IALA GUIDELINE

G1095
HARMONIZED IMPLEMENTATION OF APPLICATION-SPECIFIC MESSAGES (ASM)

Edition 1.1

May 2013

urn:mrn:iala:pub:g1095:ed1.1

10, rue des Gaudines – 78100 Saint Germain en Laye, France
Tél. +33 (0)1 34 51 70 01 – contact@iala-aism.org

www.iala-aism.org

International Association of Marine Aids to Navigation and Lighthouse Authorities
Association Internationale de Signalisation Maritim

DOCUMENT REVISION

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

Date	Details	Approval
May 2013	First issue.	Council 55
July 2022	Edition 1.1 Editorial corrections.	

CONTENTS

List of Figures

1. INTRODUCTION

Application-Specific Messages (ASM) are messages that have been developed to allow the exchange of information via the Automatic Identification System (AIS) in addition to the standard set of messages defined in ITU-R *M.1371-4, Technical characteristics for an automatic identification system using time-division multiple access in the VHF maritime mobile band.* ITU-R *M.1371-4*, Annex 5 provides technical guidance on the use of ASM; this Guideline is intended to provide guidance to IALA members on the implementation and use of ASM that have been described elsewhere and are collected in the IALA ASM collection. RTCM is developing a standard for the creation and qualification of ASM.

IMO *SN.1/Circ. 289 Guidance on the Use of AIS Application-Specific Messages*, provides additional information on use of ASMs and includes a listing of ASM that are recommended for international use. *SN.1/Circ. 289* expanded upon seven test messages contained in *SN.1/Circ. 236*, which was superseded by *SN.1/Circ. 289* on 1 January 2013.

In addition to the messages in ITU and IMO documents, competent authorities have developed their own regional messages for use in addressing specific requirements they have identified. In some cases, different authorities have developed separate messages to address similar requirements. This has led to a lack of harmonization, where shipboard equipment may be required to be able to decode/encode several different ASM in order to receive/send the same information (e.g., met./hydro. information). This Guideline will address actions that are intended to aid in harmonization, including the establishment and use of the IALA AIS ASM collection. The intended use of the collection is to promote harmonization through:

- providing a catalogue of messages for entities to consider for use to meet identified requirements; and
- providing equipment manufacturers with a reference for messages they may implement in their equipment.

While portrayal is outside the scope of this Guideline, IMO has also issued *SN.1/Circ. 290 Guidance for the Presentation and Display of AIS ASM Information*. When considering the use of ASM this Guideline should be consulted.

2. SCOPE

This Guideline describes how ASM should be implemented in a harmonized manner, following IALA Recommendation *R0144 on Harmonized implementation of Application Specific Messages (ASM)*.

3. OVERVIEW / EXPLANATION

3.1. PURPOSE AND SCOPE OF AIS APPLICATION-SPECIFIC MESSAGES

As described in *IMO SN.1/Circ. 289 AIS* was originally developed as a means for positive identification and tracking of ships. AIS accomplishes this by transmitting and receiving static, dynamic, and voyage-related data about ships, as well as allowing for the transmission of short safety-related messages. AIS has been found to be beneficial to the safety of navigation and protection of the environment by facilitating the monitoring of maritime traffic and by providing various basic services. In particular, AIS may be used to transmit and receive ASM as a means for certain types of limited communications.

ASM may be either addressed or broadcast. The content and format of the ASM can be tailored to support different applications.

ASM may provide a variety of capabilities for pre-defined information packages. For example:

- Ships may report information to other ships and shore stations; shore stations may report navigation information, conditions and warnings; and ship reporting may be simplified.

It is also possible for one station to interrogate another station for a specific message and automatically receive the requested information. ASM may reduce verbal communications and enhance reliable information exchange and reduce operator's workload. ASM are intended to augment but not replace standard services such as the Global Maritime Distress and Safety System (GMDSS) and Search and Rescue Services (SAR).

ASM are a quick way to get important information through the VDL in small, predefined packages. A ship, for example, can use ASM to transmit important details such as dangerous cargo information, number of persons on board, extended ship static and voyage-related data and route information. Similarly, a shore station can broadcast details such as met./hydro., tidal window, environmental, etc. as indicated in *SN.1/Circ. 289*.

3.2. ASMS IN USE WITH E-NAVIGATION

ASMs are expected to be extensively used in e-Navigation and are already used in different parts of the world, including the Saint Lawrence Seaway, Panama Canal, Malacca strait, etc.

As an expected e-Navigation tool, the ASM could become a useful method of communicating simple messages containing relevant information for both the ship and the shore station. For example, a ship can interrogate a shore station about navigating facilities in the port/harbour, or a shore station could ask a ship about the version of their ECDIS.

3.3. INTERNATIONAL ASM

IMO has defined a number of ASM (IMO *SN.1/Circ. 289*) for international use. These messages are intended for use all over the world by applications on board ship and on shore. This was done for harmonization so:

- Ship and shore software is designed to deal with a limited set of messages.
- Global consistency for the data contained within the ASM.
- To avoid a proliferation of ASM with a similar purpose.

3.4. REGIONAL ASM

As well as the ASM for international use, a national competent authority may authorize the use of “regional ASM” within its territory. IALA maintains a collection of the format and purpose of each of these regional ASM.

Competent authorities may develop these regional ASM to meet requirements not addressed by international ASM.

Competent authorities may use ASM from other authorities in their region. The purpose of this document is to encourage this through the use of the IALA ASM collection.

Merits:

- Regional ASM can be created and implemented quickly, without need for international approval via IMO.
- They can be customized to meet the exact needs of a specific regional application.
- Local software for use on ship, shore, or on a PPU (Portable Pilot Unit) can be tailored to local needs.

Demerits:

- Regional ASMs will not be recognized or understood by ship (or shore) systems that have not been programmed to use them:
  - this is a particular problem for ships that move between regions.
- There is the possibility of a proliferation of regional ASM leading to problems for manufacturers of ship and shore hardware and software.

Having recognized both the merits and demerits of regional ASM, IALA encourages its members who manage/control AIS messages to cooperate to harmonize regional ASM by adopting the following policy.

1 Authorities should check the IALA Collection of ASMs to ensure that the ASM does not already exist in the collection, a new ASM should not be created by solely changing the Application Identifier (DAC and FI), but rather the authority should use the existing ASM, although the DAC is not of the authority. The authority should update the IALA ASM collection to indicate their use.

2 If requirements are identified to use ASM, ensure that other users of the AIS VDL in their country are encouraged, as far as possible, to use the international ASM and the existing regional ASMs in the IALA ASM Collection.

3 When a new regional ASM is unavoidable, submit its details for recording in the IALA ASM Collection.

4 Establish a means to manage the DAC and FI code allocation for ASM in their country.

5 Authorities are encouraged to publish which international and regional ASM are supported in their area.

4. OPERATIONAL ASPECTS

When using ASMs there are different aspects to be taken into account. This paragraph will give some of those aspects.

4.1. WHEN TO USE / WHY

ASM can provide additional data than that provided by the standard messages in ITU-R *M.1371*.

IMO *SN.1/Circ. 290* provides examples of how ASM may be used in practical cases.

4.2. DECISION-MAKING PROCESS

See figure 1 below:

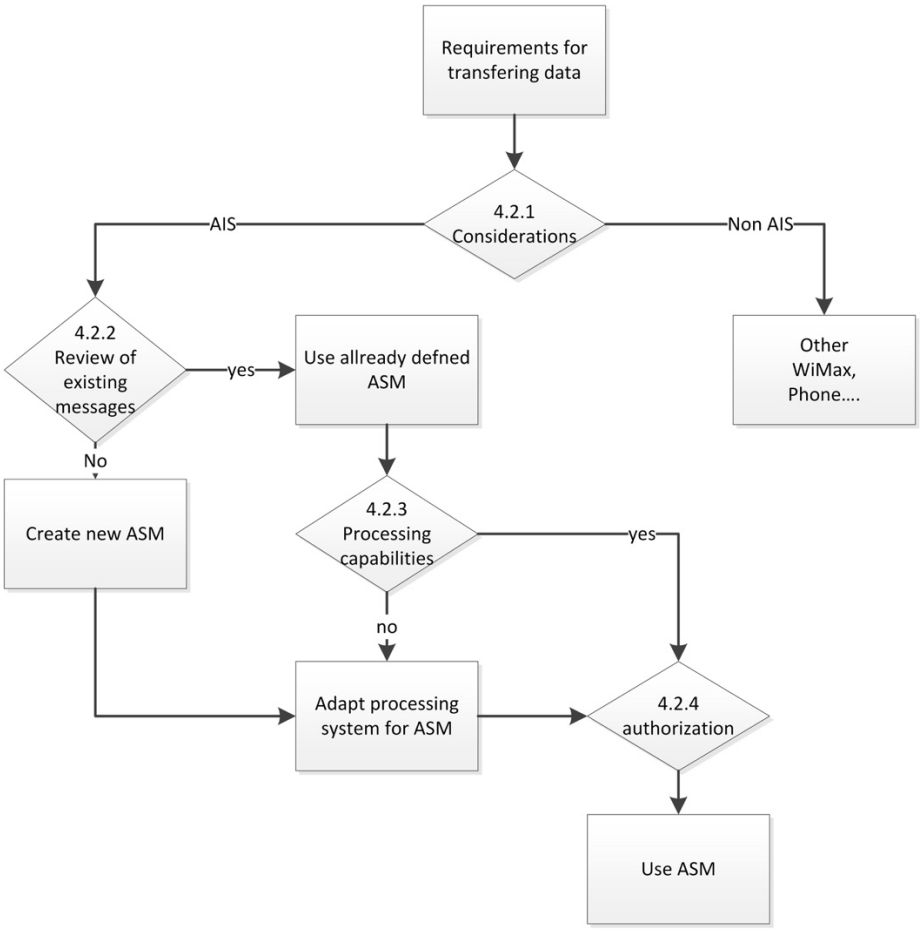

Figure 1 Decision making diagram

4.2.1. CONSIDERATIONS

4.2.1.1. Identification of requirements

The need for transfer of data will be determined by one or more considerations of safety and efficiency. Having determined that there is a genuine need, thought must be given to the best communications medium. In some cases, AIS will not necessarily be best, and another communications medium could be employed in addition. For example, if a shore facility wishes to transfer data to ships in port, then WiFi or a satellite connection may be more effective.

4.2.1.2. Coverage/area

The use by AIS of VHF for the data link means that the communications range for AIS is limited. Refer to IALA Recommendation *R0124 (A-124)* for more detail. Shore facilities may use one or more AIS base stations in a network to extend the coverage area.

4.2.1.3. Mandatory processing and display of ASM

A competent authority may require that processing and display (or use) of certain (international or regional) ASM is mandatory for certain vessels and/or within certain areas.

4.2.1.4. Transmission

Consideration should be given to the length in slots, and the rate of transmission of the ASM, and the effect of this on the loading of the AIS VDL. Refer to the relevant appendix in IALA Recommendation *R0124 (A-124)* for more detail.

ASM may be safety-related or not directly safety-related and should be treated accordingly.

Competent authorities may prohibit the use of certain ASM by certain vessels and/or within certain areas.

4.2.1.5. Costs

Implementation of ASM will have potential cost impact, including:

- Development of desired ASM
- Development and/or updating software and hardware
- Quality control of the ASM data at its source
- Training of shore operators and/or deck officers

4.2.1.6. Availability of equipment

There is no requirement for the Minimum Keyboard Display to be capable of interpreting AIS binary messages. Therefore, the display/use of the ASM information may require additional hardware and/or software. Also, shore infrastructure needs to be equipped to process these messages if they are to receive and send ships' ASM or other binary messages and distribute them to other applications.

4.2.1.7. Frequency of transmission

Since the use of ASM is optional, there are timing considerations for the user to look into. There is no guideline for every situation and one single frequency of transmission will not fit all cases. ASM may be sent in different modes:

- Automatic - the user may choose to have the ASM sent periodically or in response to an event.
- On request - in the case of a shore station that wants to interrogate a specific station, the ASM would be sent in response to the request.
- Sequencing - consideration of the effect of sequencing of ASM in an interacting manner.

4.2.1.8. Permissions

In certain situations, a station could be requested to stop the broadcasting of any ASM at the discretion of the regional authority. For example, a ship could be broadcasting an ASM automatically, however the authority at the shore station could request the broadcasting station to cease the transmission of the message.

4.2.1.9. Group and/or area of interest

An ASM may be intended for a particular interest group, for example national groups or a maintenance staff.

4.2.1.10. Dynamic or static

An ASM could contain two types of information, dynamic or static. Examples of dynamic information can include met/hydro data, tidal windows, etc. Such information can change at any moment without notice. The transmission rate of ASM should take this into consideration. The static information can include station identification.

4.2.1.11. Using alternative data transfer methods

Whenever possible, alternative ways of exchanging information should be considered instead of using AIS ASM. Depending on the broadcaster and their available resources, they can choose to use other means of data transmission like 4G, WiMax, WiFi etc.

4.2.1.12. Broadcast or Addressed

An ASM can be delivered to a single station (addressed) or to any station present within the region (broadcast). A broadcast ASM can include information that can be used by multiple users. In contrast, an addressed message could include information of use to a single user, for example, (ship) interrogating a shore station about the port/harbour facilities. Interrogation can happen both ways in addressed messages.

4.2.1.13. Feasibility

The ASM should be studied and tested completely before it is authorized and used. The regional authority should be able to know if the ASM will reach the intended station(s), convey the desired message in a clear and understandable manner, not overload the VDL, among other important considerations that can include some of those mentioned in the points above.

4.2.2. REVIEW OF EXISTING MESSAGES

When the required functionality and the required data content of the application is defined, the requirements should be compared with the data content of the existing ASM. If the requirements can be met by using an international ASM then this normally would be the preferred alternative because suitable application software is likely to be available and widespread. Development of software may be required if the data is intended to be used in a "new" way (new application using the same data).

If the requirements are not met with an existing International ASM, it should also be considered if the requirements can be modified to allow the use of an existing ASM, taking into account the advantages that might give.

If only a part of the content of an existing International ASM is required and if a new message would reduce the number of slots used, it is recommended to consider the development of a new message, taking the VDL load in account.

If no International ASM is suitable for use, there might be a Regional ASM that meets the requirements. The IALA Collection of ASM is a tool to find messages that are already developed and where normally also appropriate software is available. The main purpose of this collection of ASM, is to help IALA members to avoid developing ASM with the same function as an ASM that already exists and to keep down the number of different ASM and required application software.

4.2.3. ASM PROCESSING CAPABILITIES BY SYSTEMS ONBOARD AND ASHORE

Once a determination is made whether to use an existing ASM or develop a new one, consideration should be given to how the ASM will be processed by systems receiving it, whether ashore or onboard. If using an existing ASM, it is likely that such capabilities and systems exist, and these should be evaluated to ensure they meet requirements and the intention of using the ASM. It may be that such systems are mandated for usage by a competent authority.

If a new ASM is created, it is likely that no capability exists in systems to process and display the information in the ASM. In such an event, consideration should be given to the following questions:

- How will the user use the information?

For instance, for navigation, route planning, traffic management, collision avoidance, etc. This will help indicate what system(s) the ASM should be processed and displayed upon.

- What type of system should be used?
  - ECS, radar, stand-alone software, other system or equipment
- Should existing software be modified, or does new software need to be developed?
- How critical is the information?
  - Does it need to be displayed immediately and prominently?
  - Does the user need to be alerted to its availability?
  - Does it need to be available only when requested by the user?
- How should the information be portrayed or used?
  - Refer to IMO *SN.1/Circ. 290* and other portrayal guidance. Various data types should be portrayed in certain ways (e.g., alpha-numeric, graphic, symbol/icon or geo-spatial).
- Does the ASM act as a trigger for other applications?

- Will use of the ASM and systems to process/display its information be mandated?

If use of the ASM and its processing/display equipment is not to be mandated, competent authorities should work with system and software manufacturers on implementing the capability in their systems. They may also consider developing and distributing specific software to encourage the use of the capability, and should foster an environment where the availability of the ASM is publicized, the benefits to users are made known and users and equipment manufacturers are encouraged to develop or adapt systems to use it.

4.2.4. AUTHORIZATION FOR CREATION AND USE

Authorization for the creation (assignment of DAC and FI) and use of an ASM within a certain region may only be given by a competent authority. Other organizations that wish to create a new regional ASM should obtain the approval of the competent authority. Some administrations will prohibit the use of certain ASM.

- Mandatory use

  Competent authorities within a certain region can mandate the use of ASMs or give the Mariner the choice of using ASMs or other means of communications.

- Approval process for use

  Competent authorities should develop and implement a procedure for approval of ASMs. Approved ASMs should be in the IALA ASM collection. In this process, it is recommended that the identification of the provider of the ASM be broadcasted on the VDL using the appropriate message, such as:

  - Message 5 for Class A stations;
  - Message 21 for AIS AtoN stations;
  - Message 24.

As an alternative, the identification of the provider could be included in the payload of the ASM.

4.3. CO-ORDINATION ASPECTS

ASM can be used in adjacent areas of different administrations. The administration as well as the Mariner, will not support every ASM in a specific region. Therefore, it is recommended that the adjacent administrations have to coordinate which ASM are supported in their region. The Mariner should be informed about which ASM are supported in a region so they could benefit from the services the administrations will support.

In a region there could be a number of authorities who want to use AIS to inform and be informed about the shipping in a region. They could do this through their own system or using a system of another authority, but they are advised also to use a consistent set of ASM. Liaison between neighbouring authorities for creation and use of ASM is encouraged.

There could be overlapping jurisdiction in specific regions and co-ordination of ASM could be required.

The IALA Collection of ASM should be used by authorities to assist the creation of a coordinated set of ASM.

If MSI related information is to be transmitted via ASM, the information should be co-ordinated with the MSI coordinators.

4.4. LIABILITY

Consider the local or national liability implications of use of ASM.

5. TECHNICAL ASPECTS

ITU-R *M.1371-4* Annex 5 contains technical details on the use of ASM, including the binary structure of the messages, definition of ASM functional identifiers, guidelines for creation of ASM, and definition of system-related international function messages. When creating new ASM, the guidance in ITU-R *M.1371-4* Annex 5 should be followed.

IMO *SN.1/Circ. 289* also includes guidance applicable to the creation of ASM, in particular section 5 of the Annex, "General format considerations for all messages".

Each ASM developed should include documentation associated with the ASM. This should include a description of the intended purpose and use of the ASM, any information regarding its development that would aid in understanding how it should be used and any information that differs it from other ASM. The units, and format of the data elements used in the ASM should be harmonized with other ASM. Once the Common Shared Maritime Datamodel (CSMD), which is based on IHO's *GI S-100 Registry*, is developed, data elements used in ASM should be drawn from and directly linked to that registry. Refer to RTCM *standard 12100*, presently in development.

5.1. QUALITY CONTROL

The competent authority should ensure that the accuracy of the information contained in the ASM is acceptable in accordance with the authority's requirements.

The ASM should include quality indicators related to the ASM content when applicable.

5.2. VDL ASPECTS

Concern has been expressed regarding the impact of the use of AIS ASM on the AIS VDL. It is highly likely that extensive use of ASM by ship and shore AIS stations may have negative effects on the delivery of ASM. In high VDL loading environments, it is likely that ASM will not be received by their intended recipients; therefore, in such environments the use of other transport means for instance the future VDES for this information should be considered.

In a high VDL loading environment, competent authorities should implement appropriate VDL management measures, as described in IALA *R0124 (A-124),* Annex 17. Specifically, with regard to the use of ASM, FATDMA assignment should be employed to manage the VDL. The VDL should also be monitored and the amount and frequency of AIS ASM transmitted should be adjusted accordingly. This may require advertisement of changes in level of services provided by AIS ASM; for example, if transmission of met./hydro. observations are reduced in frequency, users of such information should be made aware of the reduction in service.

To aid in orderly VDL management, the use of Message 26: Multiple slot binary message with communications state (as described in ITU-R *M.1371-4* Annex 8, section 2.24) should be used wherever possible. This will allow the ASM to be sent using SOTDMA or ITDMA, rather than RATDMA.

6. DEFINITIONS

The definitions of terms used in this Guideline can be found in the *International Dictionary of Marine Aids to Navigation* (IALA Dictionary) and were checked as correct at the time of going to print. Where conflict arises, the IALA Dictionary should be considered as the authoritative source of definitions used in IALA documents.

7. ABBREVIATIONS

AIS	Automatic Identification System
ASM	Application Specific Message(s)

AtoN	Marine Aids to Navigation
Circ.	Circular (IMO document)
CSMD	Common Shared Maritime Datamodel
DAC	Designated Area Code
ECDIS	Electronic Chart Display and Information System
ECS	Electronic Chart System
FATDMA	Fixed-Access Time-Division Multiple Access
FI	Function Identifier
GI	Geospatial Information (IHO)
GMDSS	Global Maritime Distress and Safety System
IHO	International Hydrographic Organization
IMO	International Maritime Organization
ITDMA	Incremental Time Division Multiple Access
ITU	International Telecommunication Union
ITU-R	International Telecommunication Union-Radiocommunication Sector
met./hydro.	meteorological / hydrological (information)
PPU	Portable Pilot Unit
RATDMA	Random Access Time Division Multiple Access
RTCM	Radio Technical Commission for Maritime Services
SAR	Search and Rescue
SN	Safety of Navigation (IMO)
SOTDMA	Self-Organising Time-Division Multiple Access
S-100	Geospatial Information Registry (IHO)
VDES	VHF Data Exchange System
VDL	VHF Data Link
VHF	Very high frequency (30 MHz to 300 MHz)
WiFi	local area wireless computer networking
WiMax	Worldwide Interoperability for Microwave Access
4G	4th Generation (of mobile telecommunications technology)