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Uniform Resource Name (URN) Namespace Definition Mechanisms
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Abstract

Uniform Resource Names (URNs) are intended to serve as persistent, location-independent, resource identifiers. To structure and organize their usage, the URN syntax specifies a hierarchy that horizontally divides the set of possible URNs into "URN Namespaces" that can be individually defined and managed. URN Namespaces in particular serve to map existing identifier systems into the URN system and thereby make available generic, network-based resolution services for the identified documents, artifacts, and other objects (and their metadata).

To actually leverage such synergetic advantage, URN namespaces need to be specified in a comparable manner, and their Namespace Identifiers (NIDs) need to be registered with IANA, so that naming conflicts are avoided and implementers of services can follow a structured approach in support of various namespaces, guided by the registry to the related documents and the particularities of specific namespaces, as described in these namespace registration documents.

This document serves as a guideline for authors of URN Namespace definition and registration documents. It describes the essential content of such documents and how they shall be structured to allow readers familiar with the scheme to quickly assess the properties of a specific URN Namespace. Further, this RFC describes the process to be followed to get a URN Namespace registered with IANA.

This document is a companion document to the revised URN Syntax specification, RFC 2141bis; it supersedes and replaces RFC 3406.

Discussion

This draft version has been obtained by importing the text from RFC 3406 into modern tools and making a first round of updating steps. It is an initial chartered work item of the URNBIS WG.

Discussion of this memo utilizes the urn@ietf.org mailing list.

Status of This Memo

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1. Introduction

Uniform Resource Names (URNs) are resource identifiers with the specific requirements for enabling location-independent identification of a resource, as well as longevity of reference. URNs are part of the larger Uniform Resource Identifier (URI) family (see the joint W3C/IETF memorandum, RFC 3305 [RFC3305], and the IETF STD 66, RFC 3986 [RFC3986]) with the specific goal of providing persistent naming of resources.

There are two assumptions that are key to this document:

Assumption #1: Assignment of a URN is a managed process.

I.e., not all strings that conform to URN syntax are necessarily valid URNs. A URN is assigned according to the rules of a particular namespace (in terms of syntax, semantics, and process).

Assumption #2: The space of URN namespaces is managed.

I.e., not all syntactically correct URN namespaces (per the URN syntax definition) are valid URN namespaces. A URN namespace must have a recognized definition in order to be valid.

The purpose of this document is to outline a mechanism and provide a template for explicit namespace definition, as well as provide the mechanism for associating an identifier (called a "Namespace ID", or NID), which is registered with the Internet Assigned Numbers Authority (IANA) [IANA] in the URN Namespaces registry maintained at [IANA-URN].

The URN Namespace definition and registration mechanisms originally have been specified in RFC 2611 [RFC2611], which has been obsoleted by BCP 66, RFC 3406 [RFC3406]. Guidelines for documents prescribing IANA procedures have been revised as well over the years, and at the time of this writing, BCP 26, RFC 5226 [RFC5226] is the normative document. This document is a revision of RFC 3406 based on the revised URN Syntax specification RFC 2141bis [I-D.ietf-urnbis-rfc2141bis-urn] and RFC 5226.

The reader is referred to Section 1.1 of RFC 2141bis [I-D.ietf-urnbis-rfc2141bis-urn] for a more detailed synopsis of the history of documents fundamental for URNs.

Note that this document restricts itself to the description of processes for the creation of URN namespaces. If "resolution" of any so-created URN identifiers is desired, a separate process of registration in a global NID directory, such as that provided by the

DDDS system [RFC3401], is necessary. See [RFC3405] for information on obtaining registration in the DDDS global NID directory.

1.1. Requirement Language

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [RFC2119]. In this document, these key words describe requirements for the process to be followed and the content to be provided in namespace definition documents and registration templates.

2. What is a URN Namespace?

For the purposes of URNs, a "namespace" is a collection of uniquely-assigned identifiers. That is, the identifiers are not ever assigned to more than 1 resource, nor are they ever re-assigned to a different resource. A single resource, however, may have more than one URN assigned to it for different purposes. A URN namespace itself has an identifier in order to:

- ensure global uniqueness of URNs,
- (where desired) provide a cue for the structure of the identifier.

For example, many identifier systems use strings of numbers as identifiers (e.g., ISBN, ISSN, phone numbers). It is conceivable that there might be some numbers that are valid identifiers in two different established identifier systems. Using different designators for the two collections ensures that no two URNs will be the same for different resources (since each collection is required to uniquely assign each identifier).

The development of an identifier structure, and thereby a collection of identifiers, is a process that is inherently dependent on the requirements of the community defining the identifier, how they will be assigned, and the uses to which they will be put. All of these issues are specific to the individual community seeking to define a namespace (e.g., publishing community, association of booksellers, protocol developers, etc.); they are beyond the scope of the IETF URN work.

This document outlines the processes by which a collection of identifiers satisfying certain constraints (uniqueness of assignment, etc.) can become a bona fide URN namespace by obtaining a NID. In a nutshell, a template for the definition of the namespace is completed for deposit with IANA, and a NID is assigned. The details of the process and possibilities for NID strings are outlined below.

3. URN Namespace (Registration) Types

There are three categories of URN namespaces defined here, distinguished by expected level of service and required procedures for registration. Registration processes for each of these namespace types are given in Section 4.

3.1. Experimental Namespaces

These are not explicitly registered with IANA. They take the form:

X-<NID>

No provision is made for avoiding collision of experimental NIDs; they are intended for use within internal or limited experimental contexts.

[[Editorial Note:

Has anybody ever seen usage of such experimental URN Namespaces? According to the observations of the author, three years of RFC 2611 and eight years of RFC 3406 have constantly seen "tentative grabbing" and subsequent usage of NIDs that the stakeholders later have tried to register with IANA as Formal NIDs (with varying success). So should this kind of namespaces better be dropped and a kind of provisional NIDs be created? -- This would be in the spirit of BCP 100, RFC 4020 [RFC4020], and it would resemble the manner how URI Scheme registrations are dealt with (RFC 4395 [RFC4395], [IANA-URI]).]]

3.2. Informal Namespaces

These are fully fledged URN namespaces, with all the rights and requirements associated thereto. Informal namespaces can be registered in global registration services. They are required to uphold the general principles of a well-managed URN namespace -- providing persistent identification of resources and unique assignment of identifier strings. Informal and formal namespaces (described below) differ in the NID assignment. IANA will assign an alphanumeric NID (following a defined pattern) to registered informal namespaces, per the process outlined in Section 4.

3.3. Formal Namespaces

A formal namespace may be requested, and IETF review sought, in cases where the publication of the NID proposal and the underlying namespace will provide benefit to some subset of users on the Internet. That is, a formal NID proposal, if accepted, must be functional on and with the global Internet, not limited to users in

communities or networks not connected to the Internet. For example, assume a NID is requested that is meant for naming of physics research. If that NID request required that the user use a proprietary network or service that was not at all open to the general Internet user, then it would make a poor request for a formal NID. The intent is that, while the community of those who may actively use the names assigned within that NID may be small (but no less important), the potential use of names within that NID is open to any user on the Internet.

It is expected that Formal NIDs may be applied to namespaces where some aspects are not fully open. For example, a namespace may make use of a fee-based, privately managed, or proprietary registry for assignment of URNs in the namespace, but it may still provide benefit to some Internet users if the services associated have openly-published access protocols.

In addition to the basic registration information defined in the registration template (in Appendix A), a formal namespace request must be accompanied by documented considerations of the need for a new namespace and of the community benefit from formally establishing the proposed URN namespace.

Additionally, since the goal of URNs is to provide persistent identification, some consideration as to the longevity and maintainability of the namespace must be given. The collective experience of the IETF community contains a wealth of information on technical factors that will prevent longevity of identification. Thus, the IESG may elect not to accept a proposed namespace registration if the IETF community consensus is that the registration document contains technical flaws that will prevent (or seriously impair the possibility of) persistent identification, and that it therefore should not be published as an RFC.

Consideration should be given to these aspects:

- the organization maintaining the URN namespace should demonstrate stability and the ability to maintain the URN namespace for a long time, and/or it should be clear how the namespace can continue to be usable/useful if the organization ceases to be able to foster it;
- it should demonstrate ability and competency in name assignment; this should improve the likelihood of persistence (e.g., to minimize the likelihood of conflicts);
- it should commit to not re-assigning existing names and allowing old names to continue to be valid, even if the owners or assignees

of those names are no longer members or customers of that organization; this does not mean that there must be resolution of such names, but that they must not resolve the name to false or stale information, and that they must not be reassigned.

These aspects, though hard to quantify objectively, should be considered by organizations/people considering the development of a Formal URN namespace, and they will be kept in mind when evaluating the technical merits of any proposed Formal URN namespace.

4. URN Namespace Registry: Processes for Registration and Update

Different levels of disclosure are expected/defined for namespaces. According to the level of open-forum discussion surrounding the disclosure, a URN namespace may be assigned an identifier or may request a particular identifier.

The IANA Considerations Guidelines document (BCP 26, RFC 5226 [RFC5226]) suggests the need to specify update mechanisms for registrations -- who is given the authority to do so, from time to time, and what are the processes. Since URNs are meant to be persistently useful, few (if any) changes should be made to the structural interpretation of URN strings (e.g., adding or removing rules for lexical equivalence that might affect the interpretation of URN IDs already assigned). However, it may be important to introduce clarifications, expand the list of authorized URN assigners, etc., over the natural course of a namespace's lifetime. Specific processes are outlined below.

The official list of registered URN namespaces is currently maintained by IANA at
<[http://www.iana.org/assignments/urn-namespaces/
urn-namespaces.xhtml](http://www.iana.org/assignments/urn-namespaces/urn-namespaces.xhtml)>.

[[NOTE: It would be preferable to restore the generic, most universally supported (HTML) form of the registry be identified by an implementation-neutral URL, as previously supported by IANA: <<http://www.iana.org/assignments/urn-namespaces>>. The content there should link to alternate forms (.xml, .txt), and those alternate versions should indicate the *other* versions; i.e., where currently the .txt version also says, "This registry is also available in XML and plain text formats.", it should better say: "This registry is also available in HTML and XML formats."]]

The registration is subdivided into two sub-registries, one for "Formal URN Namespaces" and one for "Informal URN Namespaces", and each entry there links to a stable repository of the registration document or (an escrow copy of) the filled-out registration template.

The registration and maintenance procedures vary slightly between the namespace types.

4.1. Experimental Namespaces: No Registration

The NIDs of Experimental Namespaces (Section 3.1) are not explicitly registered with IANA. They take the form:

X-<NID>

No provision is made for avoiding collision of experimental NIDs; they are intended for use within internal or limited experimental contexts exclusively.

As there is no registration, no registration/maintenance procedures are needed.

4.2. Informal Namespaces

The NIDs of Informal Namespaces are synthesized by IANA using an assigned sequence number and registered in their own sub-registry, as indicated in Section 4; they take the format:

"urn-" <number>

where <number> is the decimal representation of a natural number, with no leading zeroes. This sequence number is assigned by the IANA on a First-Come-First-Served [RFC5226] basis to registration requests for informal namespaces.

Registrants should send a copy of the registration template (as shown in Appendix A), duly completed, to the urn-nid@ietf.org mailing list for review and allow for a two-week discussion period for clarifying the expression of the registration information and suggestions for technical improvements to the namespace proposal. [NOTE: Longer time is needed in practice! Increase to 4 weeks?]

After suggestions for clarification of the registration information have been incorporated, the template may be submitted for assignment of a NID by email to iana@iana.org .

Registrations may be updated later by the original registrant, or by an entity designated by the registrant, by updating the registration template, submitting it to the discussion list for a further two-week discussion period, and finally resubmitting it to IANA in a message to iana@iana.org .

4.3. Formal Namespaces

Formal NIDs are assigned via IETF Review, as defined in BCP 26 [RFC5226]. The designated expert(s) for URN namespace registrations are nominated by the IESG, and their role adheres to the regulations in BCP 26, unless specified otherwise below.

This means that the Formal NID application is made via submission to the IETF of an Internet-Draft that contains the namespace definition and targets publication as an RFC of Informational or Standards Track category, which needs to be approved by the IESG after performing an IETF Last Call on the document and evaluating review comments. The applicant can be an individual or an IETF working group, in alignment with the designation of the Internet-Draft.

Before publication can be requested, however, the draft namespace specification document must undergo an Expert Review process [RFC5226] pursuant to the guidelines written here (as well as standard RFC publication guidelines). The template defined in Appendix A SHOULD be included as part of an RFC-to-be defining some other aspect(s) of the namespace, or it may be put forward as a namespace definition document in its own right. The proposed template (including a pointer to a readily available copy of the registration document) should be sent to the urn-nid@ietf.org mailing list for review. This list is monitored by the designated expert(s). The applicant has to allow for a two-week discussion period for clarifying the expression of the registration information, and SHOULD improve the namespace document and/or registration template based on the comments received, under the guidance of the designated expert(s), before the IESG reviews the document.

Working groups generally SHOULD seek early expert review for a namespace definition document, before they hand it over to the IESG, and individual applicants are also advised to seek expert comments early enough. The aforementioned list can be contacted for informal advice at any stage.

4.4. Registration Documents

The following subsections describe essential, MANDATORY parts of URN namespace registration documents, which will be focal in the expert Review process and IETF Review.

4.4.1. Namespace Considerations in Registration Documents

The namespace definition document MUST include a "Namespace Considerations" section that outlines the perceived need for a new namespace (i.e., where existing namespaces fall short of the proposer's requirements).

Considerations MUST include, directly or with the help of referenced stable (and preferably readily available) documents:

- URN assignment procedures;
- URN resolution/delegation;
- type of resources to be identified;
- type of services to be supported.

NOTE: It is expected that more than one namespace may serve the same "functional" purpose; the intent of the "Namespace Considerations" section is to provide a record of the proposer's "due diligence" in exploring existing possibilities, for the IESG's consideration.

[[Editorial Note: See the endnote of the next section!]]

4.4.2. Community Considerations in Registration Documents

The namespace definition document MUST also include a "Community Considerations" section that indicates the dimensions upon which the proposer expects its community to be able to benefit by publication of this namespace, as well as how a general Internet user will be able to use the space if they care to do so.

Potential considerations include:

- open assignment and use of identifiers within the namespace;
- open operation of resolution servers for the namespace (server);
- creation of software that can meaningfully resolve and access services for the namespace (client).

[[Editorial Note:

It is acknowledged that, in many cases, the Namespace Considerations and Community Considerations are closely intertwined. Further, the bulleted list above (from RFC 3406) seems to be more related to the items in the registration template entitled "Identifier uniqueness

considerations", "Identifier persistence considerations", "Process of identifier assignment", and "Process for identifier resolution" than to the primary objectives presented in the first paragraph above (also from RFC 3406).

In fact, namespace registration documents seen so far duplicate in the registration template material from the "Community Considerations" that addresses the above bullets.

Therefore: Should this specification now allow a combined section "Namespace and Community Considerations" that focuses on the (non-)utility of possible alternate namespace re-use and the *benefits* of an independent new namespace?

]]

4.4.3. Security Considerations in Registration Documents

According to the general procurements for RFCs, URN namespace definition documents must include a "Security Considerations" section (cf. BCP 72 [RFC3552]). That section has to identify the security considerations specific to the subject URN namespace. If the subject URN namespace is based on an underlying namespace, the registration can include substantive security considerations described in specifications related to that particular namespace by reference to these documents. For general security considerations regarding URN usage (and more generally, URI usage), for the sake of clarity and brevity, it should refer to the Security Considerations in STD 63 [RFC3986] and in the URN Syntax document [I-D.ietf-urnbis-rfc2141bis-urn].

4.4.4. IANA Considerations in Registration Documents

According to the general procurements for RFCs, URN namespace definitions documents must include an "IANA Considerations" section (cf. BCP 26 [RFC5226]). That section has to indicate that the document includes a URN Namespace registration that is to be entered into the IANA registry of Formal URN Namespaces.

Registration documents for formal URN namespaces will provide a particular, unique, desired NID string, and this will be assigned by the Standards/Protocol Action of the IESG that approves the publication of the registration document as an RFC. RFC 2141bis [I-D.ietf-urnbis-rfc2141bis-urn] specifies that NID strings are ASCII strings that are interpreted in a case-insensitive manner, but the NID string SHALL be registered in the capitalization form preferred by the registrant. The proposed NID string MUST conform with the <nid> syntax rule in Section 2.1 of RFC 2141bis [I-D.ietf-urnbis-rfc2141bis-urn] and it MUST adhere to the following additional constraints:

- not be an already-registered NID;
- not start with "X-" (see Section 4.1 above);
- not start with "urn-" (see Section 4.2 above);
- not start with "xy-", where xy is any combination of 2 ASCII letters (see NOTE below);
- be more than 2 letters long.

NOTE: All two-letter combinations as well as two-letter combinations followed by "-" and any sequence of valid NID characters are reserved for potential use as countrycode-based NIDs for eventual national registrations of URN namespaces. The definition and scoping of rules for allocation of responsibility for such namespaces is beyond the scope of this document.

Further, to avoid confusion, "urn" is not allowed as an NID string; IANA has permanently reserved this string to prohibit assignment.

Registrations may be revised by updating the RFC through standard IETF RFC update processes. In any case, a revised document, in the form of a new Internet-Draft, must be published, and the proposed updated template must be circulated on the urn-nid discussion list, allowing for a two-week review period before pursuing RFC publication of the new document.

5. Security Considerations

This document largely focuses on providing mechanisms for the declaration of public information. Nominally, these declarations should be of relatively low security profile, however there is always the danger of "spoofing" and providing mis-information. Information in these declarations should be taken as advisory.

6. IANA Considerations

This document outlines the processes for registering URN namespaces, and has implications for the IANA in terms of registries to be maintained, as previously defined in RFC 3406 [RFC3406]. This document replaces RFC 3406; it contains a revised description for the management of the "Uniform Resource Names (URN) Namespaces" IANA Registry that uses the policy designation terms from BCP 26, RFC 5226 [RFC5226], but does not introduce significant changes to the applicable procedures.

All references there to the predecessor, [RFC3406], should be replaced by references to this document.

Section 4.4.4 above describes the syntax rules for NIDs to which the registry needs to obey. As pointed out in Section 4.4.4 above and in RFC 2141bis [I-D.ietf-urnbis-rfc2141bis-urn], the string "urn" is permanently reserved and MUST NOT be assigned as an NID.

In all cases of new namespace registration proposals, the IANA should provisionally assign the appropriate NID (informal or formal), as described throughout the body of this memo, once an IESG-designated expert has confirmed that the requisite registration process steps have been completed. These registrations become permanent and can be made publicly available once the registration document has been approved by the IESG for publications as a Standards Track or Informational RFC.

7. Acknowledgements

This document is heavily based on RFC 3406, the author of which are cordially acknowledged.

This document also been inspired by other recent documents that have updated important IANA registries, and the countless authors and contributors to these efforts are acknowledged anonymously.

Your name could go here ...

8. References

8.1. Normative References

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- [RFC3339] Klyne, G., Ed. and C. Newman, "Date and Time on the Internet: Timestamps", RFC 3339, July 2002.
- [RFC3986] Berners-Lee, T., Fielding, R., and L. Masinter, "Uniform Resource Identifier (URI): Generic Syntax", STD 66, RFC 3986, January 2005.
- [RFC5226] Narten, T. and H. Alvestrand, "Guidelines for Writing an IANA Considerations Section in RFCs", BCP 26, RFC 5226, May 2008.

8.2. Informative References

- [IANA] IANA, "The Internet Assigned Numbers Authority", <<http://www.iana.org/>>.
- [IANA-URI] IANA, "URI Schemes Registry", <<http://www.iana.org/assignments/uri-schemes/>>.
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- [RFC4020] Kompella, K. and A. Zinin, "Early IANA Allocation of Standards Track Code Points", BCP 100, RFC 4020, February 2005.
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[RFC5234] Crocker, D. and P. Overell, "Augmented BNF for Syntax Specifications: ABNF", STD 68, RFC 5234, January 2008.

Appendix A. URN Namespace Definition Template

Definition of a URN namespace is accomplished by completing the following information template. Apart from providing a mechanism for disclosing the structure of the URN namespace, this information is designed to be useful for

- entities seeking to have a URN assigned in a namespace (if applicable) and
- entities seeking to provide URN resolvers for a namespace (if applicable).

This is particularly important for communities evaluating the possibility of using a portion of an existing URN namespace rather than creating their own.

Applications for Formal URN namespaces must also document "Namespace Considerations", "Community Considerations", "Security Considerations", and "IANA Considerations", as described in Section 4.4.

Information in the template is as follows (text in curly braces is tutorial and should be removed from filled-in templates):

Namespace ID:

```
{ If request is for an Informal NID, indicate so; the number will
be assigned by IANA. In the case of a Formal NID registration,
regularly a particular NID string will be requested. }
```

Registration Information:

```
{ This is information to identify the particular version of
registration information: }
- version number:
  { starting with 1, incrementing by 1 with each new version }
- date:
  { date submitted to the IANA or date of approval of
  registration document, using the format outlined in "Date and
  Time on the Internet: Timestamps", [RFC3339]: YYYY-MM-DD }
```

Declared registrant of the namespace:

- Registering organization:
 - Name: { ... }
 - Address: { ... }
- Designated contact person:
 - Name: { ... }
 - { Address: ...
(at least one of: Email, Phone, Postal address) }

Declaration of syntactic structure of NSS part:

[[Editorial Note: In the past, there has been iterated trouble in tentative registration documents with confusion between entire URN syntax and NSS syntax (only). Since the "urn:" prefix is fixed and the NID is fully determined by the "Namespace ID" clause above, in order to avoid error prone duplication, this version of the template tentatively restricts this clause to the NSS (namespace specific string) part of the new URNs.]]

{
This section should outline any structural features of identifiers in this namespace. At the very least, this description may be used to introduce terminology used in other sections. This structure may also be used for determining realistic caching/shortcuts approaches; suitable caveats should be provided. If there are any specific character encoding rules (e.g., which character should always be used for single-quotes), these should be listed here.

Answers might include, but are not limited to:

- the structure is opaque (no exposition);
 - a regular expression for parsing the identifier into components, including naming authorities;
 - formal syntax of the NSS, preferably in ABNF (STD 68 [RFC5234]).
- }

Relevant ancillary documentation:

{
This section should list any RFCs, standards, or other published documentation that defines or explains all or part of the namespace structure.

Answers might include, but are not limited to:

- RFCs that outline the syntax of the namespace;
 - other documents of the defining community (e.g., ISO) that outline the syntax of the identifiers in the namespace;
 - explanatory material that introduces the namespace.
- }

Conformance with URN Syntax:

[[Editorial Note: This clause moved into vicinity of "syntax".]]

{
This section should outline any special considerations required for conforming with the URN syntax. This is particularly applicable in the case of legacy naming systems that are used in the context of URNs.

For example, if a namespace is used in contexts other than URNs, it may make use of characters that are reserved in the URN syntax.

This section should flag any such characters, and outline necessary mappings to conform to URN syntax. Normally, this will be handled by percent-encoding the symbol.
}

Rules for Lexical Equivalence of NSS part:

[[Editorial Note: This clause moved into vicinity of "syntax".]]

[[Editorial Note: In the past, there has been iterated trouble in tentative registration documents with regard to what rules can be imposed for lexical equivalence. Since the "urn:" prefix and the NID part both are invariably case-insensitive per RFC 3986 and RFC 2141[bis], in order to avoid repeated confusion, this version of the template tentatively restricts this clause to only the NSS part of the new URN namespace definition documents.]]

{
If there are particular algorithms for determining equivalence between two identifiers in the underlying namespace (and hence, in the URN string itself), rules can be provided here.

Some examples include:

- equivalence between hyphenated and non-hyphenated groupings in the identifier string;
- equivalence between single-quotes and double-quotes;
- namespace-defined equivalences between specific characters, such as "character X with or without diacritic marks".

Note that these are not normative statements for any kind of best practice for handling equivalences between characters; they are statements limited to reflecting the namespace's own rules.

}

Identifier uniqueness considerations:

{

This section should address the requirement that URN identifiers be assigned uniquely -- they are assigned to at most one resource, and are not reassigned.

(Note that the definition of "resource" is fairly broad; for example, information on "Today's Weather" might be considered a single resource, although the content is dynamic.)

Possible answers include, but are not limited to:

- exposition of the structure of the identifiers, and partitioning of the space of identifiers amongst assignment authorities that are individually responsible for respecting uniqueness rules;
- identifiers are assigned sequentially;
- information is withheld; that is, the namespace is opaque.

}

Identifier persistence considerations:

{

Although non-reassignment of URN identifiers ensures that a URN will persist in identifying a particular resource even after the "lifetime of the resource", some consideration should be given to the persistence of the usability of the URN. This is particularly important in the case of URN namespaces providing global resolution.

Possible answers include, but are not limited to:

- quality of service considerations.

}

Process of identifier assignment:

{

This section should detail the mechanisms and/or authorities for assigning URNs to resources. It should make clear whether assignment is completely open, or if limited, how to become an assigner of identifiers, and/or get one assigned by existing assignment authorities.

Answers could include, but are not limited to:

- assignment is completely open, following a particular algorithm;
 - assignment is delegated to authorities recognized by a particular organization (e.g., the Digital Object Identifier Foundation controls the DOI assignment space and its delegation);
 - assignment is completely closed (e.g., for a private organization).
- }

Process for identifier resolution:

{
If a namespace is intended to be accessible for global resolution, it must be registered in an RDS (Resolution Discovery System, see RFC 2276 [RFC2276]) such as the DDDS (see RFC 3401 [RFC3401]). Resolution then proceeds according to standard URI resolution processes, and the mechanisms of the RDS. What this section should outline is the requirements for becoming a recognized resolver of URNs in this namespace (and being so listed in the RDS registry).

Answers may include, but are not limited to:

- the namespace is not listed with an RDS, this is not relevant;
 - resolution mirroring is completely open, with a mechanism for updating an appropriate RDS;
 - resolution is controlled by entities to which assignment has been delegated.
- }

Validation mechanism:

{
Apart from attempting resolution of a URN, a URN namespace may provide mechanisms for "validating" a URN -- i.e., determining whether a given string is currently a validly-assigned URN. There are 2 issues here: 1) users should not "guess" URNs in a namespace; 2) when the URN namespace is based on an existing identifier system, it may not be the case that all the existing identifiers are assigned on Day 0. The reasonable expectation is that the resource associated with each resulting URN is somehow related to the thing identified by the original identifier system, but those resources may not exist for each original identifier. For example, even if a telephone number-based URN namespace was created, it is not clear that all telephone numbers would immediately become "valid" URNs, that could be resolved using

whatever mechanisms are described as part of the namespace registration.

Validation mechanisms might be:

- a syntax grammar;
 - an on-line service;
 - an off-line service.
- }

Scope:

{
This section should outline the scope of the use of the identifiers in this namespace. Apart from considerations of private vs. public namespaces, this section is critical in evaluating the applicability of a requested NID. For example, a namespace claiming to deal with "social security numbers" should have a global scope and address all social security number structures (unlikely). On the other hand, at a national level, it is reasonable to propose a URN namespace for "this nation's social security numbers".
}

Appendix B. Illustration

B.1. Example Template

[[Editorial Note: Do we really need this any more?
Such an almost-concrete example likely contradicts current IESG policy on usage of examples in RFCs.]]

The following example is provided for the purposes of illustrating the URN NID template described in Appendix A. Although it is based on a hypothetical "generic Internet namespace" that has been discussed informally within the URN WG, there are still technical and infrastructural issues that would have to be resolved before such a namespace could be properly and completely described.

Namespace ID:

To be assigned

Registration Information:

- version number: 1
- date: <when submitted>

Declared registrant of the namespace:

- Registering organization:
 - Name: Thinking Cat Enterprises Name: Thinking Cat
Example Enterprises
 - Postal: 1 ThinkingCat Way
Trupville, NewCountry
- Designated contact person:
 - Name: L. Daigle
 - Email: leslie@thinkingcat.example

Declaration of syntactic structure of NSS part:

The namespace specific string structure is as follows:

<FQDN>:<assigned string>

where FQDN is a fully-qualified domain name, and the assigned string is conformant to URN syntax requirements.

Relevant ancillary documentation:

Definition of domain names, found in:

P. Mockapetris, "DOMAIN NAMES - CONCEPTS AND FACILITIES", STD 13, RFC 1034, November 1987.

P. Mockapetris, "DOMAIN NAMES - IMPLEMENTATION AND SPECIFICATION", STD 13, RFC 1035, November 1987.

Conformance with URN Syntax:

No special considerations.

Rules for Lexical Equivalence of NSS part:

FQDNs are case-insensitive. Thus, the leading portion of the URN up to the colon after the FQDN is case-insensitive for matches. The remainder of the identifier must be considered case-sensitive.

Identifier uniqueness considerations:

Uniqueness is guaranteed as long as the assigned string is never reassigned for a given FQDN, and that the FQDN is never reassigned.

N.B.: operationally, there is nothing that prevents a domain name from being reassigned; indeed, it is not an uncommon occurrence. This is one of the reasons that this example makes a poor URN namespace in practice, and is therefore not seriously being proposed as it stands.

Identifier persistence considerations:

Persistence of identifiers is dependent upon suitable delegation of resolution at the level of "FQDN"s, and persistence of FQDN assignment.

Same note as above.

Process of identifier assignment:

Assignment of these URNs is delegated to individual domain name holders (for FQDNs). The holder of the FQDN registration is required to maintain an entry (or delegate it) in the DDDS. Within each of these delegated name partitions, the string may be assigned per local requirements.

E.g., urn:urn-<assigned number>:thinkingcat.example:001203

Process for identifier resolution:

Domain name holders are responsible for operating or delegating resolution servers for the FQDN in which they have assigned URNs.

Validation mechanism:

None specified.

Scope:

Global.

B.2. Registration steps in practice

The key steps for registration of informal or formal namespaces typically play out as follows:

A) Informal NID:

1. Complete the registration template. This may be done as part of an Internet-Draft.
2. Communicate the registration template to `urn-nid@ietf.org` for technical review -- as an email with a pointer to the submitted I-D or inline text containing the template.
3. Update the registration template (and/or document) as necessary from comments, and repeat steps 2 and 3 as necessary.
4. Once comments have been addressed (and the review period has expired), send a request to IANA with the revised registration template.

B) Formal NID:

1. Write an Internet-Draft describing the namespace and include the registration template, duly completed. Be sure to include "Namespace Considerations", "Community Considerations", "Security Considerations", and "IANA Considerations" sections, as described in Section 4.4.
2. Submit the Internet-Draft, and send a pointer to the I-D (perhaps using a copy of the I-D announcement) to `urn-nid@ietf.org` in order to solicit technical review.
3. Update the Internet-Draft as necessary from comments, and repeat steps 2 and 3 as needed.
4. If the Internet-Draft is the product of a working group in the IETF, follow the usual WG process to forward the document to the IESG for publication as an RFC. Otherwise, find a sponsoring Area Director willing to guide the draft through the IESG. The IESG (or the IETF at large in case an IETF-wide last call is deemed necessary) may request further changes (submitted as I-D revisions) and/or direct discussion to designated working groups, area experts, etc.
5. The IESG evaluation process includes a review by IANA, and if the IESG approves the document for publication as an RFC, IANA processing of the document will follow the regular work-flow between the RFC Editor and IANA. This way, the NID registration will be made public by IANA when the RFC is published.

Appendix C. Changes from RFC 3406

C.1. Essential Changes since RFC 3406

[RFC Editor: please remove the Appendix C.1 headline and all subsequent subsections of Appendix C starting with Appendix C.2.]

T.B.D. (after consolidation of this memo)

C.2. Changes from RFC 3406 to URNbis WG Draft -00

- o Abstract: rewritten entirely;
- o Section 1 (Introduction): added historical RFC information;
- o Section 1.1 (Requirements Language): added;
- o Section 3.1: added Note that challenges the utility of Experimental namespaces and raises question of whether formal "provisional" registrations would be useful;
- o Section 4: text expanded and updated; background material added; added Note to challenge IANA website practices;
- o Section 4.2 ff: changed "home" of URN-NID registration discussion list (it already had been moved to the IETF Secretariat servers);
- o Section 4.2: added Note to challenge the 2-week review period; in current practice, that is almost always exceeded, and some regard it as too short;
- o Section 4.3: largely clarified procedures as they happen in practice; adapted language for conformance with RFC 5226; use new home of URN-NID (as mentioned above); the registration template (Appendix A) now "SHOULD" be used;
- o Section 4.3: split off new Section 4.4 on Registration Documents, because registrants essentially are encouraged to follow these guidelines for Informal namespaces as well, as far as practical; replaced "RFC" by "Registration Document"; Section 4.4 is subdivided for all mandatory sections;
- o Section 4.4.1: made requirements a "MUST";
- o Sections 4.4.1 and 4.4.2: added common Note that challenges the need to split Namespace and Community Considerations, based on observed problems in practice to separate the topics, and pointing to overlap with clauses in the registration template due to

bullets listed that are not so clearly related to the headlines under which they appear; suggestion is to avoid duplication, place factual stuff into the template and focus on rationale in these Considerations, perhaps in a common section;

- o Section 4.4.3: added discussion of Security Considerations section; advice is to focus on namespace-specific considerations and refer to the SecCons in the "generic" RFCs for the general issues;
- o Section 4.4.4: amended discussion of IANA Considerations section; this tries to reflect standing practice and codifies that Formal NIDs are generally proposed by the registrant; added Note that "urn" is permanently reserved and MUST NOT be assigned as a NID, to avoid confusion (as also specified in RFC 2141bis draft); wrt registration maintenance: got rid of wrong reference in RFC 3406 (to RFC 2606);
- o Section 6 (IANA Considerations): updated and rephrased description of the role of this document, including a sketch of the history; added text that tries to precisely describe what is expected from IANA on approval of this draft; added text on procedures and suggest a provisional assignment practice upon "thumbs-up" of the IANA Expert to protect prospective registrants from collateral damage on NID precedence in case the document suffers from delays unrelated to the registration template before it eventually gets approved;
- o Section 7 (Acknowledgements): added;
- o References: Updated and amended references; added pointers to chartered URNbis work items; removed entirely outdated example material related to legacy documents;
- o Appendix A and B.1: added words on Security Considerations section;
- o Appendix A (Registration Template): clarified role of text snippets in the Template: hint and commentary now all enclosed in curly braces, with note that these parts shall be removed when filling in the template; indicate that Formal NIDs are normally proposed by registrant; changed date/time ref. from ISO 8601 to RFC 3339; use inherited term "percent-encoding";
- o Appendix A -- structure: moved formal clauses on Conformance with URN Syntax and Rules for Lexical Equivalence to vicinity of namespace specific syntax clause, to which these are closely related;

- o Appendix A -- changes of clauses: the Declaration of syntactic structure and Rules for Lexical Equivalence clauses now tentatively have been restricted to the NSS part only; this change is described in NOTES and motivated by the observation of repeated confusion in past and present registration documents, which hopefully can be avoided (and the job of the Expert and reviewers made easier) by leaving discussion of the invariable parts that cannot be re-specified there at the single place where they belong to: the NID is fully specified in the initial clause, rules for the NID and the URI scheme name "urn" are inherited from RFC 2141[bis] and RFC 3986, respectively, and hence the new clause descriptions avoid conflict by taking these components out of scope of these clauses;
- o Appendix B.1 (Example Template): facelifted a bit; concerns with IESG policy on examples in RFCs raised in a NOTE;
- o Appendix B.2 (Registration steps in practice): updated and clarified description of procedure, in alignment to current practice;
- o Appendix C: removed "Changes from RFC 2611"; added this change log;
- o General: numerous editorial changes and enhancements, following contemporary RFC style.

Appendix D. Open Issues

Discuss consequences of RFC 2141bis (once consensus is achieved); if proposal for fragment part is adopted, details need to be described per namespace that wants to adopt these possibilities, and maybe the registration template needs a new clause where this will be specified -- or the information has to be assigned to existing clauses.

More elaboration on Services. Since RFC 2483 is considered outdated, but RFC 2483bis not yet a URNbis work item, we might need a registry for URN Services (initially populated from RFC 2483) that can be referred to in namespace registration documents, thus avoiding normative dependencies on a future RFC 2483bis.

Also see the Editorial Notes interspersed in the body of this draft.

What else?

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