

## Paper for Consideration by S-100 TSM6

### IHO Level Guidance on how to manage the urn:mrn:iho namespace

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<b>Executive Summary:</b>	Draft guidance for managing the IHO Maritime Resource Names (MRN) namespace.
<b>Related Documents:</b>	S-100, TSM5-4.5
<b>Related Projects:</b>	GI registry

### Introduction / Background

The MRN concept is a powerful mechanism for generating globally unique identifiers. Its flexibility is in part a factor for its adoption by several organizations involved in e-Navigation, see <http://mrnregistry.org/>. With this flexibility also comes the need to create robust rules governing its use, else disharmony between users is a risk that can reduce the usefulness of the concept. On the MRN Registry site a high-level introduction and guidance can be found ([http://mrnregistry.org/Maritime\\_Resource\\_Name.docx](http://mrnregistry.org/Maritime_Resource_Name.docx)).

This guidance only considers how IHO should govern its namespace, and provides guidance for how IHO should use the MRN identifier concept when creating Globally Unique Identifiers (GUID). IHO has several outputs that can benefit from utilizing MRN identifiers. This guidance is specifically for how to assign MRN to IHO publications and standard, as well as IHO data products, data products generated in compliance with IHO standards, and object instances used in data products generated in compliance with IHO standards.

It is recommended that a governing body is stood up for the management of the IHO MRN domain. It is envisioned that the management can be done in a similar way as S-62, with the IHO Secretariat managing the domain on behalf of IHO. As part of managing the IHO MRN domain, a public location for publishing the designated MRN namespaces should be set up.

This guidance considers three distinct structures for IHO Publications, IHO data products and object instances in products created in accordance with IHO Standards. Other uses are briefly discussed in the clause on future considerations.

### References

IALA ENAV17-9.14 Maritime Resource Name.

[http://mrnregistry.org/Maritime\\_Resource\\_Name.docx](http://mrnregistry.org/Maritime_Resource_Name.docx)

TSMAD26/DIPWG5\_11.7E Uniform Resource Identifiers for S-100.

[https://www.iho.int/mtg\\_docs/com\\_wg/TSMAD/TSMAD26/TSMAD26\\_DIPWG5Docs.htm](https://www.iho.int/mtg_docs/com_wg/TSMAD/TSMAD26/TSMAD26_DIPWG5Docs.htm)

## High level rules

### Registry of reserved codes

The management of the IHO MRN requires some overarching rules. It is recommended to establish ranges of reserved codes, such as producer codes, and other codes as appropriate for use during development of specifications. For example, JS00 should be a reserved producer code for “Jussland” test datasets.

### Maximum length of an MRN

In the MRN specification there is no given limit to the length of a MRN. However, the length of an MRN adds to the byte size of a dataset, and longer MRNs add more than shorter ones. The urn:mrn:iho part is 11 bytes, and additional characters will add one byte per character, per instance. Some flexibility may be useful in the length to give sufficient space to give enough space for different cataloging purposes. It is recommended that maximum total length of any MRN should be no more than 128 bytes.

### Preservation of MRN

It should be recommended that, as far as possible, MRN GUIDs should be preserved throughout an object’s lifetime. Including when that object is reused in other products than where it originated. The purpose is for traceability of an object to its source, and to enable user systems to link instances of the same object across products which can assist users and systems when interpreting data.

The question of whether one data object is the same as or different from another is quite complex, given that different data products or different versions of the same product may add or remove attributes, coordinates may be different at different scales, the number of points in a curve, surface boundary, multipoint, or grid may be different at different scales, the nature of spatial primitive may change as scale increases or decreases (area geometry becoming point geometry at a smaller scale), or feature geometries may be merged at some scale (e.g., an islet merging with a nearby land area).

## IHO Publications

For IHO Publications it will be useful to have a namespace for publications, followed by a few distinguishing characteristics for the individual publication to make the MRN ID globally unique.

Consider this format of the MRN:

urn:mrn:iho:pub:<publication type>:<publication name or number>:<edition number>:<correction number>:<clarification number>:<optional and additional version information>.

This makes ‘pub’ a fixed namespace for publications, and means that any part of the identifier that comes after indicate the type and name of the IHO publication. The section marked optional and additional version information can be used for additional name spaces as per need.

IHO’s current publication types and proposed codes for these are;

- Bathymetric Publications - bathy;
- Capacity Building Publications - cb;
- Miscellaneous (Base Regulatory Publications) - reg;
- Periodic Publications - per;
- Standards and Specifications - spec.

Example;

The standard S-57 with supplement 3 is given the following MRN identifier;

urn:mrn:iho:pub:spec:s57:3:1:supplement3

### **IHO data products**

For IHO data products it will be useful to have a namespace that specify that the MRN is about products, such as the S-64 test datasets or INT3 consider this format of the MRN;

urn:mrn:iho:prod:<product name>:<edition number>:<correction number>:<clarification number>:<optional information about related specification>.

This makes 'prod' a fixed namespace for products, and means that any part of the identifier that comes after indicate the type and name of the IHO product. The section marked optional and additional version information can be used for additional name spaces as per need.

Examples:

For S-64 ENC test dataset version 3.0.1, unencrypted used for the power up check the ID could be:

urn:mrn:iho:prod:s64tds:3:0:1:unencrypted:powerup

For IHO INT3 version 3.5, Lowesmouth to Port Rimon panel, the ID could be;

urn:mrn:iho:prod:int3:3:5:19000

A public location for listing the MRN for the IHO product specifications should be established. The MRN for the product specification should be included in the specification.

### **Object instances in data products**

For harmonization purposes a common structure should be considered for MRN identifiers for object instances. This yields benefits such as a predicable ID structure which can be leveraged for reducing total data volume. IHO product specifications should consider this format of the MRN for object instances;

urn:mrn:iho:<product specification>:<producer code>:<producer governed namespaces>.

This format gives a consistent structure over the product specification codes, leading to greater harmonization. This enable a predictable upper level GUID namespace that can be defined for each IHO product specification. Moreover, the producers of data are given flexibility over how they wish to

manage their namespaces and includes it a clear delineation between the fixed upper level and flexible lower level.

It is important to note that some data formats may give specific meaning to parts of the MRN ID, such as GML where the colon has special significance<sup>1</sup>. MRNs should therefore not be used verbatim for GML identifiers (“gml:id”) or tags. Instead, either MRNs can be used as values for an *identifier* attribute, or the product specification define a rule for mapping MRNs to *gml:id* values.

A structure like urn:mrn:iho:<product specification>:<producer code>:<producer governed namespaces> (urn:mrn:iho:s000:CCYY: - 000 is the product specification number, CCYY is the S-62 code pending change as per S-100WG3-6.4) gives predictability to the fixed part of the GUID, permitting byte saving schemes, such as having the fixed part stated in metadata. If implemented in product specifications, a function for recreating GUIDs may be needed in user and production software<sup>2</sup>. This would be needed to permit functions that identify same instances across products. Also needed are rules for how to preserve GUIDs of objects that originate elsewhere, for example checks can see that if GUID start with MRN the origin is elsewhere<sup>3</sup>, and all other cases the GUID should begin with the <producer code>. The same rules can also be configured with a list of permitted MRN name spaces to ensure that only permitted inputs are used and help identify erroneous MRN.

When deciding if the MRN of an object should be preserved, product specification authors<sup>4</sup> should specify how a producer should consider how similar the instance is to the original. Classes whose attributes are subsets of the original object class attributes should be considered the same and their instances should have the MRN preserved. When adding attributes, consideration should be given to intent of the object, and as long as it is to describe the same physical phenomenon and the instance uses the original feature as a starting point, the ID should be preserved. Objects that are generally considered scale independent, and preserved in the same location and with the same shape through scales and products should retain the same MRN ID in those products. Scaled objects need not be considered as the same object between scales.

## Future considerations

Although the MRN concept is incredibly powerful and flexible, some management challenges may remain to be addressed. An example is the GI Registry which has the camelCase ID as a GUID for feature concepts but also different domains. This organizational structure leaves some uncertainty of which MRN structure that would require, especially since it should ideally be a common harmonized structure for the GI registry as a whole. Specifically, it is unclear if all submitters should be subject to the IHO namespace, or should they be permitted to use their own name spaces. Either way could be done, but would first require a name space from the MRN registry or an MRN namespace from IHO for any submitting organization. Another question that will have to be answered is how to structure MRN for

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<sup>1</sup> The URN format cannot be used for values of the built-in XML Schema type ID, and “:” in an XML tag is reserved for separating namespaces from “local names”.

<sup>2</sup> This will work only if all producers use the same rules, and can be ensured by the proposed structure and including these in the specification as a required structure.

<sup>3</sup> Checks can be designed to look for permitted sources and flag all cases that do not meet the condition.

<sup>4</sup> Leaving this decision completely to data producers may lead to multifarious criteria for the same data product. There should be some guidelines for data producers to follow. The best people to determine those guidelines are the product specification teams and the best place for the guidelines is the individual product specification.

different domains, similar questions remain here as with the submitting organizations. It is therefore recommended that using MRN for the feature concepts in the GI Registry is delayed till a later time when more consideration can be given to the issue.

MRN format should take into consideration whether mapping of an MRN to a URL may be needed in the future, for example to facilitate lookup of additional information, metadata, or updates to a data object. See S-100 11-7.4 and TSMAD26/DIPWG5\_11.7E for more information and hypothetical use cases.

Consider linking with S-62, e.g. no organization get an OSNID unless they already have an S-62 ID. This enables a link between S-62 and producers of data. Recommend that there is no automated creation of S-62-linked OSNID in order to clean up the content of S-62. Linking to S-62 codes permit organizational name change without needing a code change.

## Producer level guidance

This section is for guidance over the management of the sub-level namespace, such as for countries or producer organizations that generate data in compliance with IHO product specifications.

It is recommended that all namespace owners develop a guideline for managing their name spaces. Consider the following paragraphs a draft guideline that provide the starting point for implemented guidelines.

Recommend maximum total length should be no more than 128 byte, meaning 22 bytes are set aside for the upper level name spaces (urn:mrn:iho:s~~000~~:CCYY:), leaving up to 106 bytes for producer governed namespaces. In an effort to reduce file sizes of products, the length of MRNs should be kept to a minimum.

It may be advantageous for some producers to subdivide MRN IDs. Reasons can be that more than one office produce data in a particular domain inside one country or several contractors are granted work in producing products. For example, IDs can be subdivided at a national level by provinces, by projects or by topics where a specification contains several topics, such as ENC. It is up to the producer to specify how such sub division is done.

The data production process should include functions to preserve MRN IDs from original source to all derived products, as far as possible. The process should as far as possible consider the intent of objects, if the purpose is to describe the same physical phenomenon, and the instance use the original feature as a starting point, the ID should be preserved. It is not necessary to preserve the MRN of scale dependent features.

Examples of how a GUID from another domain may look among other product producer generated MRN IDs;

Feature: Recommended Track

Attribute: category of recommended track: Based on a system of fixed marks

Attribute: orientation: 270 degrees

Attribute: MRN: urn:mrn:iho:s101: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:s101:jsho:87654321

Feature: Landmark

Attribute: category of landmark: tower

Attribute: function: light support

Attribute: MRN: urn:mrn:iala:s201:jscg:54321678

Feature: Light

Attribute: category of light: leading light

Attribute: colour: white

Attribute: MRN: urn:mrn:iala:s201:jscg:45678123

Feature: Range System

Attribute: name: Micklefirth approach range

Attribute MRN: urn:mrn:iho:s101:jsho:23456781

Aggregation: Range System Aggregation

Consists of: MRN: urn:mrn:iho:s101:jsho:12345678

Consists of: MRN: urn:mrn:iho:s101:jsho:87654321

Consists of: MRN: urn:mrn:iala:s201:jscg:54321678

Consists of: MRN: urn:mrn:iala:s201:jscg:45678123