GUIDELINES FOR DEFINING APPLICATION SPECIFIC MESSAGES

Edition 1.0

Version: 09-05-2017

Author:
Vessel Tracking and Tracing Expert Group

Table of Content

1 SCOPE

This document provides guidelines on how to define Inland Application Specific Messages (ASM).

2 REFERENCES

2.1 Provisions

The following documents contain provisions of relevance for this document.

ITU:

- Rec. ITU-R M.1371, Technical Characteristics for an Automatic Identification System Using Time Division Multiple Access in the VHF Maritime Mobile Band

VTT Expert Group:

- VTT standard
- European Harmonization process on Application Specific Messages for Inland AIS
- Inland AIS ASM Inventory

IMO

- SN.1/Circ.289
- SN.1/Circ236

2.2 Useful documents

The following documents are useful for defining and handling of ASM messages. It is assumed that the reader of this document is fully aware of these documents and has enough knowledge and understanding of these documents. If a specific version or publication date of a document has not been mentioned, the latest published document is meant.

IALA

- Guideline No. 1095 “Harmonised implementation of Application-Specific Messages (ASMs)”

RTCM

- RTCM 12100.0 Standard for Creation and Qualification of Application Specific Messages

3 FUNCTIONAL PROCESS

3.1 Introduction

The members of the VTT Expert Group have written this document to allow developers to define Inland ASM that can be used on European inland waterways.

To maintain quality and compatibility with existing Inland ASM and the maritime environment, the newly defined Inland ASM

- shall comply on a functional level (the business case for that specific Inland ASM),
- shall comply with the technical recommendations set forth in chapter 4 of this document.

This quality assurance is taken care of in the VTT Expert Group.

This chapter describes the recommendations and guidelines that need to be followed for Inland ASM to be used in European inland waterways.

3.2 Benefits of European Inland ASM

The purpose of standardized ASM for use on European inland waterways is to allow European-wide, harmonized services for the users of inland waterways and to ease the implementation of ASM on side of the equipment manufacturers.

3.3 Rules for European Inland ASM

There are certain rules for the definition of a new application specific message on a European level. The following guidelines should be followed for defining a European Inland ASM.

- The documentation (both functional and technical) of the ASM must be complete and adequate;
- Proper research has been executed that the ASM is genuinely a new message and none of the existing ASM messages can be reused (both inland as maritime http://www.iala-aism.org/asm);
- The ASM has the potential to be used in more than one country and is of relevance for pan-regional usage;
- The functional need is clearly defined and the use of AIS for data transmission is beneficial for the function;
- Privacy constraints on AIS should be considered as AIS is an open non-protected communication means;
- The ASM definition is of adequate quality;
- The ASM is clearly optimized for minimized slot usage (only exceptionally 3 slot);
- The IALA guidelines for ASM have been followed.

These guidelines will be used by the VTT Expert Group in the evaluation of the ASM.

3.4 What type of message to use

There are two types of ASM messages, addressed and broadcast. An addressed message is directed to a specific MMSI number whereas a broadcast message is sent to every station in the reception area. In the design and definition of the ASM, it shall be considered if the message is directed to only one or a few stations or to a larger or undefined group of recipients or a certain region. It shall be noted, that only addressed ASM will be acknowledged by the recipients.

3.5 Process of application specific messages

To protect the VHF Data Link (VDL), autonomous Inland ASM sent from ship are only allowed upon approval from the regional competent authority by means of the “Control Message” Inland ASM. This message also provides the possibility to deactivate autonomous transmission of Inland ASM from vessels.

3.6 Registration of European Inland ASM

The VTT expert group is responsible for the approval and registration of European Inland ASM. To get an ASM accepted as a European Inland ASM, the following steps need to be executed.

1. when designing a new Inland ASM the rules set forth in chapter 3.3 have to be followed;
2. A proposal for a new Inland ASM has to be sent to the VTT Expert group following the procedures laid out in the document “European Harmonization process on Application Specific Messages for Inland AIS” published by the VTT Expert Group;
3. In case of approval the VTT Expert Group will register and publish the new Inland ASM and inform official bodies like IALA to take it also in their AIS ASM collection;;

4 TECHNICAL GUIDELINES

4.1 Introduction

To improve consistency, quality and ease of implementation for vendors, this chapter contains technical requirements and guidelines on how to encode attributes and values in an Inland ASM message.

4.2 General Requirements

4.2.1 Version indicator

Every Inland ASM must have a version indicator field. The version indicator is 3 bits long as an unsigned integer, which starts as 000 and is numbered sequentially. The MSB is left oriented (e.g. version 1 = 001, version 5 equals 101).

The version indicator is used by implementation partners to parse the contents of the ASM message and therefore must be unique.
Although the version indicator is used as discriminator, new versions of existing ASM shall be backwards compatible as much as possible. Preferably new data fields shall be added instead of changing existing ones (see chapter 4.3.1.4).

4.2.2 Maritime data fields

If maritime data fields and/or formats shall be used it is recommended to follow the coding used in ITU-R M.1371.

4.2.3 Date and Time parameter

If date and/or time fields are used in an Inland ASM, the following guidelines shall be followed :

a. Encoding is based on current ITU-R M.1371
b. Date and time fields will always be separate parameters.
c. Time is always encoded based on UTC value.

Field	Bits	Description
Date	9	Bits 9-5: month; 1-12; 0 = not available = default Bits 4-0: day; 1-31; 0 = not available = default
Time	11	Bits 10-6: hour; 0-23; 24 = not available = default Bits 5-0: minute; 0-59; 60 = not available = default

4.2.4 Horizontal position parameters

Horizontal positions must be encoded in the same way as is described in ITU-R M.1371 for position reports. The longitude is encoded in 1/10000 min (East = positive, West = negative; 181 = N/A, default). The latitude is also encoded in 1/10.000 min (North = positive, South = Negative, -91 is N/A, default).

The following table is an excerpt from ITU-R M.1371

Field	Bits	Description
Longitude	28	Longitude in 1/10 000 min (±180°, East = positive (as per 2's complement), West = negative (as per 2's complement). 181 = (6791AC0h) = not available = default)
Latitude	27	Latitude in 1/10 000 min (±90°, North = positive (as per 2's complement), South = negative (as per 2's complement). 91° (3412140h) = not available = default)

4.2.5 Vertical Distance parameters (via metric system)

If a vertical distance parameter is needed in an Inland ASM, the value shall be encoded via the metric system, preferably encoded in meters or decimeters. Vertical distance values above the vertical reference datum shall be expressed with a positive number while values under the vertical reference datum shall be expressed with a negative number.

4.2.6 Horizontal direction parameters

The horizontal direction parameter shall be encoded in degrees and decimal degrees. The values are relative to the reference of true north.

4.2.7 Directional speed parameters

Directional speeds shall be expressed in meters per second or kilometers per hour.

4.2.8 Inland Vessel and ConvoyTypes

In inland navigation, the Vessel and Convoy Type is encoded based on UN ECE Recommendation 28. For an Inland ASM message, the vessel type field shall be encoded as described in inland specific message FI10, inland ship static and voyage related data.

Field	Bits	Description
Vessel and convoy type	14	Numeric UNECE Classification code as described in Appendix C of the VTT standard. 0 = not available, = default

4.2.9 Use of existing RIS codes and standards

Inland AIS is one of the 4 key RIS technologies. If values, common to inland navigation, need to be encoded in an Inland ASM, the Inland ASM must use the existing codes and standards as much as possible. Some existing codes common in inland shipping are described in the following paragraphs.

4.2.10 Requirements on identification codes

4.2.10.1 Generic recommendations

When using identification codes in an Inland ASM message, the identification code shall be based on an unsigned Integer value as much as possible, starting with 0. The identification code is used to uniquely identify one or more values that are not transmitted via Inland AIS. The use of codes is highly recommended to improve the compactness of the ASM.
The number of bits needed for the specific identification code is dependent of the length of the identification code. A specific value must be provided for an unknown identification code, preferably 0 or a value that will never be used.
When using existing identification codes, in the definition of the ASM the proper reference must be made.
When using new identification codes, the definition of the ASM shall also provide the details of the values represented by the identification codes.

4.2.10.2 Specific recommendations

There are specific cases where an (existing) identification code cannot be encoded conform the generic recommendation. These specific identification codes, used in inland navigation are described in the next paragraphs.

4.2.10.3 ENI number

An inland vessel is uniquely identified using the ENI number, which consists of 8 numbers. The ENI number must be encoded in the manner as described below

Field	Bits	Description
Unique European Vessel Identification Number (ENI)	27	8 digits, numeric value bit-coded, 0 = default = not assigned, 01000000 to 99999999, rest not used (a 7-digits ENI indicates a leading 0)

4.2.10.4 ISRS - Location Code

In a RIS environment, many objects on or near the river are coded via the ISRS Location code. How objects are encoded is described in the RIS Index encoding guide. The ISRS code is based on the following fields.

Field	Bits	Description
UN Country Code	12	2 * 6 bit characters, 0 = unknown = default Based on UN Country Code according to UN Recommendation 16;
UN Location Code	18	3 * 6 bit characters, 0 = unknown = default Based on UN Location Code according to UN Recommendation 16
Fairway section number	17	bit coded numerical value 1-99999, 0 = unknown = default, rest not used
Object Code	30	5 * 6bit characters, 0 = unknown = default Object according to ISRS Codes
Fairway hectometer	17	bit coded numerical value 1-99999, 0 = unknown = default, rest not used

It is recommended, for compactness of the Inland ASM, to carefully review the full use of the ISRS code. However, if certain fields of the ISRS code are omitted, uniqueness of the code inside the Inland ASM must be preserved.

4.3 Structure of ASM

The following guidelines must be followed when defining the binary structure of an Inland ASM.

4.3.1 Structure constraints

The following constraints apply for the structure of an Inland ASM.

4.3.1.1 Version indicator

The first field of the binary structure of the Inland ASM is always the version indicator. The version indicator is used by software application suppliers to discriminate between versions.

4.3.1.2 Byte boundary

The ASM payload must end on a byte boundary (that the length of the payload is an integer multiple of eight bits). If the payload does not end on a byte boundary, spare bits shall be added at the end of the payload to reach a byte boundary.

4.3.1.3 Bit stuffing

An ASM shall be structured in a way that its parameters' default or commonly used values do not result in the sequence of five consecutive 1's in accordance with current ITU-R M.1371.

4.3.1.4 Backwards compatibility

The revision of an ASM should be backwards compatible as much as possible with all previous versions of an ASM.

1. All parameters and possible values used in previous versions should also exist in the revision
2. Only unused or not to be used values can be used to add new values
3. Any changes for ranges should be within the previously defined range
4. Any new parameter added should not conflict with earlier versions of the message

4.3.2 Description requirements

The technical structure of the Inland ASM must be documented in the same format as used in ITU-R M.1371 and the VTT standard. The following message structure can be used as reference.

Broadcast ASM

	Parameter	Bit	Description
	Message ID	6	Identifier for Message 8; always 8
	Repeat Indicator	2	Used by the repeater to indicate how many times a message has been repeated. Default = 0; 3 = do not repeat any more
	Source ID	30	MMSI number of source station
	Spare	2	not used, should be set to zero
Binary data	Application Identifier	16	DAC = 200, FI = x
Binary data	Version Indicator	3	Version Indicator of message
Binary data	field 1	x	information
Binary data	field n	x	Information
Binary data	Spare (observe byte boundaries)	x	not used. Should be set to zero
		168	occupies 1 slot

Addressed ASM

	Parameter	Bit	Description
	Message ID	6	Identifier for Message 6; always 6
	Repeat Indicator	2	Used by the repeater to indicate how many times a message has been repeated. Default = 0; 3 = do not repeat any more
	Source ID	30	MMSI number of source station
	Sequence Number	2	0 – 3
	Destination ID	30	MMSI number of destination station
	Retransmit Flag	1	Retransmit Flag should be set upon retransmission: 0 = no retransmission = default; 1 = retransmitted.
	Spare	1	not used, should be set to zero
Binary data	Application Identifier	16	DAC = 200, FI = x
Binary data	Version Indicator	3	Version Indicator of message
Binary data	field 1	x	information
Binary data	field n	x	information
Binary data	Spare (observe byte boundaries)	x	not used. Should be set to zero
		168	occupies 1 slot

4.4 Documentation

Each Inland ASM shall be documented according to:

- the Change Request form of the VTT Expert Group following the template

and upon approval by the VTT Expert Group:

- the Inland AIS ASM inventory, following the predefined structure:
  - Overview table
  - Introduction
  - Additional information
  - Structure
- the Inland AIS visualisation guidelines following the rationale of the document