IALA GUIDELINE

G1086
THE GLOBAL SHARING OF MARITIME DATA AND INFORMATION

Edition 1.1

June 2012

urn:mrn:iala:pub:g1086: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 Maritime

DOCUMENT REVISION

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

Date	Details	Approval
June 2012	First issue	Council 53
July 2022	Edition 1.1 Editorial corrections.	

CONTENTS

CONTENTS

List of Tables

1. 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.

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. 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 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 *R0142 Maritime Data Sharing, "IALA-NET".*

In September 2011, IALA hosted a workshop entitled "Global Sharing of Maritime Data" at 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; and
- technical aspects.

IALA-NET and the United States' Maritime Safety and Security Information System (MSSIS) are 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

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

2. PURPOSE

The purpose of this document is to provide guidance to IALA members on relevant aspects related to the exchange of global maritime data and information (e.g., terrestrial and satellite AIS), in the context of promoting safety of navigation, security, protection of the maritime environment and efficiency of maritime traffic.

3. SCOPE

The scope of this document is limited to the following 3 key considerations:

- user needs related to the current and future interchange of maritime data and information;
- legal, policy and security implications related to the sharing of maritime data and information in a global environment (i.e., ownership, timing and accessibility); and
- contemporary technical solutions, standards and developments in network technology and storage.

4. USER NEEDS

4.1. USES

Comprehensive user needs have been well documented in IMO and IALA documents. Nevertheless, this Guideline offers a brief list of some potential applications or uses for maritime data and information. This list is offered to provide an indication of the range and diversity of activities that rely on maritime data and information and which will further benefit from mutual exchange of maritime data and information. It should be noted that dynamic updating is essential for maintaining the quality, relevancy and integrity of marine data and information and should apply universally afloat and ashore.

4.1.1. SEA-BASED USES

- voyage planning & execution:
  - risk identification & avoidance (shipboard);
  - weather routeing;
  - 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; and
- SAR response.

4.1.2. SHORE-BASED USES

- 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 optimization;
  - infrastructure.
- science & research support;

- Maritime Safety Information (MSI);
- environmental information reporting;
- Marine Spatial Planning (MSP):
  - licencing;
  - offshore structure permits; and
- offshore operations.

4.2. USER DATA NEEDS

An authority, organization or service that intends to undertake any of the above listed activities or operations require 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 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; and
  - anomalous activity.
- Environmental Data:
  - hydrographic;
  - meteorological;
  - physical environment;
  - ecological;
  - oceanographic (Tsunami);
  - Special Areas of Conservation;
  - oil spill/pollution detection & reporting; and
  - signal propagation (atmospheric data).
- regulations & references:
  - Port State Control; and
  - technical references.

4.3. USER CONCERNS

4.3.1. DATA INTEGRITY

Data integrity 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 trusted process by all parties (providers and recipients) to enable access.

Users expect that data provided is accurate and consistent and that the data is authentic, in that it is 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 recognized formats such that the receiver will understand the format used by the sender.

Timeliness can be regarded as a part of data integrity. (See sections 6.3, 6.5.2 & 6.8)

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

4.3.2. 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.

4.3.3. TIME STAMPING

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. The time stamp should preferably be at time of origin but if not should be as soon thereafter as possible. Where the time stamp is not time of origin it is desirable that the difference involved be flagged.

4.3.4. DATA LIMITATIONS

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.

4.3.5. 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.

4.3.6. ACCESSIBILITY

There is a concern that authorities that may wish to exchange maritime data may be restricted in their ability to do so due to cost or complexity. This may be resolved through the use of open source software and sharing agreements between contracting government and service providers.

4.3.7. 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 and that they remain competent in its use through continuous professional development.

Training should be aligned with the particular needs of the user.

4.3.8. 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.

4.3.9. TECHNOLOGY DEPENDENCE

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

4.3.10. 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.

4.3.11. 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 for the global sharing of maritime data and information.

4.3.12. TOTAL COST OF OWNERSHIP

The operating cost for 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 minimized.

4.4. 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.

Data storage must comply with national regulations.

5. 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 the world is for the free exchange of government produced data and information. Several systems have been developed in the past few years that exchange data and information to provide National Authorities with a consolidated picture of the maritime domain, e.g., LRIT, HELCOM, MSSIS and IALA-NET. Their common objective 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.

5.1. LEGAL

A 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.

5.1.1. 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.

5.1.2. 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.

5.2. POLICY

According to IMO Resolution *A.917(22) Guidelines for the Onboard Operational Use of Shipborne Automatic Identification Systems (AIS),* AIS is intended to enhance safety of life at sea, the efficiency of navigation, and the protection of the marine environment.

AIS data is an example of a source of maritime information that is readily shared. 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:

- recognize and respect the confidentiality and sensitivity of any maritime data and information received;
- protect the information that may be received, as required;
- use the information received in a manner consistent with international law, appropriate national laws, and the interest of the international community; and
- 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:

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

See annex A for an example agreement for data sharing.

5.2.1. 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 as per ITU-R article 17.

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 international marine accident investigations, giving due regard to privacy, security and commercial sensitivity.

5.3. 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 has a sensitive security aspect and should be part of the principles and rules to be adopted by the international community. This includes the use of data for unauthorized use such as economic gain or abuse of privacy.

6. TECHNICAL CONSIDERATIONS

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.

6.1. EXISTING MARITIME DATA EXCHANGE SYSTEMS

A number of maritime data sharing systems have been created to accommodate user needs as referred to 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 (see Table 1).

Table 1 Existing Maritime Data Exchange systems

System Name	Responsible Organization	Data type(s)	System technology	Access	Global or regional	Application area Comments
IALA-NET	IALA	Shared coastal AIS data	web-based + regional servers	Authorized contributors only	Global Governmental	
S-IALA-NET	IALA	Shared SAT AIS	LEO + central server	Authorized contributors only	Global Governmental	
SafeSeaNet	EMSA	Shared coastal AIS data	AIS shore stations + central server	EMSA maritime administrations	Regional EU Member states	
CleanSeaNet	EMSA	Satellite surveillance	LEO (Envisat) + central server	EMSA 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	

System Name	Responsible Organization	Data type(s)	System technology	Access	Global or regional	Application area Comments
MARSUR	EDA	Interface between existing defence systems	Various. Aims at improving the Recognized Maritime Picture (RMP)	EMS	Regional Voluntarily Participating EU Member states	
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	Italian Coast Guard	AIS Data sharing arrangement	Central server connected to National Centres	EU members around the Mediterranean Sea	Regional Governmental	
GICOMS	Korea MLTM	LRIT (Satellite location reporting & identification) OrbComm (commercial SAT AIS), coastal AIS data	LRIT + AIS shore stations + web-based central server	Authorized members only	Regional Governmental	

6.2. THE NEED FOR DATA MODELS

Exchange of data requires an understanding of its encoding and its meaning. The former is specified by the data format whereas the latter is reflected in the data model. The data model unambiguously defines the semantics, the structure, 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.

Although there are a number of existing formats (see annex A), in view of the IMO recommendation, a common data model should be developed, supported and used.

6.3. COMMUNICATION LINKS

The transfer of data requires connectivity via a data network composed of appropriate hardware and software.

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

- connectivity characteristics (e.g., bandwidth, delay, and cost) between the sending and receiving parties;
- services provided by the network; and
- quality of service requirements.

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 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 to transmission protocols, bandwidth limitations, cost, communication / data distribution security aspects such as authentication and confidentiality as well as data integrity.

6.4. BANDWIDTH ASPECTS

Although bandwidth[1] 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.

1 Bandwidth in datacomms terms is the amount of data which can be transferred across a data link in a given amount of time (normally expressed in bits per second (bits/s or bps)

6.5. DATA SECURITY ASPECTS

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

6.5.1. AUTHENTICATION

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

6.5.2. DATA INTEGRITY

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

6.5.3. DATA CONFIDENTIALITY

Data confidentiality means that the data is protected against eavesdropping. No other parties, other than the sender and intended receiver(s) 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 authorized parties. Depending on the sensitivity of the data, different levels of data encryption may be required.

6.6. QUALITY OF SERVICE (QoS)

The QoS covers the prioritization 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. QoS requirements may also guarantee the delivery of data items.

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 that is used by other data systems, it may be necessary to ensure quality of service for the preferred system.

6.7. 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.

6.8. QUALITY / INTEGRITY OF DATA

Integrity of data can be described as “the representational faithfulness of information to the true state of the object that the information represents”. It can be sub-divided into “four essential qualities or core attributes: completeness, currency/timeliness, accuracy/correctness and validity/authorization.”

In order to achieve Data Integrity, certain rules can be applied:

- a data value rule specifies the domain of allowable values for a data attribute;
- a data structure rule defines relations between data;
- a data derivation rule specifies how a data value is derived based on an algorithm, contributory values and conditions; and
- a data retention rule specifies the length of time data values need to be retained in a particular database.

6.9. 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.

6.10. NEW AND EMERGING SOLUTIONS

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 for the creation of a new common Maritime Data Model. The IHO S-100 Geospatial Information Registry is proposed as the baseline reference for this model, and this is supported by IALA.

7. DEFINITIONS

The definitions of terms used in this Guideline can be found in the *International Dictionary of Marine Aids to Navigation* (IALA Dictionary) at http://www.iala-aism.org/wiki/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.

In addition, for this document:

COLAIS - The Columbus AIS experiment, based in the International Space Station is an ESA project.

e-GEOS - An Italian Space Agency (20%) and Telespazio (80%) company

GEO - The Intergovernmental Group on Earth Observations (GEO) is leading a worldwide effort to build a Global Earth Observation System of Systems (GEOSS)

HELCOM - The Helsinki Commission, or HELCOM, works to protect the marine environment of the Baltic Sea from all sources of pollution through intergovernmental co-operation between Denmark, Estonia, the European Community, Finland, Germany, Latvia, Lithuania, Poland, Russia and Sweden.

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

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

SafeSeaNet - is a vessel traffic monitoring and information system, established by EMSA in order to enhance maritime safety; port and maritime security; marine environment protection and efficiency of maritime traffic and maritime transport.

S-100 – This is the document that explains how the IHO will use and extend the ISO 1900 series of geographic standards for hydrographic, maritime and related issues. S-100 provides the data framework for the development of the next generation of ENC products, as well as other related digital products required by the hydrographic, maritime and GIS communities.

Unidata - is a diverse community of over 250 institutions vested in the common goal of sharing data, and tools to access and visualize that data.

8. ABBREVIATIONS

AIS	Automatic Identification System
AtoN	Marine Aid(s) to Navigation
bit	binary digit
CF	Climate and Forecast Metadata convention (WMO)
ColAIS	Columbus Automatic Identification System
DoT	Department of Transport
ECDIS	Electronic Chart and Display Information System
EDA	European Defence Agency
EMSA	European Maritime Safety Agency
ENC	Electronic Navigation Chart
Envisat	ENVIronment SATellite
ESA	European Space Agency
EU	European Union
FFI	Norwegian Defence Research Establishment
GEOSS	Global Earth Observation System of Systems
GICOMS	General Information Centre on Marine Safety & Security (Korea)
GMES	Global Monitoring for Environment and Security
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IEC	International Electro-technical Commission
IHO	International Hydrographic Organization
IMO	International Maritime Organization
I/O	Input / Output
ISO	International Organization for Standardization
ISS	International Space Station
ITU-R	International Telecommunication Union – Radiocommunication Sector
IVEF	Inter VTS Exchange Format (IALA)
LEO	Low Earth Orbit
LRIT	Long Range Identification and Tracking
MARISS	Maritime Security Services
MARSUR	Maritime Surveillance
MLTM	Ministry of Land, Transport and Maritime Affairs (Korea)
MSI	Maritime Safety Information
MSSIS	Maritime Safety & Security Information System (US)
NAV	Sub-Committee on the Safety of Navigation (IMO)
NetCDF	Network Common Data Form
NCA	Norwegian Coastal Administration
QoS	Quality of Service
RMP	Recognized Maritime Picture
Rx	Receiver
s	second

SAR	Search and Rescue
SAT	Satellite
S-IALA-NET	Satellite IALA-NET
S-52	Standard and the portrayal of colours and symbols in ECDIS (IHO)
S-57	Transfer Standard for Digital Hydrographic Data (IHO)
S-63	IHO Data Protection Scheme
S-100	Geospatial Information Registry (IHO)
UCAR	University Corporation for Atmospheric Research
USDoT	United States Department of Transportation
VHF	Very High Frequency
VTS	Vessel Traffic Services
WMO	World Meteorological Organization
XML	Extensible Mark-up Language

ANNEX A CONDITIONS OF PARTICIPATION IN IALA-NET

A.1. IALA-NET

IALA-NET is founded by the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA), 10 rue de Gaudines, 78100 St Germain-en-Laye, France. IALA-NET is a near real time maritime data exchange service through the Internet. It is a worldwide service only open to National Competent Authorities.

IALA-NET is for governmental and scientific/research use only. IALA-NET is intended to assist the participants in fulfilling their obligations regarding maritime safety, maritime planning, risk analysis, maritime security and combating illegal activities, improving efficiency of navigation and protecting the marine environment as well as scientific research and development in these areas.

IALA-NET aims to support as many data types as possible; initially IALA-NET supports the exchange of AIS data. It is the choice of the IALA-NET participant what types of maritime data will be shared through IALA-NET however as minimum AIS data shall be shared.

A.2. DEFINITIONS

In these Conditions terms have the following meaning:

AIS means automatic identification system;

IALA-NET framework encompasses all technical components of IALA-NET necessary to ensure its operation (servers, archives etc.);

IALA-NET host means an IALA-NET participant who hosts central parts of the IALA-NET framework;

IALA-NET participant means a National Competent Authority eligible to participate in IALA-NET; and “maritime data” encompasses any real-time, near real-time or aggregated data from the maritime domain that IALA-NET participants may choose to share.

A.3. RIGHTS AND RESPONSIBILITIES OF THE PARTICIPANTS

IALA-NET participants sharing data through IALA-NET keep their existing rights in the said data.

IALA-NET participants receiving data through IALA-NET have the right to use the data in accordance with these conditions.

Each IALA-NET participant is responsible for ensuring that there is no breach of its national laws or of ownership or intellectual property rights in relation to the use of IALA-NET data.

IALA-NET participants may assign the operation of their part of IALA-NET framework to a third party (e.g., to other governmental organizations or a contractor) provided that these conditions are fulfilled.

A.4. DATA USAGE AND REDISTRIBUTION

IALA-NET participants may re-distribute data from IALA-NET to other governmental organizations, research institutes or contractors for the purpose of supporting the fulfilment of their obligations.

A.5. IALA-NET OPERATIONS

IALA-NET participants shall make their data available to IALA-NET through the Internet and provide information to IALA-NET hosts on access thereto.

By connecting to the IALA-NET framework and feeding maritime data into IALA-NET each IALA-NET participant agrees to share the said data with other IALA-NET participants.

IALA-NET participants cannot guarantee the transmission of shared data will be continuous or without fault. In case of outages transmitting IALA-NET participants and IALA-NET hosts are committed to taking reasonable steps during working hours to restore their connection to IALA-NET.

Maritime data received into the IALA-NET framework will be forwarded as received i.e., the forwarded data will not be verified or validated.

A.6. TERMINATION OF PARTICIPATION

Each IALA-NET participant has the right to terminate, in whole or in part, its participation in IALA-NET upon formal written notice to IALA. Where possible, IALA-NET participants should give advance notice of their intention to terminate.

Any failure by any IALA-NET participant to fulfil any of these conditions entitles IALA to terminate the access to IALA-NET without further notice. Further, IALA is entitled to disconnect the data feed from any IALA-NET participant if the data received is faulty in any way or may possibly be interfering with the operation of IALA-NET.

A.7. GENERAL DISCLAIMER

All IALA-NET participants take part in IALA-NET at their own risk, liability and cost. IALA accepts no responsibility or liability whatsoever for any errors or omission, death, injury, claims, costs, actions, loss or damage which may arise directly or indirectly out of, or in connection with any form of usage or omitted usage of data from IALA-NET.

The services provided by IALA-NET are provided without any quality assurance.

ANNEX B RELEVANT TECHNICAL STANDARDS

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 require standardization, 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 resulting marine data products in such a manner that it will help to reach coherency, enhancing the information provided by adding «discovery metadata»;
- fulfil a common data format structure and harmonize/standardize its description, which will ease exchange and joint use of AIS data sets and derived products; and
- harmonize 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:

- ISO 19100 series:
  - 19119:2005: identifies and defines the architecture patterns for service interfaces used for geographic information;
  - 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; and
  - 19139:2007: defines Geographic MetaData XML (gmd) encoding, an XML Schema implementation derived from ISO 19115.
- IHO digital data transfer standards:
  - 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;
  - S-57 – The official IHO Transfer Standard for Digital Hydrographic Data; and
  - S-100 – Standard for Geospatial Information Registry, marine data and information data modelling; S-100, will incorporate the requirements of S-57 for ENCs and ECDIS and is aligned with the ISO 19100 series of geographic information Standards.
- 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 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).

ANNEX C COMMON FORMATS

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

Table 2 Common Formats

Format Name	Responsible Organization	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 M.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