Document Revisions

The Committee is requested to review this document and make comment to ANM18

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**IALA Guideline No. ####**

**On**

**The Global Sharing of Maritime Data & Information**

**Edition 1**

**[Date issued]**

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

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| **Date** | **Page / Section Revised** | **Requirement for Revision** |
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|  |  |  |

Table of Contents

[Document Revisions 1](#_Toc304957307)

[Table of Contents 3](#_Toc304957308)

[Index of Tables 4](#_Toc304957309)

[Index of Figures 4](#_Toc304957310)

[Global Sharing of Maritime Data & Information 5](#_Toc304957311)

[1 Background 5](#_Toc304957312)

[2 Scope / Purpose 5](#_Toc304957313)

[3 Definitions / Acronyms 6](#_Toc304957314)

[4 User Needs 6](#_Toc304957315)

[4.1 Uses 6](#_Toc304957316)

[4.1.1 Afloat 6](#_Toc304957317)

[4.1.2 Ashore 6](#_Toc304957318)

[4.2 User data needs 8](#_Toc304957319)

[4.3 User Concerns 8](#_Toc304957320)

[4.3.1 Data Integrity 8](#_Toc304957321)

[4.3.2 Data Security and Confidentiality 9](#_Toc304957322)

[4.3.3 Timeliness 9](#_Toc304957323)

[4.3.4 Limitations of the data. 9](#_Toc304957324)

[4.3.5 Legal Limitations 9](#_Toc304957325)

[4.3.6 Parity of accessibility 9](#_Toc304957326)

[4.3.7 Training & Guidance 9](#_Toc304957327)

[4.3.8 Ease of Use 10](#_Toc304957328)

[4.3.9 Technology Dependence 10](#_Toc304957329)

[4.3.10 Storage 10](#_Toc304957330)

[4.3.11 Version control 10](#_Toc304957331)

[4.3.12 Total Cost of Ownership 10](#_Toc304957332)

[4.4 Data storage aspects 10](#_Toc304957333)

[5 Legal, Policy & Security 10](#_Toc304957334)

[5.1 LEGAL 10](#_Toc304957335)

[5.1.1 Legal aspects of sharing navigation safety information between nations 10](#_Toc304957336)

[5.1.2 Legal Aspects of remote sensing 11](#_Toc304957337)

[5.2 POLICY 11](#_Toc304957338)

[5.2.1 Access to data and information 11](#_Toc304957339)

[5.3 SECURITY 11](#_Toc304957340)

[6 Technical Aspects / Solutions 12](#_Toc304957341)

[6.1 Existing Maritime Data Exchange systems 12](#_Toc304957342)

[6.2 The need for Data models 13](#_Toc304957343)

[6.3 Communication links 13](#_Toc304957344)

[6.4 Bandwidth aspects 14](#_Toc304957345)

[6.5 Data Security Aspects 14](#_Toc304957346)

[6.5.1 Authentication 14](#_Toc304957347)

[6.5.2 Data Integrity 14](#_Toc304957348)

[6.5.3 Data Confidentiality 14](#_Toc304957349)

[6.6 Quality of Service (QoS) 14](#_Toc304957350)

[6.7 System availability and continuity 14](#_Toc304957351)

[6.8 Quality / integrity of the original data input 15](#_Toc304957352)

[6.8.1 Integrity/quality of the original input data 15](#_Toc304957353)

[6.8.2 Trustworthiness of input data 15](#_Toc304957354)

[6.8.3 Accuracy of input data 15](#_Toc304957355)

[6.8.4 Integrity/consistency? 15](#_Toc304957356)

[6.9 Source control of the use of data 15](#_Toc304957357)

[6.10 New and emerging solutions 15](#_Toc304957358)

[ANNEX A Example agreement (IALA-Net) 16](#_Toc304957359)

[ANNEX B Relevant Technical Standards 20](#_Toc304957360)

[ANNEX C Common Formats 21](#_Toc304957361)

Index of Tables

[Table 1 Existing Maritime Data Exchange systems 12](#_Toc303864700)

[Table 2 Common Formats 20](#_Toc303864701)

Index of Figures

[Figure 1 ????? 14](#_Toc303864702)

Global Sharing of Maritime Data & Information

Note: Consistent use of the term Maritime data and information

# Background

IALA plays an important role with respect to safety of navigation, efficiency of maritime transport and protection of the environment. Promoting maritime information exchange is within the overall intent of the IALA constitution and the spirit of IALA.

Maritime Authorities when using AIS to fulfil their responsibilities regarding safety, security and protection of the marine environment, cannot rely solely upon existing commercial AIS data networks.

IALA-NET is a global network of networks, facilitating the interconnection of national and regional maritime data sharing networks. It is a near real time global maritime data exchange service, assisting its participants to fulfil their duties with respect to maritime safety, security and protection of the marine environment. Members with AIS data networks can benefit from IALA-NET´s broader access to worldwide AIS information;

IALA-NET enables the growth of value added services, extending beyond AIS data up to and including e-Navigation data. IALA-NET has the potential to become one of the building blocks of e-Navigation, fostering the safe, economic and efficient movement of vessels;

The principles upon which IALA-NET is based are set out in IALA Recommendation 142 on Maritime Data Sharing, ‘IALA-NET’.

In September of 2011, IALA, hosted a workshop entitled ‘Global Sharing of Maritime Data’ at the new IALA Headquarters.

The workshop, which was set in the context of IALA Recommendation E-142, was the continuation of the work of IALA in creating IALA-NET, first as a demonstrator project launched at the 2008 VTS Symposium in Bergen Norway, and later as a permanent system from 1st July 2010.

The workshop addressed several aspects of exchanging terrestrial and satellite AIS and other maritime data and information on a global basis between maritime authorities; user needs, legal, policy and security aspects as well as technical aspects. IALA-NET and MSSIS were taken as good examples of global data sharing networks. Based on the experience gained so far, the workshop focused on the further development of concepts related to sharing maritime data and information to ensure safety of navigation, security, protection of the maritime environment and efficiency of maritime traffic.

This Guideline includes the results of work carried out during the workshop.

# Scope / Purpose

This Guideline aims at providing guidance to IALA members relevant aspects of exchanging globally maritime information including, but not limited to terrestrial and satellite AIS;

Specifically, the following aspects are addressed:

* User need, possible applications of maritime data and information presently shared and potential added value of maritime data and information to be shared in the future;
* Legal, policy and security aspects of sharing maritime data and information in a global environment, in particular data and information ownership, timing and accessibility;
* Contemporary technical solutions, standards and developments in network technology and storage.

# Definitions / Acronyms

CIRM Comité International Radio-Maritime

IHO International Hydrographic Office

IWRAP IALA Waterway Risk Assessment Program

MSSIS Maritime Safety & Security Information System (US)

ITU **International Telecommunication Union**

WMO World Meteorological Organisation

IALA-NET - A near real time AIS data exchange service that uses the Internet with a capacity for AIS data storage for statistical purposes

From IALA Dictionary: 5-3-340 Information, The meaning assigned to data by known conventions.

# User Needs

## Uses

Comprehensive user needs have been well documented in IMO instruments and other IALA documents. Nevertheless, this Guideline offers a brief list of some potential applications or uses for maritime data and information. This list is by no means intended to be exhaustive. It is offered to provide an indication of the range and diversity of activities that rely on maritime data and information for their success and which will further benefit from mutual exchange of maritime data and information.

### Afloat

* Voyage planning & execution:
  + Risk identification & avoidance (shipboard);
  + Weather routing;
  + Cargo management (planning loading & discharge);
  + Logistics (shipboard);
  + Monitoring of cargo, vessel status and resources;
  + Track keeping & collision avoidance;
  + Planning for sufficient under keel clearance.
* Regulatory compliance:
  + Reporting;
  + Environmental;
  + Port State;
  + Coastal State.
* Seakeeping (Stability & Seaworthiness);
* Security;
* SAR response.

Dynamic updating (essential for maintaining the quality of marine data and information – This applies universally afloat and ashore)

### Ashore

* Traffic management:
* VTS operations;
* Anchorage & berth management.
* Hazard Management:
* Risk analysis;
* Accident investigation;
* Contingency planning;
* Incident reporting;
* Emergency towage & salvage.
* SAR;
* Pilotage and allied services;
* Support to logistics chain:
* Port operations;
* Voyage monitoring;
* Asset & resource management (Increased efficiency);
* Forward planning of movements.
* Contingency response;
* Asset tracking & management;
* Regulatory Compliance:
* Shipping inspection;
* Port State Control.
* Law enforcement:
* Fisheries enforcement;
* Customs;
* Border control / Immigration.
* Ship Clearance:
* Health & Quarantine.
* Environmental protection:
* Pollution monitoring & Control / response.
* Security & Intelligence;
* Waterways infrastructure management (including inland waterways):
* AtoN operations & system optimisation;
* Infrastructure.
* Science & Research support;
* Maritime Safety Information (MSI);
* Environmental information reporting;
* Marine Spatial Planning:
* Licencing;
* Offshore Structure permits.
* Offshore operations.

## User data needs

An authority, organization or service that intends to undertake any of the above listed activities or operations requires timely, relevant and accurate maritime data and information. Such data and information takes many forms and may be derived from many sources. While primarily focussing on vessels and environmental conditions, it may also address regulatory and technical matters. Furthermore historical and baseline maritime data and information needs to be considered. The following list is, again, not intended to be exhaustive. It is meant to provide an indication of the range of maritime data and information that is gathered, processed and exchanged by shore authorities, organizations and services in the conduct of their business and may be available for sharing.

* Vessel Data:
* Static;
* Dynamic;
* Voyage related data (cargo, crew, passengers, route, etc.);
* Defects (including local intelligence on defects);
* Incident reports;
* Anomalous activity.
* Environmental Data:
* Hydrographic;
* Meteorological;
* Physical environment;
* Ecological;
* Oceanographic (Tsunami);
* Special Areas of Conservation;
* Oil spill/pollution detection & reporting;
* Signal propagation (Atmospheric data).
* Regulations & references:
* Port State Control;
* Technical references.

## User Concerns

### Data Integrity

Data integrity is paramount and is a key concern of both users and providers.

Source data holders are often reluctant to allow access to their data. If the intent is free and open exchange of data there must be a process trusted by all parties (providers and recipients) to enable access.

Users expect that data provided will be accurate and consistent. Furthermore, that the data are authentic in that they are derived from credible sources which can be validated.

It is also of concern that because the route from provider to user may be a chain of different links, with various opportunities for interference, that there must be some means of confirming received data integrity along the data supply chain. Loss of integrity may be accidental or through deliberate interference.

Data should be transmitted using recognised formats such that the receiver will understand the format used by the sender.

Timeliness can be regarded as a part of data integrity. Section 4.3.3 refers.

Quality of data is also very important. Data should, therefore, include some form of quality marker information.

Note to Technical Group – It is assumed that Tech WG will deal with means of transmission.

### Data Security and Confidentiality

Users are concerned with issues of data security and confidentiality and in particular any commercial sensitivity of data as it relates to release of information that may compromise investors or introduce a competitive advantage/disadvantage.

Other information that requires protection includes location sensitive information, such as location of fishing grounds, or personal identification information. Personal data includes identity data relating to vessels as well as individuals.

In many cases confidentiality is already protected by legislation but this is not universal throughout the maritime domain. The requirement to protect access to data may go beyond the limits of primary legislation. Confidentiality needs, at least, to be protected by appropriate levels of access rights to data exercised through physical security, encryption and password protection.

### Timeliness

Information should be received when needed. This may be in advance of an event, real time, near real time or historic as appropriate. Data should be time stamped as appropriate to the nature and use of the information. Time stamp should preferably be at time of origin but if not should be as soon thereafter as possible. Where time stamp is not time of origin it is desirable that the difference involved be flagged.

### Limitations of the data.

Users need to be made aware of the limitations of the maritime data or information to avoid taking action based on inappropriate, incomplete or inaccurate data or information.

### Legal Limitations

Many national States, in the lawful exercise of their authority, place legal limits on the exchange and public dissemination of data and information. These include protections on intellectual and commercial property rights, and limitations on third party use of proprietary data and information.

In the course of exchanging maritime data and information in the interest of safety, security and efficiency, these limitations must be respected and the authorities involved must be aware of their rights and obligations under law. In particular data received should be consistent with the laws of the national authority receiving the data.

Authorities need be aware of any exposure to liability that might occur from their actions or inactions with regard to maritime data and information exchange.

### Parity of accessibility

There is a concern that authorities who may wish to exchange maritime data and information should not be restricted in their ability to do so due to cost or complexity.

### Training & Guidance

The introduction of any new system requires that the operators and users of that system be proficient in its use. Systems intended for the exchange of maritime data and information are no exception. Deployment of these systems will require that users and operators be provided with generic, type specific and recurrent training.

### Ease of Use

Systems designed for the global sharing of maritime data and information should be intuitive in their use and should not impose an undue burden on the user or operator.

### Technology Dependence

Systems designed for the global sharing of maritime data and information should be supportable and avoid single points of failure.

### Storage

The volume of maritime data and information involved in many of the aforementioned uses will be considerable. Given that many of these uses also require access to archive or historic data and information, consideration must be given to providing adequate capacity for retaining and archiving these records.

### Version control

Version control procedures will be required to ensure there is proper tracking and control of changes to software and equipment. This will ensure on-going efficient exchange of global sharing of maritime data and information.

### Total Cost of Ownership

The cost for operating any system that supports the exchange of maritime data and information will be borne by national authorities and end users. These systems should be designed such that their initial acquisition and life cycle support costs are minimised.

## Data storage aspects

When using historical data, the more commonly searched maritime information is mainly related to geographical areas and time periods. In light of this observation, to facilitate the end-users to access the relevant information and then the growth of value added services, such as risk analysis and environmental studies, suitable file format and storage space architecture can be chosen. The storage space architecture could rely on a hierarchical geographical area / time period model, while the file format should provide direct, efficient and fast access to the stored information.

# Legal, Policy & Security

This section describes legal, policy and security aspects of sharing navigation safety data and information in a global environment, in particular data ownership, timing and accessibility. A recent major shift in policy around world is for the free exchange of government produced data and information and to facilitate access to these data and information. Several systems have been developed in the past few years that exchange data and information to provide National Authorities with a picture of the maritime domain, e.g. LRIT, HELCOM, MSSIS and IALA-NET. Their common characteristic is to provide primary data to authorities. Other systems, such as SafeSeaNet, are more complex as they combine primary data with processed and analysed data. The purpose of this section is to address only the primary data exchanged for navigation safety and environmental protection purposes between National Authorities.

## LEGAL

The responsibility of authorities and of the system is to ensure that the data and information are transmitted without any alteration. However, the authority makes no value judgement nor bears any liability regarding the content, accuracy or completeness of the data as well as the consequences of the use of the data.

### Legal aspects of sharing navigation safety information between nations

There is a need to ensure the integrity of navigation safety information when used in legal proceedings. Ensuring data authenticity, security and integrity from its initial generation through final disposition is of particular concern to National Authorities.

### Legal Aspects of remote sensing

Sharing data collected by satellites is addressed by potentially conflicting international and national laws and could fall under a special space legal regime.

## POLICY

According to IMO Resolution A.917(22), AIS is intended to enhance safety of life at sea, the safety and efficiency of navigation, and the protection of the marine environment.

AIS is one source of maritime data and information and, as digital data, is readily shared. Responsible sharing of maritime data and information can improve maritime safety and security, facilitate commerce, and enhance environmental protection and conservation efforts. The e-Navigation concept is founded on the principle of efficient international exchange of maritime data and information.

The main principles for developing a responsible data and information sharing policy are as follows:

1. Recognize and respect the confidentiality and sensitivity of any maritime data and information received;
2. Protect the information that may be received, as required;
3. Use the information received in a manner consistent with international law, appropriate national laws, and the interest of the international community; and
4. Encourage the exchange of information for the purposes of safety of navigation.

Access to and distribution of maritime data and information should be in accordance with applicable governmental and/or commercial licensing and sharing agreements. Additionally, data and information exchange should be governed by formal agreements between National Authorities. General principles for agreements/contracts between parties sharing data and information include:

1. Identify all parties to the agreement.
2. Describe the required data and information: format, method of transmission, authentication, security, information assurance, timing, latency and additional technical specifications, as appropriate.
3. Identify intended use(s) of data and information including descriptions of any planned modifications or value-added transformations to the data.
4. Describe general access rights, data redistribution, and third party access rights, including commercial use, restrictions and costs/cost recovery.
5. Specify entry into force and right of termination.

See ANNEX A for an example agreement for data sharing.

### Access to data and information

The reception and use of broadcast information is subject to ITU-R Radio Regulations Article 17 on Secrecy. Clear and realistic principles and rules regarding access to AIS and other navigation safety data should be defined and adopted by the international community.

National Authorities should have criteria to ensure that exchanged data and information is of the highest quality. For example, the established international system of exchanging Maritime Safety Information (MSI) is a useful model that ensures quality and reliability of transmitted information. The quality of exchanged information should be made known to the end user.

National Authorities that own navigation safety data and information should always consider the release of appropriate data for the purposes of marine accident investigations, giving due regard to privacy, security and commercial sensitivity.

## SECURITY

National Authorities should make every effort to ensure the security of data and information during its exchange and when stored locally in a database. Real time vessel traffic data and information is a sensitive security aspect and should be part of the principles and rules to be adopted by the international community.

# Technical Aspects / Solutions

This section describes contemporary technical solutions, standards and developments in network technology and storage applications. Communication technology is changing rapidly, and while present systems utilize contemporary technical solutions, future systems may be expected to utilize new and emerging technologies and standards.

## Existing Maritime Data Exchange systems

A number of maritime data sharing systems have been created to accommodate user needs as described in previous sections. National systems are designed to accommodate the needs of national stakeholders. Supranational systems address the needs of two or more countries. Global systems such as IALA-Net and MSSIS attempt to meet the needs of the international community. IALA-NET is strictly for governmental use. Some systems are commercial, while others are non-commercial and available to the general public.

1. Existing Maritime Data Exchange systems

| **System Name** | **Responsible Organisation** | **Data type(s)** | **System technology** | **Access** | **Global or regional** | **Application area Comments** |
| --- | --- | --- | --- | --- | --- | --- |
| IALA-NET | IALA | Shared coastal AIS data | web-based + regional servers | Authorised contributors only | Global  Governmental |  |
| S-IALA-NET | IALA | Shared SAT AIS | LEO + central  server | Authorised contributors only | Global  Governmental |  |
| SafeSeaNet | EMSA | Shared coastal AIS data | AIS shore stations + central server | EMS maritime administrations | Regional  EU Member states |  |
| CleanSeaNet | EMSA | Satellite surveillance | LEO (Envisat) + central server | EMS maritime administrations | Regional  EU Member states |  |
| MSSIS | US DOT | Shared coastal AIS & radar data | AIS shore stations + central server | Government agencies | Global  Governmental |  |
| OrbComm | OrbComm | Commercial SAT AIS | LEO + central server | Commercial customers | Global  Commercial |  |
| ExactEarth | ExactEarth | Commercial SAT AIS | LEO + central server | Commercial Customer | Global  Commercial |  |
| North Atlantic Information Server | NCA | National Coastal and SAT AIS | LEO + central server | Norwegian Government agencies and other North Atlantic governments | Regional  Governmental  AISSAT-1 |  |
| COLAIS | ESA | AIS RX on ISS | LEO | Norwegian FFI | Experimental |  |
| MARSUR | EDA | Interface between existing defence systems | Various | EMS | Regional  EU Member states  ?? Nick Ward to explain |  |
| MARISS | e-GEOS | pre-op maritime surveillance | LEO | Project partners | Regional  EU Member states  Part of ESA GMES |  |
| LRIT | IMO | Satellite location reporting & identification | GEO + central server | IMO members | Global  IMO Members  Internationally agreed, but take-up not complete |  |
| HELCOM | HELCOM | AIS Data sharing arrangement | AIS shore stations + central server | Baltic states | Regional Governmental |  |
| NORTHSEA | HELCOM | AIS Data sharing arrangement | AIS shore stations + central server | North Sea states | Regional Governmental |  |
| MED SEA | EMSA??? | AIS Data sharing arrangement | ? (Italy) | EU member around the Mediterranean sea | Regional Governmental?? TO be investigatied |  |

## The need for Data models

Exchange of data requires an understanding of the meaning of each and every data item. This concerns the way in which data values are encoded and the exact meaning of data items.

The former is specified by the data format, the latter is reflected in the data model.

The data model unambiguously defines the semantics of the data item, the structure of a data item and the permissible values of a data item.

Data items need not be simple items, such as integer numbers or strings, in fact, they may be arbitrarily complex compositions of these simple items.

Once the data model is defined, a suitable data format can be chosen, depending on transmission channel characteristics and data processing requirements.

Since the use of data models is fundamental to the exchange of data, IMO, at NAV57, decided to institute the principle of a Common Maritime Data Model.

A common data model should be developed, supported and used.

## Communication links

The transfer of data from A to B requires connectivity via a data link or more generally a network. A network comprises appropriate hardware and software interconnected by communication channels. In the maritime world, both aboard ship and shore side, data links can be wired or wireless.

Different technical solutions and architectures can be used when establishing a data sharing network. Consideration should be given to the:

* physical distance between the sending and receiving parties;
* services provided by the network;
* quality of services requested by the users.

The processes established to guarantee the quality of the services provided by a data sharing network should be carefully defined and monitored and could be part of a Quality Management System.

Global sharing of maritime data and information can take place either through the internet or through dedicated networks. The internet is public while dedicated networks are generally closed. Consideration should be given to the security related characteristics of these different network types.

Systems used for global sharing of maritime data and information are, in reality, a network of networks.

When designing a network for global sharing of maritime data, consideration has to be given on transmission protocols, bandwidth limitations, communication/data distribution strategy security aspects such as authentication and confidentiality as well as data Integrity.

A selection between the options available should be based on a number of criteria, including the type of data being transferred, volume of data, types and number of clients connected to the network.

## Bandwidth aspects

Although bandwidth cost is ever decreasing there is still a cost associated with the transfer of a certain data item. So the value of the conveyed information has to be balanced against the cost of transmitting it. Another trade-off is the time required to transfer a data item versus a higher required bandwidth (with increased cost). In the future one can expect to have more flexibility in terms of roaming i.e. dynamic choice of communication links with different bandwidths coverage and cost.

## Data Security Aspects

The following data security aspects are relevant for the transmission (and storage) of data.

### Authentication

Authentication means that the sending and receiving parties are able to unambiguously identify each other. This means that each party knows who he is communicating with.

### Data Integrity

Data integrity means that the data received is the same as the data sent. No data is lost or altered during transmission.

### Data Confidentiality

Data confidentiality means that the data is protected against eavesdropping. No other parties, other than the sender and receiver are able to read the data. Data confidentiality can be obtained by physical protection, i.e. prevent access to the data or by data encryption using a secret key that is only accessible to authorised parties. Depending on the sensitivity of the data, a certain level of data encryption may be required.

Insert Illustration from GH

1. ?????

## Quality of Service (QoS)

The QoS covers the prioritisation of certain data above others in order to guarantee a timely delivery of that data. A higher priority data item will be delivered faster than a lower priority item.

In real-time or near real-time systems, it may be necessary to ensure that some data types have priority. Furthermore, when Data Sharing Networks utilize infrastructure which also is used by other data systems, it may be necessary to ensure quality of service for the preferred system.

## System availability and continuity

System availability and continuity of maritime data and information sharing systems must be compatible with the operational user needs associated with the system (IALA Guideline XXX refers).

## Quality / integrity of the original data input

### Integrity/quality of the original input data

### Trustworthiness of input data

### Accuracy of input data

### Integrity/consistency?

## Source control of the use of data

For many data sources to data sharing networks, control over the destiny of the data supplied is important. This can be solved through proper Authentication.

Part of the information may be open while other parts may be confidential through encryption.

## New and emerging solutions

Obviously contemporary technical solutions are used for contemporary systems. Future systems will be based on new and emerging technologies relevant to global data sharing.

At NAV57 IMO delegates expressed strong support to the creation of a new common Maritime Data Model. The IHO S-100 is proposed to be the baseline reference for this model.

1. Example agreement (IALA-Net)

Agreement on Access to IALA-NET

by and between

The International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA)

and

[National authority]

**Agreement on Access to IALA-NET demonstrator AIS Data**

1. Parties
   1. International Association of Marine Aids to Navigation and Lighthouse Authorities

10 Rue des Gaudines

78 100 St Germain-en-Laye

France

As represented by

Danish Maritime Safety Administration

Overgaden o. Vandet 62B

P.O. BOX 1919

DK-1023 Copenhagen

and

[National Authority]

1. Contribution of and Access to IALA NET AIS Data
   1. IALA-NET required AIS Data

IALA-NET will from National Authorities receive and provide to the National Authorities real-time AIS data from all SOLAS ships carrying AIS as mandatory equipment pursuant to regulation 19 chapter V of SOLAS Convention. Consequently, National Authorities participating in IALA-NET is deemed to accept to contribute and receive the said AIS data. However, National Authorities are entitled to limit AIS data for ships that does not fall under the SOLAS regulation 19 chapter V.

* + 1. Real-time AIS data in this Agreement is defined to be:
* delivered end-to-end non-stop, one vessel report after the other as soon as they are transmitted
* delivered promptly when they are received at the base station
* delivered without any delay (additional latency)
* not sent in blocks
* irrespective of the reporting interval, however the reporting interval is no less than up-date every 6 minutes
  + 1. The data format for the AIS data stream is identical to the basic VDM/VDO output on the Presentation Interface of AIS devices such as class A stations, Base Stations or AIS receivers, as described in IEC 61162 / IEC 61993-2 / IEC 62320-1:
* !AIVDM,1,1,,A,@01uEO@rJwqP3h00,0\*6D
* !AIVDM,1,1,,B,6000W6<q=:M00480J0,4\*04
* !AIVDM,1,1,,B,6000W64pF;qP0480J0,4\*2B
* !AIVDM,1,1,,A,6000W4u9aR120480J0,4\*4D
* !AIVDM,2,1,3,A,53P:t=@0000384a?:215D4qAE>10C?OV2222220N0000040Ht0000000,0\*07
* !AIVDM,2,2,3,A,000000000000000,2\*27
  + 1. Further information on technical requirements etc. is available at http://www.frv.dk/iala-net
  1. Contribution of IALA-NET AIS Data by a National Authority
     1. National Authorities ensures that real time AIS data is made available to IALA-NET from a server accessible via the Internet and provides information on access thereto. The National Authority is not under any obligation to provide IALA-NET with online technical support with respect to the AIS data access and the further handling of said.
     2. IALA-NET acknowledges that the forwarded AIS data will be transmitted to it in the form in which it was received. The forwarded data will not be verified, validated or enhanced. IALA-NET acknowledges that the National Authority cannot guarantee the transmission of the forwarded data will be continuous or without fault.
  2. Access to IALA-NET AIS Data
     1. Access to AIS data received from the participating National Authority will only be accessible through IALA-NET to other participating National Authorities. However, the participating National Authority is entitled to re-distribute the received IALA-NET AIS data to the following national recipients based on a need for access to IALA-NET AIS data based on:

|  |  |
| --- | --- |
| **National Authorities** and any research institutes or organizations or their contractors acting according to the uses set herein | Pollution preventing and combating  VTS(Vessel Traffic Services)  Port State Control (PSC)  Contingency planning  International Ship and Port Security (ISPS)  Search and Rescue (SAR)  Traffic planning, efficiency and management, incl. icebreaking services  Mandatory reporting system for HAZMAT reporting requirements  Pilotage  Customs surveillance  Protection of marine resources  Science and research supporting the implementation of the Helsinki Convention and for preparing IMO ships routeing measures |

* + 1. IMO Maritime Safety Committee (MSC) urged on its 79th meeting, held 1st-10th December 2004, Member Governments to discourage publication of AIS data on the world-wide web or elsewhere.
    2. Moreover, National Authorities are not entitled to use IALA-NET AIS data for any commercial purpose or charge a fee for a legitimate use thereof.
    3. Consequently, any access apart from the abovementioned to IALA-NET AIS data will be deemed a violation and the access hereto will be cancelled without further notice.
  1. Entry into Force and Right of Termination
     1. This Agreement enters into force at the final day of signing, cf. section 2.5. The agreement is valid for the duration of the IALA-NET system.
     2. Both Parties are entitled the right of terminating this agreement upon a formal written notice on the intention of terminating this agreement in total or in part. The term of notice is three (3) months
     3. Such notification on termination must be received by the other party in order to take effect.
     4. Any failure by one of the Parties to fulfil any of the conditions in this Agreement entitles the other Party the right of terminating the access to IALA-NET AIS Data without further notice.
  2. Signatures
     1. This Agreement on Access to IALA-NET AIS Data has been drawn up in two (2) identical originals; one for each Party.

On behalf of IALA Net On behalf of [National Authority]

Where / date Where / date

1. Relevant Technical Standards
2. Overview

It is widely acknowledged that there are already a significant number of Standards covering description and transfer of data, however there still are a few gaps that need standardisation, particularly in the field of equipment monitoring and control, interfacing of various sensors etc.

Moreover, it is important to strike a balance between and to merge the practices and experiences of communities in the maritime domain, into a harmonized view taking into account specific features of the data and provide interoperability:

* to describe the marine data resulting products in such a manner it will help to reach coherency, enhancing the information provided by adding « discovery metadata »,
* to fulfil a common data format structure and harmonise and standardise its description, which will ease exchange and joint use of AIS data sets and derived products,
* to harmonise data transport and exchange procedure, that is the ability to access the data in an interoperable manner from client applications, relying on a compatible system architecture for distribution on a public or private network

It is necessary to use the most appropriate standard for the current task although there are a number of choices. Some relevant standards and formats are listed below:

1. ISO 19100 series
   1. 19119:2005: identifies and defines the architecture patterns for service interfaces used for geographic information.
   2. 19115:2003: defines the schema required for describing geographic information and services. It provides information about the identification, the extent, the quality, the spatial and temporal schema, spatial reference and distribution of digital geographic data.
   3. 19139:2007: defines Geographic MetaData XML (gmd) encoding, an XML Schema implementation derived from ISO 19115.
2. IHO digital data transfer standards
   1. S-52 – Portrayal; provides specifications and guidance regarding the issuing and updating of Electronic Navigational Charts (ENC), and their display in ECDIS. S-52 comprises a number of separate documents.
   2. S-57 - the official IHO Transfer Standard for Digital Hydrographic Data.
   3. S-100 – New developed standard for marine data and information data modelling; S-100, will incorporate the requirements of S-57 for ENCs and ECDIS, significantly it is aligned with the ISO 19100 series of geographic information Standards.
3. S-63 – IHO Data Protection Scheme – used to enable the authentication, integrity and confidentiality of ENC data throughout the data distribution chain from Producer Hydrographic Office to individual seafarer licence holder.

Since maritime information can be spatial information and related to the field of Environment, further guidance can be found in the European INSPIRE directive for establishing an infrastructure for spatial information as well as the CF – Climate and Forecast Metadata convention (WMO).

1. Common Formats

Some of these following formats are more convenient for real time data transport, while the others should be considered for storage and retrieval of historical data on a non real time basis.

1. Common Formats

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| **Format Name** | **Responsible Organisation** | **Description** | **Application** |
| IEC 61162 | IEC | Maritime navigation and radiocommunication equipment Real time  and systems - Specification for communication between marine electronic devices. | Real time |
| IVEF | IALA | Inter VTS Exchange Format (IALA Recommendation V-145) | Real time |
| ITU-R 1371.4 | ITU | Technical characteristics for an automatic identification system using time division multiple access in the VHF maritime mobile band. | Real time |
| NetCDF | UCAR/Unidata | NetCDF (Network Common Data Form) is a set of software libraries and self-describing, machine-independent data formats that support the creation, access, and sharing of array-oriented scientific data. The format is an open standard. NetCDF is an international standard of the Open Geospatial Consortium. | Non real time |
| HDF5 | HDF Group | HDF5 is a data model library and file format for storing and managing data. It supports an unlimited variety of data types, and is designed for flexible and efficient I/O and for high volume and complex data. | Non Real time |