



Input paper for the following Committee(s):

- ☐ ARM
 ☐ ENG
 ☒ **PAP**
- ☐ ENAV
 ☐ VTS

Purpose of paper:

- ☒ **Input**
- ☐ Information

Agenda item

7.1.1 – Draft Guidelines for Unique Identifiers for Maritime Resources

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ENAV Committee

From: ENAV Committee  
To: Policy Advisory Panel

ENAV18/output/14.1.19  
19 March 2016

## LIAISON NOTE

### Maritime Resource Names

#### 1 INTRODUCTION

ENAV17 produced the draft *Guideline on Unique Identifiers for Maritime Resources*, and a liaison note to PAP introducing the *Maritime Resource Name* (MRN) as a method for creation of globally Unique Identifiers. PAP decided to initiate an e-mail discussion with members and study more use cases to determine what should be the scope of this guideline.

Further inputs to ENAV18 considered this matter, and this Liaison note discusses:

- The background behind the MRN;
- Additional use cases and examples of possible application of the MRN ;
- The burden this introduces or how this may affect IALA;
- The burden on external bodies applying the MRN methodology;
- Actions needed to progress and a possible way ahead.

#### 2 BACKGROUND

The IHO noted in the paper HSSC6-5.4B problems HO may be confronted with when an existing light numbering schema changes by either the producing HO (national light numbers) or the UKHO (international light number). The paper discussed the advantages of a Persistent Unique Identifier for lights and possible consequences. 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 possible extent.

In addition to light numbers, the larger scale use of unique identifiers is a necessary development across e-Navigation to maintain harmonization across domains and services. Navigationally unique objects such as Aids to Navigation, VTS products and services and other maritime resources require identification to avoid duplication and misalignment.

#### 3 INTRODUCTION TO MARITIME RESOURCE NAMES

##### 3.1 Namespaces

Based on protocols in the well-established and proven format from the internet domain – the Uniform Resource Name (URN) – the draft guideline produced at ENAV17 on Unique Identifiers for Maritime



Resources proposes to establish a unique ‘namespace’ denoted ‘Maritime Resource Name’. Within this namespace IALA – and sister organisations like IHO – can define their own types of identifiers for objects within their respective domains. Issuing identifiers can be delegated by subdivision of the namespaces into national domains or any number of organizational layers.

This subdivision will allow existing AtoN providers or HOs exposing data from their internal AtoN database to external agencies to apply the syntax provided by the guideline as a simple prefix to existing internal identifiers. Inside the context of the existing AtoN database or national list of lights, no change to the internal processes of the AtoN providers or HOs are required. Applying the prefix specified by the guideline will however ensure that the identifier of an AtoN will be globally unique, even though different countries or providers apply different and uncoordinated numbering mechanisms.

Example – the unique AtoN identification:

The MRN namespace:

**“urn:mrn”**

IALA’s domain within the namespace:

**“urn:mrn:iala”**

IALA’s definition of a prefix for an AtoN identifier:

**“urn:mrn:iala:aton”**

The prefix of an AtoN established by the United States:

**“urn:mrn:iala:aton:us”**

Thus, an AtoN established under the responsibility of the United States, who issued the identifier 1234.5 for the AtoN in the US list of lights, will internationally be: **“urn:mrn:iala:aton:us:1234.5”**

A similarly unique identifier for a particular AtoN established under the responsibility of the Sweden, who issued the identifier 1234.5 for the AtoN in the Swedish list of lights: **“urn:mrn:iala:aton:se:1234.5”**

### 3.2 Applicability beyond IALA

The draft guideline assumes that IALA may wish to invite other organizations – such as the IHO - to apply the MRN notation, should they wish to do so.

Examples:

IHO’s domain within the MRN namespace:

**“urn:mrn:iho:”**

IMO’s domain within the MRN namespace:

**“urn:mrn:imo:”**

ITU’s domain within the MRN namespace:

**“urn:mrn:itu:”**

CIRM’s domain within the MRN namespace:

**“urn:mrn:cirm:”**

BIMCO’s domain within the MRN namespace:

**“urn:mrn:bimco:”**

...

### 3.3 Different types of identifiers – but similar syntax

The MRN notation will allow very different objects to be identified by very different identifiers, which can all be represented by the MRN notation with a common syntax rule set, although very differently constructed.

Examples:

W26 Lighthouse, Great Belt, Denmark:

**urn:mrn:iala:aton:dk:021345-w26**

Great Belt VTS:

**urn:mrn:iala:vts:vtsstation:dk:vtsgreatbelt**

Ship (the hull):

**urn:mrn:imo:imonumber: 9250969**

Ship (the radiostation):

**urn:mrn:itu:mmsi:219543000**

Ship (the radiostation):

**urn:mrn:itu:callsign:xp4358**

## 4 POTENTIAL USE CASES FOR APPLYING THE MARITIME RESOURCE NAMES

Worldwide harmonized 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 Information services;
- reduce the administrative burden associated with the maintenance associated with unique numbering of navigation products;

The following sections provide use case examples of where the MRN notation could prove to be useful.



#### 4.1 VTS services

The ENAV committee foresees that the VTS committee may wish to utilize the MRN notation to support definition of

- Unique identifiers for *types* of harmonized VTS services;
- Unique identifiers Individual *instances* of harmonized services.

Such unique identifiers would assist in searching a digital catalogue (such as the Service Registry proposed by the Maritime Cloud) of VTS services, discovering which harmonized services are available and locating the technical interface to an instance of a VTS service in a particular VTS area.

It is however the prerogative of the VTS committee to decide upon this. A separate Annex has been allocated for the VTS committee to consider, if relevant.

Similarly, the ARM and ENG committees might have a need for their own annexes to the guideline.

#### 4.2 IALA publications

IALA could similarly utilize this notation to uniquely identify its publications, as a facilitator of automating an interface for retrieving the latest edition of any publication. For instance:

Recommendations: “urn:mrn:iala:publ:rec:A-124”

Guidelines: “urn:mrn:iala:publ:guidel:1084”

ISO has applied a similar approach for unique identification its publications.

#### 4.3 Waterways (and other locations)

For e-navigation, any methodology to identify a navigational point of interest must be machine readable and discoverable in the digital environment. While UNLOCODES are widely used to identify ports, they do not provide the levels of granularity that allow precise reference to particular waterways, terminals, other locations or areas. An ongoing initiative in the US is attempting to identify waterways uniquely, and harmonize their descriptions however three different US agencies are currently using different names to identify the same waterway.

Many nations are facing similar challenges, and certainly between neighbouring countries it may be difficult to communicate precisely about areas defined differently by different stakeholders.

The MRN notation will not solve this challenge by itself, but it may introduce uniqueness to an area identifier, allowing further granularity to be appended to the identifier, and allowing a machine readable deduction of the origin of the definition of each of these areas.

#### 4.4 Navigational Warnings

Navigational Warnings need to be uniquely referenced, and their lifecycles managed, in order to determine if information received is a duplication of previous information, or represents a change (update, cancellation). In e-navigation, this unique reference needs to be machine readable.

In a dialogue between French and Danish developers of a harmonized MSI promulgation system based on S-124, the idea to utilize the MRN notation allowing a similar delegation of authority to issue MSI identifiers based on NAVAREAs or local distribution of responsibilities similar to the example of AtoN numbering has been discussed.

#### 4.5 Ships voyages and Port Calls

Currently, the ‘STM validation project’ in Europe is aiming to validate concepts related to the development of information sharing services, that allow a ship or its operator to share information related to a particular instance of a ship’s voyage with selected collaborating parties (Voyage Management). This may be in relation to passage of VTS areas, or synchronization of port call activities, cargo carried and similarly allowing actors in the port environment to synchronize their activities (Port Collaborate Decision Making) in relation to a ship’s arrival, various port operations and the departure of the ship.



This requires a unique identifier (a Universal Voyage ID) to reference each instance of a ship's voyage from A to B, and a unique identifier to reference a particular Port Call (Universal Port Call ID), as the series of events and operations that need to take place from the time a ship arrives and until it departs on another voyage.

The aims are primarily to increase the efficiency of logistics operations, including the relations to logistic chains beyond the port, but also relations to safety information - and to the ability to execute automated reporting in relation to Ship Reporting Systems or Single Window Systems in relation to Port Calls.

The STM validation project intends to utilize the MRN notation on an experimental basis, to validate these concepts, and subsequently to submit the results of the validation into the standardization process. Utilizing the MRN notation will make the approaches to issuing identifiers quite similar to the standards developed by Global Standards One (GS1), the organization that is managing the standards for logistic operations in other industries (including the standards for barcodes, etc.)

Detailed examples of the draft definitions of Voyage and Port Call identifiers, including management of their lifecycles (version history) are provided in appendix.

#### 4.6 Identity management of 'Actors' in e-navigation

In the current development of the 'Maritime Cloud' concept, the management of identities of actors is an important factor. Actors may be organizations, users (employees, individual mariners or VTS operators), ships or systems that expose an instance of a technical service.

Whenever actors need to interact with a service, unique identification and the process of authentication of the actor requesting access is important.

The MRN notation could be useful to support the delegation of authority to issue identifiers using a uniform syntax, while managing users within the hierarchies of various organizations.

A user belonging to the shipping company Maersk Line, who provides their own user management system for authentication: **"urn:mrn:maerskline:user:u43662"**

A SOLAS vessel registered with an IMO number: **"urn:mrn:imo:imonumber:546789"**

A VTS operator at a Danish VTS center: **"urn:mrn:iala:vts:vtsoperator:dk:greatbelt:b002190"**

#### 4.7 Support for lifecycle management of identifiable objects

Many objects that require unique identification may also require support for life cycle management. Examples above include the Voyage and Port Call IDs, that represent information objects which will change over time, but still require a common unique reference.

Example (see more details in appendix):

Voyage number **134**, for which information is available at the Voyage Information Service provided by the service provider **stm-a** may be identified by the Universal Voyage ID (UVID) **"urn:mrn:stm:uvid:stm-a:134"**. The information about the voyage – including the identity of the ship – is only accessible by authorized parties.

If details of this voyage plan are changed by its owner or proposals for changes submitted by others, its version will be updated, and a version number can be appended:

Version 2.1: **"urn:mrn:stm:uvid:stm-a:134:2.1"**

In this scenario, **"urn:mrn:stm:uvid:stm-a:134"** will reference the currently monitored route (version 2) of the voyage plan committed by the owner, but **"urn:mrn:stm:uvid:stm-a:134:2.1"** may provide a unique reference to the first proposed change to version 2 of the voyage plan.

## 5 STEPS AHEAD

The establishment of the MRN namespace based on the Uniform Resource Name, assumes that this namespace will be registered with the [Internet Assigned Numbers Authority \(IANA\)](https://www.iana.org/).



The process for achieving this is by submission of an RFC (Request for Comments) to (and negotiation of the contents with) the Internet Engineering Task Force (IETF) for their publication. The Danish Maritime Authority offers to assist IALA in progressing this task, if IALA Council approves this process with the intention to finally publish the draft Guideline on Unique Identifiers for Maritime Resources.

Assuming that the RFC is published and the guideline finalized and approved, the following sections elaborate on the future consequences for IALA.

### 5.1 Burden and responsibility of IALA

The future responsibility of IALA will solely be to maintain and publish the Guideline on Unique Identifiers for Maritime Resources.

As this guideline not only is the document which contains the IALA definitions of unique identifiers, but also the list of organizations that have chosen to register their organizational abbreviation to utilize the MRN namespace, the guideline may initially need regular updates, to keep the list of registered 'governing organizations' in Annex A of the guideline up to date.

However, IALA does not assume responsibility for any maintenance on behalf of other 'governing organizations' who register to utilize the MRN namespace.

### 5.2 Burden on organizations applying the MRN

Any organization who would choose to apply the MRN notation, would only need to request IALA to be registered as a 'governing organization' in annex A of the Guideline on Unique Identifiers for Maritime Resources, and maintain and publish their own definitions of how identifiers within their own domain are defined.

This would enable sister organizations or industry clusters to utilize the MRN notation to provide prefixes to existing or new definitions of identifiers within their domain, making the identifiers universally unique and compliant with a uniform syntax across the maritime industry.

## 6 ACTION REQUESTED

The Policy Advisory Panel (PAP) is requested to:

1. Consider the use cases provided;
2. Seek approval in principal from Council to move ahead with registration of the MRN namespace with the IETF.
3. If approved by Council :
  - a. Take steps to initiate this work
  - b. Consider sending the draft guideline to other committees for their consideration on whether to contribute to an annex of the guideline
  - c. Request the ENAV committee to finalize the draft guideline and draft liaison to IHO and other bodies as advised by PAP or Council at ENAV 19



## Annex 1 – Example Usecase: Universal Voyage ID (UVID) and Universal Port Call ID (UPCID)

### 1.1 Background

The STM validation project, cofounded by the European Union under the TEN-T programme, intends to validate concepts related to Strategic and Dynamic Voyage Management, as well as interactions between ships and Port under the concept of Port Collaborative Decision Making.

As part of the project, the need for *universally unique identifiers* to identify instances of a ships voyage (to be accessible via a Voyage Service) and instances of a port call (via a Port Call Service) has been identified as required enablers of the concepts to be validated, including definition of relevant harmonized information objects to represent a ships voyage and states or events related to a portcall, based on experience from previous projects such as MonaLisa 2.0 and PRONTO.

These identifiers resemble identifiers utilized in logistic chain operations, for which GS1 (Global Standards One) have created a number of standards, for instance the [EPCIS](#) (Electronic Product Code Information Services) – however support for some features desired for application in a maritime context needs to be further developed, and the relation to the e-navigation strategy, the Single Window concept and S-100 data modelling regime needs to be evaluated.

The project wishes to apply the Maritime Resource Name methodology to test and validate the concepts in the maritime context, before bringing them to relevant standardization bodies, and has requested to be registered as <governing-organization> for an experimental namespace (listed in Annex A):

“urn:mrnx:stm:”

### 1.2 Universal Voyage\_ID (UVID)

The update of IEC 61174 teststandard for ECDIS in 2015, introduced a standardized dataformat for representation of a ships voyageplan (the RTZ format).

This format includes an identifier field, which can be used to uniquely identify an instance of a ships planned voyage, throughout the lifecycle of the voyage from strategic planning, through the dynamic updates underway, until completion. When communicating updates between any group of stakeholders, a globally unique identifier is needed, and methods to manage the version history of changes applied.

The STM project intends to establish the concept of a ‘Voyage Service’ as the point of contact to enable authorized parties (nominated collaborators such as agents, pilots, ports, VTS’s etc.) to interact electronically with information related to a ships voyage.

It has been observed that centralized methods for issuing unique identifiers (such as Global Unique Flight Identifiers in the aviation industry) demand connectivity in the time of creation. This is seen as an undesirable requirement and possible point of failure. Instead a delegated approach, where each registered provider of a Voyage Service is delegated the ability to issue their own identifiers is desired.

The project builds on an extension of the Maritime Cloud concept denoted SeaSWIM, which assumes that a *Service Registry* exist, which will enable discovery of all instances of standardized Voyage Services – and that all registered instances of a Voyage Service contain a unique Voyage\_Service\_Provider\_ID.

The following definition of the UVID is proposed for the project:

“urn:mrnx:stm:uvid:”<uvspid>”.”<localid>”[:”<version>”]

where

- <uvspid> denotes a Voyage\_Service\_Provider\_ID defined as:
  - ”<governing-organization>”-”<vsid>”



- *<governing-organization>* is lowercase alphanumeric values (a-z, 0-9, no space or other special characters) and denotes an organization which guarantees the uniqueness of the Voyage\_Service\_ID (<vsid>)
- *<vsid>* is lowercase alphanumeric values (a-z, 0-9, no space or other special characters) and denotes a unique number identifying a single provider of the Voyage Service under the domain of *<governing-organization>*.
- *<localid>* is an ID (lowercase alphanumeric values (a-z, 0-9, no space or other special characters – a serialnumber or similar) issued by the provider of the Voyage Service, which is guaranteed to be unique *within the context of this particular instance of a Voyage Service* by the provider of the service.
- *<version>* is an optional extension, which is defined as: *<major\_version>*["."<minor\_version>]
  - *<major\_version>*: Numerical characters (0-9, no space or special characters). A major version number is only incremented, when the OWNER of a voyage (during the voyage: the ships captain) commits changes to its geometry or planned (targeted) schedule/timing.
  - *<minor\_version>*: Optional field - numerical characters (0-9, no space or special characters). Minor version number is incremented, every time a collaborating actors provide a proposed change to a voyage (change of route or timing) or when calculated ETA at waypoints marked with a planned/target time of arrival changes (more than a set threshold value). If the owner of the voyage approves and commits a proposed change of route or planned timing, the major version is incremented, and the minor\_version reset to 0.

#### EXAMPLE

"urn:mrnx:stm:uvid:stm-a:134:1" denotes voyage number "134" (version "1") held at Voyage Service Provider "urn:mrnx:stm:uvspid:stm-a".

If a port receives notification, that the voyage with UVID "urn:mrnx:stm:uvid:stm-a:134:1" is intending to arrive at their port at a certain Planned (Target) Time of Arrival, and the port may start planning the Port Call.

The port can then identify the <uvspid> ("stm-a") from the UVID, and discover the address of the Voyage Service "stm-a", using the search parameter "urn:mrnx:stm:uvspid:stm-a" in the Service Registry.

Based on the reply from the service registry, they know which Voyage Service to query for information about the approaching ship, based on the standardized interfaces of a Voyage Service.

Assuming that the port is nominated as collaborator for this voyage by the owner of the voyage (the captain), they can retrieve the information allowed by the owner.

The port may wish to propose a different time of arrival for this particular voyage. They send their proposed time of arrival for voyage "urn:mrnx:stm:uvid:stm-a:134" to the Voyage Service "stm-a", which will increment the <minor\_version> and generate version "1.1" of the voyage "stm-a:134" inside the Voyage Service, triggering a notification of the owner of the voyage that a new proposal has been made. If the owner approves the proposal 1.1, then a version "2.0" is generated, and all nominated collaborators subscribing to updates of that Voyage are notified.

### 1.3 Universal PortCall\_ID (UPCID)

The STM project intends to establish the concept of a 'Port Call Service' as the point of contact to enable authorized parties (nominated collaborators to a Port Call, such as the master of a ship, the Port master, agents, pilots, tugs, ports, VTS's, terminals etc.) to interact electronically with information related to a particular Port Call.

The following definition of the UPCID is proposed for the project:

"urn:mrnx:stm:upcid:"<upcspid>":"<localid>":["<version>"]





where

- <upcspid> denotes a Port\_Call\_Service\_Provider\_ID defined as:
  - "<governing-organization>"-"<pcsid>"
    - <governing-organization> is lowercase alphanumeric values (a-z, 0-9, no space or other special characters) and denotes an organization which guarantees the uniqueness of the Port\_Call\_Service\_ID (<vsid>)
    - <pcsid> is lowercase alphanumeric values (a-z, 0-9, no space or other special characters) and denotes a unique number identifying a single provider of the Port Call Service under the domain of <governing-organization>.
- <localid> is an ID (lowercase alphanumeric values (a-z, 0-9, no space or other special characters – a serialnumber or similar) issued by the provider of the Port Call Service, which is guaranteed to be unique *within the context of this particular instance of a Port Call Service* by the provider of the service.
- <version> is an optional extension, and its use may change during the project. It is proposed as: <major\_version>["."<minor\_version>"]
  - <major\_version>: Numerical characters (0-9, no space or special characters). A major version number is only incremented, when the OWNER of a Port Call (may depend on local organization of the port) commits changes to the planned (targeted) timing of arrival or departure.
  - <minor\_version>: Optional field - numerical characters (0-9, no space or special characters). Minor version number is incremented, every time a collaborating actors provide a notification of a changed state or planning time.

#### EXAMPLE

A Port Call Service provided by Port Call Service Provider X “urn:mrnx:upcspid:stm-x” on behalf of Port P receives notification, that the voyage with UVID “urn:mrnx:stm:uvid:stm-a:134:1” is intending to arrive at their port at a certain Planned (Target) Time of Arrival.

Since there is no Port Call registered that relate to voyage “urn:mrnx:stm:uvid:stm-a:134” in Port P, a new Port Call ID is generated (version 1): “urn:mrnx:stm:upcid:stm-x:2899:1” which relates to the inbound voyage “urn:mrnx:stm:uvid:stm-a:134:1”. The Voyage Service is that notified by the port of the reference ID of the Port Call – and a relation between the Voyage information and Port Call information now exist.

The port might notify the local VTS that Port Call “urn:mrnx:stm:upcid:stm-x:2899:1” is created, and the VTS with access to the local Port Call System can that way identify that voyage “urn:mrnx:stm:uvid:stm-a:134” is approaching. The VTS can discover the address of the Voyage Service “stm-a”, and based on the reply from the service registry, they know which Voyage Service to query for information about the approaching ship, based on the standardized interfaces of a Voyage Service. If the VTS is nominated as collaborator for this voyage by the owner of the voyage, they can retrieve the information allowed, related to the most recent major version of the voyage, or register for being notified of updates.

If the VTS is not nominated as a collaborator, they may request access, and the owner of the voyage will be notified of the request and make his decision.

The Owner of the inbound Voyage “urn:mrnx:stm:uvid:stm-a:134” related to Port Call “urn:mrnx:stm:upcid:stm-x:2899:1.0”, may request that certain local port actors such as pilots, tugs, terminals, etc. are nominated as collaborators to this particular Port Call, and may thus access and collaborate in the planning related to the Port Call of this ship.





#### 1.4 Post project considerations for utilization of the UVID and UPCID identifiers

Assuming that the STM validation project delivers a positive validation of this way to handle UVID's, UPCID's - and associated service provider ID's, the construction of these identifiers may be brought forward as a proposal for a standard to be published by some relevant standardization organization.

Regardless of which organization is identified as the relevant host of such a standard, the intention will be to replace the prefix of the identifier construction ("urn:mrnx:stm:") with another prefix, identifying the relevant host organization. Possible results could be:

- "urn:mrn:stm:" if the STM project ends up establishing a STM governing organization
- "urn:gs1:" if the STM project ends up proposing the STM services to become GS1 standards
- "urn:mrn:ihma:" should the STM project end up proposing IHMA (International Harbour Masters Association) as the host for standardizing the STM services.

Either way, the technical implementations of STM Services in the testbeds may be prepared through configuration to accept another prefix than the "urn:mrnx:stm:" as the 'production' prefix of STM services, leaving the "urn:mrnx:stm:" as an indication that data belong to a testbed, rather than production environment.