

GUIDELINE

G1143

UNIQUE IDENTIFIERS FOR MARITIME RESOURCES

Edition 1.0

June 2019



DOCUMENT HISTORY

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

Date	Details	Approval
June 2019	First issue	Council 69

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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 marine 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 harmonised 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); and
- reduce the administrative burden associated with the maintenance of 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 (MRN) 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 that is designed to be compatible with existing lists of lights, yet interoperable with usage in different domains such as Electronic Navigation Charts (ENC).

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 the Annexes.

1.1. RELATED DOCUMENTS

ISO 3166-1

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

IHO S-100 version 4.0.0 – 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 subject 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.

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 persistent 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 (URN) as defined by the IETF (Internet Engineering Task Force, which has standardised 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.

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

4. REQUIREMENTS

Essential properties for a naming scheme are the following:

- **Uniqueness:**
Every ID that is created must differ from any other ID that is created.
- **Decentralisation:**
It must be possible to create IDs without relying on a single global source that must be used every time an ID is created. A central source for creating specific types of ID, for example, route ID, may exist.
- **Forward compatibility:**
A global naming scheme must be designed for evolution enabling the addition of new naming schemes for new maritime domains in the future.
- **Flexibility:**
The naming scheme must be flexible and allow for identifying any type of resource such as documents, 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 readability:**
A naming scheme should be readable by humans in such a way that identifiers can be entered in forms and documents.
- **Contextual:**
A naming scheme should provide information on the type of resource that a particular identifier refers to such as, a vessel, mariner, AtoN, port or VTS centre.

- Backward compatibility:

Different maritime naming schemes already exist: IMO numbers, MMSI numbers and various forms of AtoN identification. A naming scheme allows for integration with these existing schemes as they will continue to be used.

5. MARITIME RESOURCE NAME SYNTAX

The Maritime Resource Name (MRN) syntax 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” identifies a unique namespace within the URN.

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

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

Inserting 'iala' as <governing-organization> will create a namespace where IALA can define unique identifiers that must contain a minimum of 3 lower case alphanumeric characters:

urn:mrn:iala: '<type>': '<type-specific-part>'

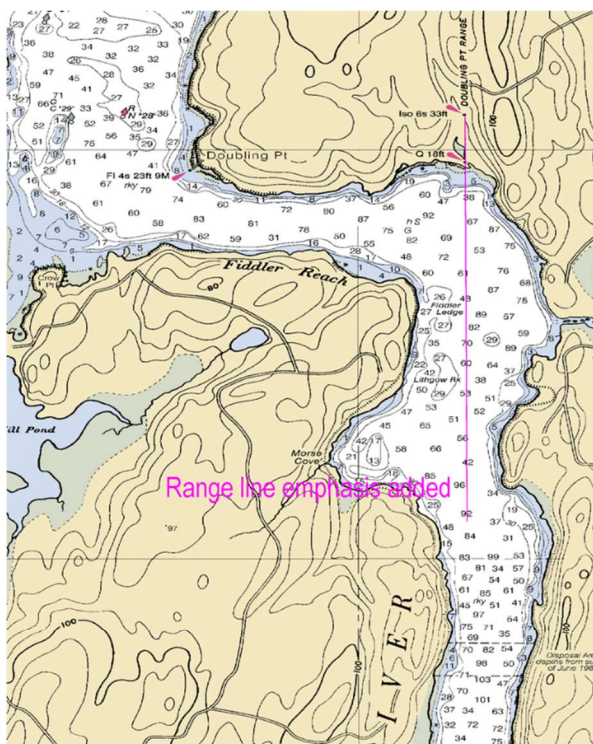
Examples of 'types' include: aton (AtoN), wwy (Waterway), vts (VTS Name), etc.

The identifiers related to marine aids to navigation use a schema allowing for decentralised management of their identifiers. This scheme includes <CountryCode>:<nationally managed name spaces>. For example urn:mrn:iala:aton:us:1234-5

urn:mrn:iala:aton:gb:sco:1234-5

It is envisaged that for <nationally managed name spaces> all existing naming/numbering schema within a National Authority could be used. See Annexes for further detail.

Note: the <CountryCode> identifier uses the ISO 3166-1 alpha-2 standards Codes for the representation of names of countries and their subdivisions.



Doubling Point Range Lights on NOAA chart 13296. (Image from Wikipedia.com)

- Examples of how MRN identifiers from another domain may look in a product that mix data from different source producers:
- Feature: Recommended Track
 - Attribute: category of recommended track: Based on a system of fixed marks
 - Attribute: orientation: 270 degrees
 - Attribute: MRN: urn:mrn:iho:chart:jsho:12345678
- Feature: Navigational Line
 - Attribute: category of navigation line: leading line bearing a recommended track
 - Attribute: orientation: 270 degrees
 - Attribute: MRN: urn:mrn:iho:chart:jscg:87654321
- Feature: Landmark
 - Attribute: category of landmark: tower
 - Attribute: function: light support
 - Attribute: MRN: urn:mrn:iala:aton:jscg:54321678
- Feature: Light
 - Attribute: category of light: leading light
 - Attribute: colour: white
 - Attribute: MRN: urn:mrn:iala:aton:jscg:45678122
- Feature: Landmark
 - Attribute: category of landmark: tower
 - Attribute: function: light support
 - Attribute: MRN: urn:mrn:iala:aton:jscg:54321679
- Feature: Light
 - Attribute: category of light: leading light
 - Attribute: colour: white
 - Attribute: MRN: urn:mrn:iala:aton:jscg:45678123
- Feature: Range System
 - Attribute: name: Micklefirth approach range
 - Attribute MRN: urn:mrn:iho:chart:jsho:23456781
- Aggregation: Range System Aggregation
 - Consists of: MRN: urn:mrn:iho:chart:jsho:12345678
 - Consists of: MRN: urn:mrn:iho:chart:jsho:87654321
 - Consists of: MRN: urn:mrn:iala:aton:jscg:54321679
 - Consists of: MRN: urn:mrn:iala:aton:jscg:45678123
 - Consists of: MRN: urn:mrn:iala:aton:jscg:54321678
 - Consists of: MRN: urn:mrn:iala:aton:jscg:45678122

Figure 1 *Example of multiple Domain and Namespace use*

5.1. EXTENDABILITY

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

5.1.1. EXTENDED APPLICATIONS WITHIN THE IALA NAMESPACE

IALA will extend the set of MRN type namespaces as appropriate. Definitions of new areas of application of the namespace within the specific domain will be published as additional or amended annexes to this guideline.

6. AREAS OF APPLICATION

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

Table 1 *Current Areas of application of Maritime Resource Names*

ID types	Syntax constraint
Marine aids to navigation	ANNEX A
VTS services	ANNEX B
Waterways	ANNEX C

7. ACRONYMS

ARM	Aids to Navigation Requirements and Management Committee (IALA)
ASCII	American Standard Code for Information Interchange
AtoN	Marine Aid(s) to Navigation
ENAV	e-Navigation Committee (IALA)
ENC	Electronic Navigation Chart
FTP	File Transfer Protocol
HSSC	Hydrographic Services and Standards Committee (IHO)
HTTP	Hypertext Transfer Protocol
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
ID	Identification / Identity / Identifier
IETF	Internet Engineering Task Force
IHO	International Hydrographic Organization
IMO	International Maritime Organization (UN)
IP	Internet Protocol
ISO	International Organization for Standardisation
MMSI	Maritime Mobile Service Identity
MRN	Maritime Resource Names
MSI	Marine Safety Information
NSS	Namespace Specific String
PUI	Persistent Unique Identifier
RFC	Request for comments (IETF)
SNPWG	Standardization of Nautical Publications Working Group (IHO)
UKHO	United Kingdom Hydrographic Office
URN	Uniform Resource Name(s)
US	United States of America
VTs	Vessel Traffic Service
XML	eXtensible Markup Language

ANNEX A MRN FOR MARINE AIDS TO NAVIGATION

A unique identifier for a Marine Aid to Navigation (AtoN) should be assigned by the responsible Marine 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.

Examples:

urn:mrn:iala:aton:us:1234-5 [1]

In example [1] the AtoN with identifier 1234-5 defined by the US AtoN authority.

urn:mrn:iala:aton:gb:sco:6789-1 [2]

In example [2], the national identifier is gb for the United Kingdom. Within the UK, AtoN are provided by 3 different AtoN authorities and so a further identifier is used: sco for Scotland in this example where the Scottish asset identifier is 6789-1.

ANNEX B **MRN FOR VESSEL TRAFFIC SERVICES**

A unique type namespace for Vessel Traffic Services (VTS) is assigned by the responsible National Authority on a national basis. This Annex is reserved for future description of VTS, bearing in mind that VTS could be described as a whole, or individual VTS components can be described separately.

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ANNEX C MRN FOR WATERWAYS

A unique type namespace for waterways (wwy) is assigned by the responsible National Authority on a national basis. This Annex is reserved for future description of waterways, bearing in mind that waterway could be described as a whole, or individual waterway segments can be described separately.

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