

IALA Guideline No. #####

on

Unique Identifiers for Maritime Resources

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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

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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, 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.

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 HOs 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 HOs which are deriving their products from a single database were mentioned. It was considered that some technical questions remain open for the time being.

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.

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.

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 RFC 2141.

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. [The MRN prefix is approved for IALA to be able to assign unique high level namespaces to stakeholders and domains within the maritime realm.](NOTE: it is assumed that in the process of approval of this guideline, that the MRN prefix will be applied for with the governing, IETF).

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

<NSS>::=<governing-organization>":"<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

In the future, IALA might decide to apply Maritime Resource Names to other areas of application, such as all IALA publications.

For example, a recommendation could be

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.

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 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:

- 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.

6 AREAS OF APPLICATION

This guideline provides the following identifier <type> specific definitions of syntax constrains

Table 1 Current Areas of application of Maritime Resource Names

ID types	Syntax constrains
Aids to Navigation	ANNEX A
VTs services	ANNEX B
Waterways	ANNEX C
<i>To be determined based upon future need and development of additional requirements</i>	
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ANNEX A MARINE RESOURCE NAMES (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.

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 B MARINE RESOURCE NAMES (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 C MARINE RESOURCE NAMES (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]