:

- *L'avantage de l'utilisation d'une interface « web-based » HTML pour l'entrée/sortie.*
- *L'utilisation de l'XML pour organiser/formater les applications du registre de manière cohérente.*
- *La transformation de la collection/registration en processus en « boucle »*
- *La conformité aux normes ISO pour organiser et gérer le Registre.*
- *L'avantage d'un registre commun à l'OMI et l'AIMS pour les applications internationales et régionales.*

INTRODUCTION

AIS was originally developed as a means for positive identification and tracking of vessels. This is accomplished by transmitting and receiving static, dynamic, and voyage-related data about ships, as well as short safety-related messages. AIS is beneficial to the safety-of-navigation and protection of the environment by monitoring the maritime traffic and by providing various basic services. In addition, AIS can be used to transmit Application-Specific Messages in binary format for certain types of critical navigation safety-related information. However, to avoid AIS system overload (i.e., on the VHF Data Link), the number of Application-specific messages and the frequency of transmission should be limited so as to not impair the main functions of AIS.

Recommendation ITU-R M.1371 specifies the technical characteristic and the structure of the Application-Specific Messages, while *IMO SN/Circ. 236* defines the data content of 7 trial messages. At IMO NAV55, a new SN Circular (*NAV55/21/Add.1*) was drafted that greatly expands the scope and content of AIS Application Specific Messages intended for international use.

ITU-R M.1371-3, Annex 5 gives guidance for the design of the application specific part of the binary message, including both “International” and “Regional” applications. For International Application (IA) specific messages, several criteria apply:

- The messages shall provide information that enhances: the safety-of-life at sea, safety and efficiency of navigation, and protection of the marine environment.
- The use of the message shall lead to operational benefits.
- The information provided is capable of being effectively and usefully displayed by an appropriate user interface.

In many respects, these criteria should also apply to regional applications. Further, this should encourage the further development of regional messages in addition to those that are internationally agreed.

ESTABLISHING A REGIONAL AIS APPLICATION SPECIFIC MESSAGE REGISTER

At the 1st Meeting of the IALA e-Navigation Committee (IALA eNAV1), it was agreed that IALA will maintain a register of regional applications for AIS Application Specific Messages (i.e., binary messages). The intent is to provide information to all interested parties of what currently exists and/or is in use. In this way, IALA Members and other National Aids-to-Navigation Authorities can make use of existing applications, and avoid developing new messages with only minor/marginal differences.

At IALA eNAV6, it was agreed that establishing the Register should be a two-phase process:

- 1st - Compile all existing AIS binaries into a “collection” (i.e., a compilation or catalogue).
- 2nd - Convert the “collection” into a Register.

Once completed, a logical third phase would be to develop IALA guidance on best practices for creating and using AIS Application Specific Messages.

COLLECTION → REGISTER PROCESS

As described on the IALA external website [[http://www.iala-aism.org/\(services offered → AIS binary messages\)](http://www.iala-aism.org/(services%20offered%20→%20AIS%20binary%20messages))], the initial collection will be performed as a two-step process:

1. Registrants (i.e., Maritime Administrations) are requested to complete a Submission Form for each AIS Binary Application-Specific Message that is in use.⁹

Once completed the forms are to be sent to:

Kurt Schwehr (kurt@ccom.unh.edu)

Lee Alexander (leealex@ccom.unh.edu)

2. In support of IALA, the Submission Forms are being collected and compiled by the Center for Coastal and Ocean Mapping at the University of New Hampshire.

The Collection of Regional Applications for AIS Binary Messages may be viewed at: <http://vislab-ccom.unh.edu/~schwehr/ais/collection/>

It should be pointed out that this initial collection should not be considered an endorsement of any submitted application-specific message. Further, the initial collection is not an authority for any Designated Area Code (**DAC**) or Function Identifier (**FI**) combinations.¹⁰

As of January 2010, no Submission Forms have been submitted by any Maritime Administration. While the initial “collection” process has been established, no forms have been received. As such, no compilation has occurred. It is hoped that this situation is only temporary.

Once the collection process begins, two further enhancements could be performed.

- 1) Use of XML for structure/formatting. While the content would be based on SN/Circ 236 and/or the new SN/Circular, there would be more specifics on units of measure, data fields, parameters, etc. Key benefits of using XML include:
 - structures/organizes proper submission (both in content and format)
 - ensures consistent units and message definitions
 - maintains a uniform, structured format capable of being viewed, downloaded and used, directly
 - single, one-stop listing/source for all regional binary applications

In addition, an XML “tool” could be developed with graphical user interface to actually create the binary message. The result would be output that is both human and machine readable.

- 2) Have the binary message registration process become a “loop” process (see Figure 1).

⁹ In Annex 1 is a copy of the Submission Form. In Annex 2 is an example of a completed form.

¹⁰ AIS application specific messages consist of the Standard AIS ITU-R M1371 framework (message ID, repeat indicator, source ID, destination ID), the Application Identifier (AI = DAC + FI) and the data content (variable length up to a given maximum). The 16-bit application identifier (AI = DAC + FI) consists of: 10-bit designated area code (DAC): international (DAC = 1) or regional (DAC > 1), 6-bit function identifier (FI) — allows for 64 unique application specific messages.

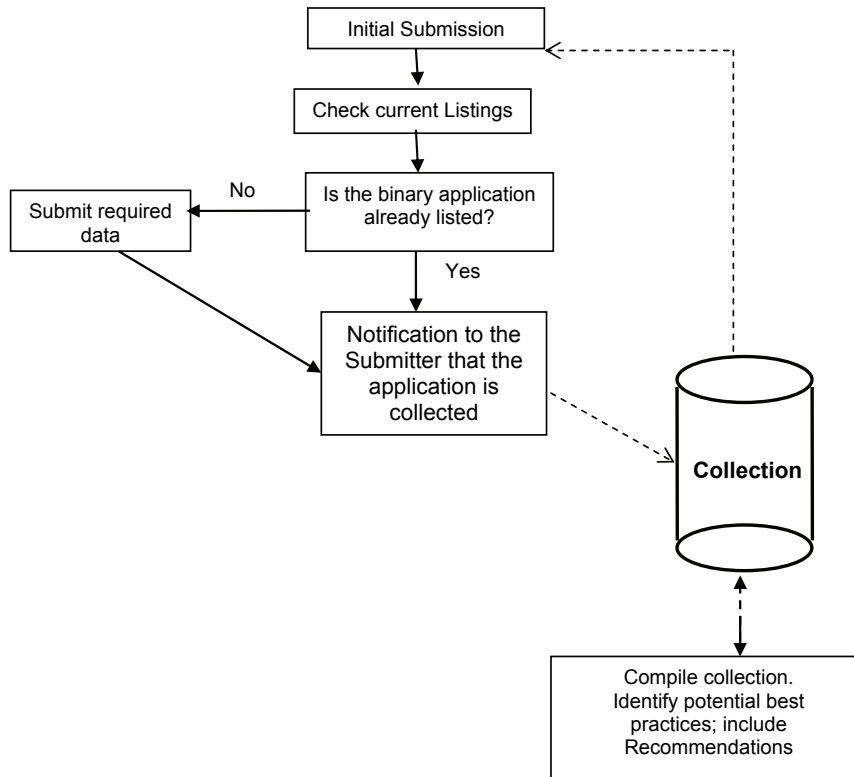


Figure 1 – Recommended process for submission and compilation for Regional AIS Application Specific Message Collection.

REGISTER MANAGEMENT

Similar to what is planned for the IMO AIS Application-Specific Message Catalogue and the IHO Geospatial Information Infrastructure Registry, the IALA Regional AIS Application Specific Register should be organized and managed based on guidance contained in *ISO Standard 19135*. Establishing the necessary operational management and oversight would benefit all those who create, broadcast, and use AIS Binary Messages. Two key things need to occur:

- 1) Establish specific procedures regarding proper submission of proposals, reviewing/accepting proposals, and access to the database.
- 2) Define the roles and responsibilities of the Register Owner, Register Manager, Control Body, Submitting Organizations, and Proposers.¹¹

¹¹ Annex 3 contains a copy of the “Recommended Organization, Structure and Management” of the IMO AIS Application Specific Message Catalogue that was agreed to at IMO NAV55 (NAV55/WP.6). Assuming that IALA takes a similar approach, the following table provides a comparison of the likely organizational structures.

	International	Regional
Register Owner	IMO	IALA
Register Manager	Maritime Safety Division	e-Navigation Committee
Control Body	Sub-Com on Safety of Nav (NAV)	AIS Technical WG
Submitting Organizations	IMO Member Governments UN specialized agencies Inter-governmental organizations NGIOS	IALA Member Administrations [others?]
Proposers	All interested stakeholders	All interested stakeholders

POSSIBILITY OF A JOINT IMO - IALA REGISTER

If both IMO and IALA operate similar “Registers” -- one for International Applications and the other for Regional Applications -- then it would be logical to jointly manage both Registers, together. Some potential benefits would include:

- Both regional and international registers are at one location
- Better coordination between two organizations (IMO and IALA)
- More efficient operation and management
- Uses a similar approach to Register Owner, Register Manager, Control Body, Submitting Organizations, and Proposers.
 - Harmonized procedures for submission, access, change, search parameters (i.e., use similar submission forms)
 - Can include “best practices” and portrayal examples.
 - For those regional applications that are widely used, they could eventually become “international” if decided by IMO.

LOOKING AHEAD

While there is general agreement on the need for establishing a Regional AIS Application-Specific Message Collection, full benefits can only be realized with the establishment of a continually-updated, web-based interactive register that is accessible to all stakeholders.

As discussed at e-NAV6 (e-NAV6/10/20) and e-NAV7 (e-NAV7/10/6), some of the challenges and future work include:

- How to encourage IALA Member States to make initial submissions.
- Continual input and updating is paramount.
- Resources will be required to maintain and monitor.
- Key processes that need to be decided include:
 - o Access & Permissions [Open, limited, restricted, by invitation?]
 - o Submission [Anyone, Members, Administration only?]

- Two-step approach? Submitter may propose (e.g. FI = XX), Administration then assigns FI?
- Search-ability terms, parameters, proposed/approved applications, DAC, FI, submitters, etc.]
- Quality Assurance/Checks [Format, naming, conformance to standards, etc.]
- Impacts interactivity (and final costs)
- Standardization of parameters & metrics [Detailed input instructions (1371 Annex 5 guidance), templates, examples, etc.]
- Approval, endorsement, certification criteria, [If so, by whom?].

All of these issues can be solved. But, it requires a commitment to get on with the task.

ANNEX 1

**Collection of Regional Applications for AIS Application-Specific Messages *
IALA e-NAV6 Committee Meeting – AIS Technical WG**

11 March 2009

Submission Form

Registrant (i.e., Maritime Administration)	
Name of Application (keep short)	
Type of Binary Message (e.g., msg 6, 8)	
DAC and FI Used	
Used by (list organisations known to be using this binary message)	
Additional Information (include typical applications, e.g., AtoN monitoring)	
How portrayed (e.g., text only, graphical on ECDIS/ECS, etc.)	
Number of Slots	
Reporting Rate	
Date - first used - status	
Technical Point-of- Contact	

Parameter Name	# bits	Description
[list]		

7th IALA Conference

Cape Town, South Africa, 22-27 March 2010

Session: MAXIMISING THE POTENTIAL OF AIS

17ème Conférence de l'AIMS

Le Cap, Afrique du Sud, 22-27 mars 2010

Session: OPTIMISER LE POTENTIEL DE L' AIS

- * The initial collection is being performed on behalf of the IALA by the Center for Coastal and Ocean Mapping (CCOM) at the University of New Hampshire.

Submit this form to:

Kurt Schwehr (kurt@ccom.unh.edu)
Lee Alexander (leealex@ccom.unh.edu)