

IALA Guideline No.

on

Unique Identifiers for Maritime Resources

Edition 0.0

DRAFT March 2016

[Previous Edition; Date issued]

10, rue des Gaudines
78100 Saint Germain en Laye, France
Telephone: +33 1 34 51 70 01 Fax: +33 1 34 51 82 05
e-mail: contact@iala-aism.org Internet: www.iala-aism.org

Document Revisions

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

Date	Page / Section Revised	Requirement for Revision

Table of Contents

DOCUMENT REVISIONS	1
1 Introduction	4
1.1 Related documents	4
2 Background	4
2.1 Background documents	5
3 Discussion	5
4 Requirements	5
5 Maritime Resource Name Syntax	6
5.1 Extendability	7
5.2 Context dependant representation.	8
5.3 General MRN Guidelines	8
6 Areas of application	10

Index of Tables

Table 1	Areas of application of Maritime Resource Names	Erreur ! Signet non défini.
---------	---	-----------------------------

Index of Figures

Figure 1	Title required	Erreur ! Signet non défini.
----------	----------------	-----------------------------

IALA Guideline No. ##### on Unique Identifiers for Maritime Resources **DRAFT** **Edition 0.1**

1 INTRODUCTION

The use of unique identifiers is a necessary development of e-Navigation to maintain harmonization across domains and services. Navigationally unique objects such as aids to navigation, VTS products and services and other maritime services requires identification numbers to avoid duplication and misalignment of AtoN and Marine Safety Information (MSI).

Worldwide harmonized identification of Unique Identifiers for maritime resources can

- assist in the development and maintenance of enhanced data exchange applications for ship to ship, ship to shore, shore to ship, and shore to shore in the context of e-Navigation;
- assist administrations in the efficient delivery of Marine Safety Information (MSI).
- reduce the administrative burden associated with the maintenance associated with international list of lights numbers and other navigation products;

This is not unique to the maritime domain, and this guideline describes a syntax for Maritime Resource Names based on proven methods from the internet domain, that will enable IALA members to issue Unique Identifiers for objects such as AtoN, VTS products and services, Waterways, etc., in a format, which is designed to be compatible with existing lists of lights, yet interoperable with usage in different domains such as Electronic Nautical Charts.

The 'Maritime Resource Name' and the associated 'Experimental' namespaces defined by this guideline can be applied in numerous areas within the maritime domain, and other maritime stakeholders are invited to adopt this syntax for creation of unique identifiers, through registration in Annex A.

1.1 Related documents

ISO 3166-1

RFC 2141 – URN Syntax (<https://www.ietf.org/rfc/rfc2141.txt>)

S_100 version 2.0.0 – Universal Hydrographic Data model

2 BACKGROUND

The International Hydrographic Organization (IHO) has noted in the paper HSSC6-5.4B the problems HO may be confronted with if the existing light numbering schema is liable to changes by either the producing HO (national light numbers) or the UKHO (international light number).

The paper discussed the advantages of a Persistent Unique Identifier¹ for lights and possible consequences. The support of the IMO e-Navigation solution S3 was highlighted. In addition, the possible effects on the workload for HO which are deriving their products from a single database were mentioned. It was considered that some technical questions remain open for the time being.

¹ IALA chooses the term Maritime Resource Names of the concept of a Persistent Unique Identifier in order to expand this concept into VTS and waterway management and other areas of maritime activity.

The paper proposed the establishment of a close IALA-IHO liaison on the light numbering development in particular and additionally, the harmonisation of the light numbering systems between the IHO and the IALA to the widest extent.

2.1 Background documents

IHO HSSC6-5.4B

IALA ENAV 15-14-1-12 – Liaison Note to ARM on IHO Proposal on Persistent Unique Identifiers

IALA ARM 1-11.1.5 - Liaison Note to ENAV on IHO Proposal on Persistent Unique Identifiers

IALA ENAV 16-9.29 - Comments on ENAV 16-9.10 by the IHO Standardization of Nautical Publications WG (SNPWG)

IALA ENAV 17-9-14 – Maritime Resource Names

3 DISCUSSION

Persistent global identifiers are needed in order to maintain data object identity as data objects pass through the data chain, are stored in different data stores, transformed to different formats, and re-purposed for different domains. The same chunk of information may be present in different data stores in different formats (ISO 8211, XML, relational database record, etc.). Using a single identifier for the same chunk of data in all formats and stores will obviously help harmonization, validation, and tracking of data across multiple application domains and at different places in the data supply chain. Similarly for data integration, especially references to features in a different data product and data set from the referring feature, require persistent identity.

Uniform Resource Names (URNs) as defined by the IETF (Internet Engineering Task Force, who have standardized protocols like IP, Http, FTP and other Internet protocols) are intended to serve as persistent, location-independent, resource identifiers and are designed to make it easy to map other namespaces (which share the properties of URNs) into URN-space. Therefore, the URN syntax provides a means to encode character data in a form that can be sent in existing protocols, transcribed on most keyboards, etc.

The URN syntax provides a mechanism to ensure the uniqueness of the name of a resource, which is already widely used in different domains such as supply chain management, unique identification of books or laws.

This guideline describes how the URN methodology is applied to identifying maritime resources within a Maritime Resource Name (MRN). This syntax allows decentralization of the management of identities. It is envisaged that already existing numbering schemes can relatively easily be fitted into this syntax, providing backwards compatibility, while the syntax is extendable to new areas of application.

4 REQUIREMENTS

Essential properties for a naming scheme are the following:

- **Unique.** Every id that is created must differ from any other id that is created.
- **Decentralized.** It must be possible to create ids without relying on a single global source that must be used every time an id is created. Essentially creating a single point of failure for the entire maritime sector. This, however, does not mean that there cannot be a central source for creating specific types of ids, for example, route ids. Similar to how creation of domain names are often delegated to various entities that each control a subdomain such as '.org', '.com', '.uk' or '.no'.
- **Forward compatible.** It must be possible to add new naming schemes for new maritime domains in the future. In other words, a global naming scheme must be designed for

evolution. Technologies will only come and go with an ever increasing rate in the coming years.

- **Flexible.** The naming scheme must be very flexible and allow for identifying any type of resource such as documents, cargo, routes, equipment, ships and mariners, giving no preference to any specific type of IDs.

There are also a number of properties that are *nice to have* for a global naming scheme:

- **Human readable.** A good naming scheme should be readable by humans in such a way that identifiers can be entered in forms and documents. Otherwise a simple solution such as creating a random 128-bit UUID similar to 'de305d54-75b4-431b-adb2-eb6b9e546014' would be the easiest solution.
- **Context.** A good naming scheme should give some idea of the *type* of resource that a particular identifier refers to. For example, is the identifier referring to a vessel, mariner, container, ATON, port or VTS center?
- **Backward compatible.** A lot of different maritime naming schemes already exist: IMO numbers, MMSI numbers and various forms of AtoN identification. A good naming scheme should allow some kind of integration with these existing schemes as they will continue to be used for many years to come.
- **Existing standards.** Preferable we should build upon ideas and standards that have already proven useful in other sectors.

URN's fulfil all of these requirements and desired properties.

5 MARITIME RESOURCE NAME SYNTAX

The Syntax of a Maritime Resource Name (MRN) is based on the Uniform Resource Name as described in [RFC 2141](#) published by the Internet Engineering Task Force (IETF).

This implicates that any MRN can be represented in ASCII.

The identifier has a hierarchical structure as follows:

`"urn:mrn:"<NSS>`

The "urn" identifies this to be a special case of a Universal Resource Name (URN), while the "mrn" identify a unique namespace within the URN.

[Note: The "mrn" prefix should be registered by the [Internet Assigned Numbers Authority \(IANA\)](#) for IALA to comply with RFC 2142 and be able to assign unique high level namespaces to stakeholders and domains within the maritime realm, based on the URN notation. It is assumed as a prerequisite for publishing that in the process of approval of this guideline, that the RFC describing the "mrn" prefix will be accepted for publication by the Internet Engineering Task Force (IETF). Insert RFC reference here, when published.]

<NSS> is the Namespace Specific String composed as follows:

`<NSS>::=<governing-organization>":"<type>":"<type-specific-part>`

Inserting "iala" as <governing-organization> will this create a namespace where IALA can define unique identifiers:

`"urn:mrn:iala:"<type>":"<type-specific-part>`

An example of identifiers related to Aids to Navigation could be an identifier scheme allowing decentralized management of identifiers for lights and buoys. Here IALA choose to let the type specific part consist of <CountryCode>:<National Identifier>. For example

urn:mrn:iala:aton:us:1234.5

The identifier <type> defined by the prefix "*urn:mrn:iala:aton*" has certain syntax constraints which are described for this identifier type, in the Annex of this guideline relevant for the area of application. These constraints are designed to allow backwards compatibility with existing national identification schemes for AtoN, as well as ensuring interoperability between systems that use these decentrally issued identifiers.

5.1 Extendability

The Maritime Resource Name is intended to be an extendable mechanism right across the maritime domain.

5.1.1 Extended applications within the IALA namespace

In the future, IALA might decide to apply Maritime Resource Names to other areas of application, such as all IALA publications. This is quite similar to how ISO identify its publications uniquely.

For example, an IALA recommendation could be identified as

urn:mrn:iala:publications:recommendation:e-nav-140

while the identifier of a guideline might be written such as

urn:mrn:iala:publications:guideline:synchronisation-of-lights-1069

Thus, the MRN provides an extendable convention for uniquely identifying new types of objects within the IALA domain.

Definitions of new areas of application of the MRN namespace within the IALA domain will be published as additional or amended annexes to this guideline.

5.1.2 Extensions beyond the IALA domain

IALA's members, sister organizations or other collaborating parties in the maritime sector are invited to join in the utilization of this Maritime Resource Name namespace.

Registering as a <governing-organization> under the Maritime Resource Name namespace requires that the organization in question is willing and able to publish and maintain publicly available definitions of identifier definitions under their own responsibility.

Organizations wishing to register as a <governing-organization> under the MRN namespace, should request IALA to register their organizational abbreviation in Annex A of this guideline, together with a reference to where identifier definitions are published, and a point of contact. This will ensure a registered and published namespace for uniquely defining identifiers under the control of the registering organization.

5.1.3 The Experimental namespace "mrnx"

Development of good quality software frequently requires testing and validation of new functions or features in a realistic environment by realistic users, to prove a concept and take into account user feedback, before the technical details – such as datamodels, encoding formats or communication protocols are frozen and published as standards, recommendations or guidelines.

In order to support a 'developer zone' where new concepts can evolve *before* being published, an 'experimental' namespace is associated with the MRN namespace.

It is defined as

"urn:mrnx:"<NSS>

However the 'x' in "mrnx" identify this namespace to be of an *experimental* nature – in other words, and unstable version which has not yet reached the maturity of a published standard or recommendation. The intention is to provide a namespace, where concepts can be matured fairly freely in a developer zone, project or validation testbed, before it is published in a standard.

The <NSS> is the Namespace Specific String of same composition as for the "urn:mrn" namespace:

<NSS>::=<governing-organization>":"<type>":"<type-specific-part>

where <governing-organization> should represent a registered governing organizations under this guidelines Annex A, but <type> and <type-specific-part> may be unstable and not yet published definitions – and thus there is no obligation to provide a documentation reference, but a point of contact must be provided to request an experimental namespace.

The "urn:mrnx:" namespace may further be utilized to identify test datasets which conforms to published standards, but where the data content is intended for testing purposes only, and may *not* be used in an operational context.

During the technical implementation of a concept in software at an early stage, the software may be prepared for a transition from an experimental stage to a standardized stage, by constructing testbed software versions to apply exactly the same logic to information objects identified by 'mrn' or 'mrnx' prefixes. Taking the proven software to a production environment will thus be an easy transition, yet a simple differentiation between data that belong to a production ('mrn') and a test ('mrnx') environment is enabled – and methods to disallow testdata in a production environment can be applied.

5.2 Context dependant representation.

The Maritime Resource Name syntax allows a context dependant representation of identifiers.

Inside the database or system of a national Aids to Navigation provider, the data format of the identifier of an AtoN does not need to be modified, because the context is known.

In the US AtoN database, the AtoN with national ID '1234.5' is well known, but when communicating information about this AtoN to an external stakeholder, the MRN can be used as a 'wrapper' or a namespace prefix to the national identifier, making the identifier universally understood and unique:

urn:mrn:iala:aton:us:1234.5

Similarly, if the same MRN syntax was applied by the ITU to define a context for MMSI numbers, the unique identifier might look like this:

urn:mrn:itu:mmsi:538070999

In the context of exchange of information via AIS or DSC, the context of the identifier is known, and thus only the number 538070999 is needed for the number to be unique, but using the full MRN description will guarantee, that the identity is unique and the context is clear, although 538070999 could just as well represent a telephone number in a different context.

5.3 General MRN Guidelines

While in general governing organizations will be free to structure their namespace in any way they see fit, these general guidelines are provided:

- All identifiers defined under this guideline must comply with the general syntax specified by [RFC 2141](#)
- The *<governing-organization>* of a namespace under the 'urn:mrn' namespace must provide a website where standards that specify identifier <type>s under their domain are published. Annex A lists all *<governing-organization>*'s who have registered their organizational abbreviation for utilization of the MRN namespace. Subsequent Annexes of this IALA Guideline ##### specifies the Unique Identifier types defined under the 'urn:mrn:iala' namespace.
- The syntax of *<governing-organization>* under subdomains of the 'urn:mrn' or 'urn:mrnx' namespaces must be at least 3 alphanumeric characters (lowercase, a-z, 0-9)
- Every identifier that refers to a national domain, uses standards available in ISO 3166-1 alpha-2 Codes for the representation of names of countries and their subdivisions.
- [TBD: provide reference to or explanations of relevant syntax restrictions provided by the RFC2141]

6 AREAS OF APPLICATION

The <governing-organizations>'s that have registered to utilize the “urn:mrn” and “urn:mrnx” namespaces are listed in Annex A.

This guideline provides the following identifier <type> specific definitions of syntax constrains under the IALA namespace in the following Annexes:

Table 1 Current Areas of application of Maritime Resource Names

ID types	Syntax constrains
Aids to Navigation	ANNEX B
VTS services	ANNEX C
Waterways	ANNEX D
<i>To be determined based upon future need and development of additional requirements</i>	

ANNEX A REGISTERED GOVERNING ORGANIZATIONS UNDER MRN(X)

Governing Organization	Namespace(s)	Documentation reference	Website / point of contact	Notes
IALA	urn:mrn:iala: urn:mrnx:iala:	IALA Guideline ##### (This document)	http://www.iala-aism.org/products/publications/ Point of contact: contact@iala-aism.org	
STM Validation Project	urn:mrnx:stm:	To be developed	http://monalisaproject.eu/ Point of contact: per.setterberg@sjofartsvverket.se	Eksperimental namespace only. Expires by December 31 st 2018
EfficienSea 2 Project	urn:mrnx:esea2:	To be developed	http://efficiensea2.org/ Point of Contact: thc@dma.dk	Eksperimental namespace only Expires by December 31 st 2018

ANNEX B MRN FOR AIDS TO NAVIGATION

A unique identifier for an Aid To Navigation should be assigned by the responsible Aids to Navigation Authority on a national basis.

When referenced outside the context of the national AtoN provider, the identifier should be prefixed using the Maritime Resource Name syntax, with the prefix:

urn:mrn:iala:aton:<countrycode>:<NationalIdentifier>

where <countrycode> is the national identification defined by ISO 3166-1 alpha-2 codes for the representation of names of countries and their subdivisions.

The National AtoN authority (the National IALA member) must ensure, that the <NationalIdentifier> is unique within the national domain, and that the syntax of the <NationalIdentifier> complies with the general MRN guidelines.

Example:

urn:mrn:iala:aton:us:1234.5

denote the AtoN with identifier 1234.5 defined by the AtoN authority of the United States of America.

When referenced within the context of the national AtoN provider, only the national identifier is required (e.g. 1234.5). Ref Section 3.2 of this guideline.

ANNEX C MRN FOR VESSEL TRAFFIC SERVICES

[Development of this annex will require liaison between the VTS and ENAV committees]

A unique identifier for a VTS service ...?

urn:mrn:iala:vts:<countrycode>:<NationalIdentifier>

where <countrycode> is the national identification defined by ISO 3166-1 alpha-2 codes for the representation of names of countries and their subdivisions.

Example:

urn:mrn:iala:vts:nl:xxxxxx

denote the VTS service xxxxxx in the Netherlands.

ANNEX D MRN FOR WATER WAYS

A unique identifier for a Water Way are frequently used in a list of lights to group AtoN according to their location.

[This annex needs to be progressed further – by which committee?]

National water ways definitions

urn:mrn:iala:wwy:<countrycode>:<NationalIdentifier>

where <countrycode> is the national identification defined by ISO 3166-1 alpha-2 codes for the representation of names of countries and their subdivisions.

International water way definitions (meaning any waterway definition involving more than one country.)

urn:mrn:iala:wwy:xz:<???

[Reference to UNLOCODES reserving the code 'xz' for international]