Canadian Maritime Resource Name Guidance

XXX – Maritime Resource Name Guidance

1 General

In 2018, the Maritime Safety Committee (MSC) published the IMO e-Navigation Strategy Implementation Plan highlighting five e-Navigation solutions:

- S1: improved, harmonized and user-friendly bridge design;
- S2: means for standardized and automated reporting;
- S3: improved reliability, resilience and integrity of bridge equipment and navigation information;
- S4: integration and presentation of available information in graphical displays received via communication equipment; and
- S5: improved communication of VTS Service Portfolio (not limited to VTS stations).

The Maritime Resource Name (MRN) concept is a naming scheme that can uniquely identify any maritime resource on a global scale and supports solution S3 promoting the workable and practical use of information and data on board and ashore.

MSC has been leading and coordinating e-Navigation strategy with active participation from IMO subcommittees, Member States, international organizations (IALA and IHO) and industry representatives. The International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) developed the MRN concept which has since been adopted by the International Hydrographic Organization (IHO) and other organizations.

IALA and IHO are primary governing organizations providing guidelines that govern use and promote harmony. The IALA Guideline for management of IALA MRN namespaces was published in 2021. The IHO MRN Guidance (this draft is outdated, updated guidance is expected to be available soon) for management of IHO MRN namespaces is being drafted in harmony with the IALA Guideline.

The use of unique identifiers promotes harmony across domains and services and 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 MSI; and
- reduce the administrative burden associated with the maintenance of international list of lights numbers and other navigation products.

While advantageous, the flexibility of the MRN concept may lead to disharmony and in turn reduce the usefulness of the concept, as such robust guidelines that govern use are

necessary. IALA and IHO provide guidance on their respective namespaces and each Member State is responsible for drafting their own MRN guidance on producer level namespaces.

Additionally, the MRN concept was adopted into S-100 by the S-100 Working Group as the recommended method for creating Persistent Unique Identifiers for S-100 based products.

2 MRN Syntax

2.1 IALA MRN Syntax

The MRN syntax is based on the Uniform Resource Name (URN) as described in RFC 2141 published by the Internet Engineering Task Force (IETF).

URN:MRN:OID:OSS:OSNID:OSNS

<URN> ::= "urn:mrn: " <OID> ":" <OSS>

<OID> ::= 1*(ALPHA / DIGIT) ; Organizational ID: iala/int

<OSS> ::= <OSNID> ":" <OSNS> ; Organizational specific string

<OSNID> ::= 1*(ALPHA / DIGIT / "-") ; Organizational specific namespace ID

<OSNS> ::= 1*<URN chars> ; Organizational specific namespace string (producer level namespaces)

Simplified

urn:mrn:oid:oss:osnid:osns

<Uniform resource name>:<Maritime resource name>:<Organization ID>:<Type>:<ISO 3166 Code>:<managed namespaces>

Organization ID: iala/int

Type: pub, prod, hydro, npub, wwy, etc.

ISO 3166 Code/S-62 Country Code: ca (for Canada)

Managed namespaces: administered by member states

2.2 IHO MRN Syntax

IHO does not ultize the <OSS>/<type> namespace describing the type of maritime resource.

URN:MRN:OID:OSNID:OSNS

<URN> ::= "urn:mrn: " <OID> ":" <OSNID> ":" <OSNS>

<OID> ::= 1*(ALPHA / DIGIT) ; Organizational ID: iho

<OSNID> ::= 1*(ALPHA / DIGIT / "-") ; Organizational specific namespace ID

<OSNS> ::= 1*<URN chars> ; Organizational specific namespace string (producer level namespaces)

Simplified

urn:mrn:oid:osnid:osns

<Uniform resource name>:<Maritime resource name>:<Organization ID>:<ISO 3166 Code>:<managed namespaces>

Organization ID: iho

ISO 3166 Code/S-62 Country Code: ca (for Canada)

Managed namespaces: administered by member states

3 IALA and IHO namespaces

3.1 <OID> namespace

The <OID> namespace identifies the governing organization. IALA utilizes the urn:mrn:iala namespaces and IHO has been granted the urn:mrn:iho namespaces.

Per the IALA guidelines, an 'int' namespace can be used as a wildcard in the <OID> namespace (urn:mrn:int) when it is impractical to assign a governing organization. It is intended to be temporary. Once an organization is established or assigned the namespace should be properly identified. IALA does not recommend using 'int' for any purposes other than documentation, private testing, and experimental contexts.

Additional governing organizations that have been granted MRN namespaces can be found on the IALA MRN Webpage.

3.2 IALA <OSS> namespace

The IALA <OSS> namespace identifies the type of maritime resource. Like 'int' a wildcard namespace is provided by IALA where 'obj' (object) can be used when it is unknown or impractical to assign another type. Unlike 'int', 'obj' is not necessarily temporary.

4.3 Areas of Application lists the pre-determined <type> specific definitions from IALA.

3.3 <OSNID> namespace

MRN identifiers use a scheme allowing for decentralized management of identifiers which is enabled by using <OSNID> as the first namespace after the IALA <OSS> or the IHO <OID> namespace. This indicates that anything after <OSNID> is administered by the <OSNID> owner.

For IALA governed namespaces the representation of names of a country, territory, or area of geographical interest shall be defined by its ISO 3166-1 alpha-2 code. For IHO governed namespaces, the <OSNID> owner shall be defined by its S-62 Country Codes.

Canada's ISO 3166 Code and it's S-62 Country Code is 'CA', therefor all Canadian maritime resources utilizing either IALA or IHO MRN namespaces should use:

- IALA - urn:mrn:iala:<OSS>:**ca**
- IHO - urn:mrn:iho:**ca**

3.4 <OSNS> namespaces

All namespaces after <OSNID> are producer-level and are defined by the member state.

<OSNS> Namespaces guidance: 4 Canada administered namespaces

3.5 General guidance

There is no maximum length of an MRN, but the maximum recommended length is 128 characters with 12-13 characters set aside for upper-level namespaces (urn:mrn:iho: or

urn:mrn:iala:). In an effort to reduce file sizes of products, the length should be kept to a minimum. The entire MRN is case-insensitive.

It is recommended that MRNs be preserved throughout a functional object's lifetime. Namespaces can be subdivided at a national level by states or provinces, by projects or by topics where a specification contains several topics, such as ENC. The data production process should include functions to preserve MRN IDs of scale independent features from original source to all derived products.

IALA rules that apply to all MRN namespaces: Appendix A

Character set available: Appendix B

3.5.1 IALA MRN requirements

IALA describes a set of MRN qualities that are either essential or beneficial.

Uniqueness: An ID within the MRN namespace is never assigned to more than one resource and never reassigned to a different resource.

Decentralization: It must be possible to create IDs without relying on a single global source that must be used every time an ID is created.

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.

Human readability (non-essential): A naming scheme should be readable by humans in such a way that identifiers can be entered in forms and documents.

Contextual (non-essential): 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 (non-essential): Different maritime naming schemes already exist which include IMO numbers, MMSI numbers and various forms of AtoN identification.

4 Canada administered namespaces

All namespaces after <OSNID>, all <OSNS> namespaces, are administered and defined by the member state.

4.1 <OSNS> namespace - Department/Agency ID

The first <OSNS> shall function like the <OSNID> which allows for decentralized management of identifiers by the Canadian governmental department. Anything after the first <OSNS> is administered by the first <OSNS> owner.

When a resource is shared by many responsible authorities an exception can be made where the first <OSNS> does not identify a department or agency.

List of potential first <OSNS> owners: Appendix C

4.2 <OSNS> namespaces - Department/Agency administrated

The rest of the MRN shall be defined by the responsible department or agency. The MRN identifier is hierarchal, and this aspect should be maintained in the producer-level namespaces. In order to maintain the decentralized/hierarchical nature as well as integrate with current Canadian standards, pre-defined systems of organization and naming schemes should be used in the <OSNS> namespaces.

4.3 IALA Areas of application

IALA have established current areas of application and defined the corresponding <type> or <OSS> namespace. An MRN utilizing IALA namespaces must be issued using the pre-determined <type> specific definitions, but there is considerable potential for the MRN to be applied to other areas of maritime resources. If a Canadian department or agency seeks to assign an MRN to a resource not listed while using the IALA namespaces they can appeal to extend its areas of application or use the wildcard definition 'obj'. The formal appeal process has yet to be established.

4.3.1 IALA namespaces

Current areas of application of MRN within IALA namespaces are listed below with the <type> specific definitions. IALA will extend the set of MRN type namespaces as appropriate. Detailed examples using each area of application can be reviewed in the IALA Guideline.

- Marine Aids to Navigation: urn:mrn:iala:**aton**
- Vessel Traffic Service: urn:mrn:iala:**vts**
- Waterways: urn:mrn:iala:**wwy**
- Publications: urn:mrn:iala:**pub**
- Wildcard: urn:mrn:iala:**obj**

4.4 S-100 application

IHO Guidance promotes the inclusion and consideration of MRN in product specifications. Product specification developers should include guidance describing its use when creating compliant data products. An interoperabilityID attribute with type URN will be implemented in S-100 product specifications to hold MRNs. As such Canadian S-100 producers shall utilize the interoperabilityID to hold MRNs.

4.5 Reporting assigned MRNs to governing organizations

Both IALA and IHO will issue guidelines on the management of MRNs within their respective organization. IALA expects to present a paper about how to manage namespaces within organizations.

IHO will require those using the IHO MRN namespaces to publish assigned MRN namespaces in a public location (TBA) allowing for easy discovery of the assigned namespaces and who owns or administers them.

Canada shall follow the guidelines put forth by the governing organizations.

5 References

IMO E-Navigation Strategy Implementation Plan (MSC.1-Circ.1595 - E-Navigation Strategy Implementation Plan)

IALA Guideline G1143 Unique Identifiers for Maritime Resources Edition 3.0 urn:mrn:iala:pub:g1143 (IALA Guidlines urn:mrn:iala:pub:g1143)

Outdated - S-100 TSM7 7.2 Annex IHO MRN Guidance (Draft) (S-100 TSM7 IHO MRN Guidance)

RFC 2141 URN Syntax – IETF (RFC 2141 - URN Syntax)

IALA MRN (Maritime Resource Name (MRN) - IALA AISM (iala-aism.org))

ISO 3166 — Codes for the representation of names of countries and their subdivisions (CA - Canada (iso.org))

IHO S-62 List of Data Producer Codes (ProducerCode.pdf (iho.int))

Government of Canada Departments and Agencies (Departments and agencies - Canada.ca)

Radio Aids to Marine Navigation 2024 (Radio Aids to Marine Navigation 2024 (ccg-gcc.gc.ca))

S100WG5-6.8 Waterway Harmonization as it Relates to Dissemination of Marine Safety Information (MSI) and Maritime Services (MS) Development (S100WG5_2020)

6 Further reading

IMO E-navigation (E-navigation (imo.org))

IALA Dictionary – Acronyms (Acronyms - International Dictionary of Marine Aids to Navigation (iala-aism.org))

IALA Guideline G1164 Management of Maritime Resource Name Organization Identifiers Edition 1.1 urn:mrn:iala:pub:g1164:ed1.1 (G1164-Ed1.1-Management-of-Maritime-Resource-Name-Organisation-Identifiers-December-2021 (2).pdf)

Appendix A Rules that apply to all IALA namespaces

The urn:mrn namespace is fixed and is administered by IALA. The identifier has a hierarchical syntax. MRN defined using the Augmented Backus-Naur Form (ABNF), as specified in RFC 5234, is described below.

The OID and OSS namespaces are equivalent to the NSS namespace in RFC 2141, therefore:

"urn:mrn:"<NSS> is equivalent to “urn:mrn:” <OID> : <OSS> where NSS is the Namespace Specific String composed as follows:

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

<MRN> ::= "urn" ":" "mrn" ":" <OID> ":" <OSS>

[rq-components]

["#" f-component]

where:

<OID> ::= (alphanum) 0*32(alphanum / "-") (alphanum) ; Organization ID

<OSS> ::= <OSNID> ":" <OSNS> ; Organization-specific string

<OSNID> ::= (alphanum) 0*32(alphanum / "-") (alphanum) ; Organization-specific namespace ID

<OSNS> ::= pchar *(pchar / "/") ; Organization-specific namespace string

Rules not defined here:

_alphanum and pchar as defined in RFC 3986.

rq-components and f-component as defined in RFC 8141. q-component, f-component and r-component are not generally defined by this specification. Organization specific namespace strings might choose to make use of them where applicable.

Appendix B Character set available

<NSS> ::= 1*<URN chars>

<URN chars> ::= <trans> | "%" <hex> <hex>

<trans> ::= <upper> | <lower> | <number> | <other> | <reserved>

<hex> ::= <number> | "A" | "B" | "C" | "D" | "E" | "F" | "a" | "b" | "c" | "d" | "e" | "f"

<other> ::= "(" | ")" | "+" | "," | "-" | "." | ":" | "=" | "@" | ";" | "$" |"_" | "!" | "*" | "'"

<upper> ::= "A" | "B" | "C" | "D" | "E" | "F" | "G" | "H" | "I" | "J" | "K" | "L" | "M" | "N" | "O" | "P"

|"Q" | "R" | "S" | "T" | "U" | "V" | "W" | "X" |"Y" | "Z"

<lower> ::= "a" | "b" | "c" | "d" | "e" | "f" | "g" | "h" | "i" | "j" | "k" | "l" | "m" | "n" | "o" | "p" |

"q" | "r" | "s" | "t" | "u" | "v" | "w" | "x" | "y" | "z"

<number> ::= "0" | "1" | "2" | "3" | "4" | "5" | "6" | "7" | "8" | "9"

<reserved> ::= '%" | "/" | "?" | "#"

The <reserved> set is reserved from normal use as specified in RFC 2141. The ‘%’ character is used for encoding the escape sequence of an octet. If a reserved character is used in an MRN, it must be encoded using the appropriate %-encoding. While permitted, the use of a character from the <reserved> set in MRNs is discouraged, except that they may be used with r-, q-, or f-components as specified in RFC 8141.

Appendix C Canadian producing departments and agencies

The first <OSNS> namespace shall identify the responsible Canadian department or agency. The following list was created using departments participating in the S-100 Interdepartmental Government of Canada Committee (SIGCC).

- Canadian Coast Guard: ccg /CCG
- Canadian Hydrographic Service: chs / CHS
- Environment of Climate Change Canada: eccc / ECCC
- Fisheries and Oceans Canada: dfo / DFO
- National Defence: dnd / DND
- Transport Canada: tc / TC

Department acronyms and abbreviations taken from the list of Departments and Agencies on Canada.ca.

Appendix D Examples of Canadian areas of application

1 Radio Aids to Marine Navigation publication

Using the Radio Aids to Marine Navigation (RAMN) publication, the following is an example of using an MRN to identify a publication. The way RAMN is currently organized by edition (year) will be used to build the MRN. <type> or <OSS> is 'pub' for publication as described in Annex A Section 4 of the IALA Guideline.

In this example the first namespace following the ISO 3166 Code will identify the responsible authority for managing and publishing RAMN. 'ccg' will be used to identify the Canadian Coast Guard as the responsible authority. Following that 'ramn' can be used to identify the publication, and then <issue year> can be used to identify the edition.

urn:mrn:iala:pub:ca:ccg:ramn:2020

"<OSNS>" #1 = Coast Guard

"<OSNS>" #2 = Radio Aids to Marine Navigation

"<OSNS>" #3 = 2020 (issue year)

2 Waterway Concept

The Waterway Concept has begun utilizing the IALA MRN namespaces to build unique identifiers of Canadian waterways. In this example an MRN will be built for the Northumberland Strait waterway.

Currently, only IALA defines waterways in their areas of application where the <type> definition of waterway is 'wwy'. The <OSNID> (ISO 3166 Code) follows the <type> namespace.

Typically the Canadian department or agency responsible for the resource would be defined in the first <OSNS> namespace, but the Waterway Concept is an exception. It is currently created and managed by the Canadian Coast Guard, but future ownership is undecided. The dataset, as it is envisioned, should not be seen as a coast guard product, but a Canada-wide one, and thus the first <OSNS> does not identify a department or agency.

The <OSNS> namespaces will follow the hierarchal nature of waterways and utilize official Canadian names. <OSNID> can be viewed as the smallest scale geographic location, followed by the Atlantic Ocean or Atlantic region, then the Gulf of St Lawrence, and then the waterway being identified (Northumberland Strait).

urn:mrn:iala:wwy:ca:atl:gstla:nortrt

"<OSNS>" #1 = Atlantic Ocean/region

"<OSNS>" #2 = Gulf of St Lawrence

"<OSNS>" #3 = Northumberland Strait