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Using Existing Bibliographic Identifiers  
as  
Uniform Resource Names

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Abstract

A system for Uniform Resource Names (URNs) must be capable of supporting identifiers from existing widely-used naming systems. This document discusses how three major bibliographic identifiers (the ISBN, ISSN and SICI) can be supported within the URN framework and the currently proposed syntax for URNs.

1. Introduction

The ongoing work of several IETF working groups, most recently in the Uniform Resource Names working group, has culminated the development of a syntax for Uniform Resource Names (URNs). The functional requirements and overall framework for Uniform Resource Names are specified in RFC 1737 [Sollins & Masinter] and the specification for the URN syntax is RFC 2141 [Moats].

As part of the validation process for the development of URNs the IETF working group has agreed that it is important to demonstrate that the current URN syntax proposal can accommodate existing identifiers from well established namespaces. One such infrastructure for assigning and managing names comes from the bibliographic community. Bibliographic identifiers function as names for objects that exist both in print and, increasingly, in electronic formats. This memo demonstrates the feasibility of supporting three

representative bibliographic identifiers within the currently proposed URN framework and syntax.

Note that this document does not purport to define the "official" standard way of moving these bibliographic identifiers into URNs; it merely demonstrates feasibility. It has not been developed in consultation with these standards bodies and maintenance agencies that oversee the existing bibliographic identifiers. Any actual Internet standard for encoding these bibliographic identifiers as URNs will need to be developed in consultation with the responsible standards bodies and maintenance agencies.

In addition, there are several open questions with regard to the management and registry of Namespace Identifiers (NIDs) for URNs. For purposes of illustration, we have used the three NIDs "ISBN", "ISSN" and "SICI" for the three corresponding bibliographic identifiers discussed in this document. While we believe this to be the most appropriate choice, it is not the only one. The NIDs could be based on the standards body and standard number (e.g. "US-ANSI-NISO-Z39.56-1997" rather than "SICI"). Alternatively, one could lump all bibliographic identifiers into a single "BIBLIOGRAPHIC" namespace, and structure the namespace-specific string to specify which identifier is being used. Any final resolution of this must wait for the outcome of namespace management discussions in the working group and the broader IETF community.

For the purposes of this document, we have selected three major bibliographic identifiers (national and international) to fit within the URN framework. These are the International Standard Book Number (ISBN) [ISO1], the International Standard Serials Number (ISSN) [NISO1, ISO2, ISO3], and the Serial Item and Contribution Identifier (SICI) [NISO2]. An ISBN is used to identify a monograph (book). An ISSN is used to identify serial publications (journals, newspapers) as a whole. A SICI augments the ISSN in order to identify individual issues of serial publications, or components within those issues (such as an individual article, or the table of contents of a given issue). The ISBN and ISSN are defined in the United States by standards issued by the National Information Standards Organization (NISO) and also by parallel international standards issued under the auspices of the International Organization for Standardization (ISO). NISO is the ANSI-accredited standards body serving libraries, publishers and information services. The SICI code is defined by a NISO document in the United States and does not have a parallel international standards document at present.

Many other bibliographic identifiers are in common use (for example, CODEN, numbers assigned by major bibliographic utilities such as OCLC and RLG, national library numbers such as the Library of Congress Control Number) or are under development. While we do not discuss them in this document, many of these will also need to be supported within the URN framework as it moves to large scale implementation. The issues involved in supporting those additional identifiers are anticipated to be broadly similar to those involved in supporting ISBNs, ISSNs, and SICIs.

## 2. Identification vs. Resolution

It is important to distinguish between the resource identified by a URN and the resources a URN resolver that can reasonably return when attempting to resolve an identifier. For example, the ISSN 0040-781X identifies the popular magazine "Time" -- all of it, every issue for from the start of publication to present. Resolving such an identifier should not result in the equivalent of hundreds of thousands of pages of text and photos being dumped to the user's machine. It is more reasonable for ISSNs to resolve to a navigational system, such as an HTML-based search form, so the user may select issues or articles of interest. ISBNs and SICIs, on the other hand, do identify finite, manageably-sized objects, but these objects may still be large enough that resolution to a hierarchical system is appropriate.

In addition, the materials identified by an ISSN, ISBN or SICI may exist only in printed or other physical form, not electronically. The best that a resolver may be able to offer is information about where to get the physical resource, such as library holdings or a bookstore or publisher order form. The URN Framework provides resolution services that may be used to describe any differences between the resource identified by a URN and the resource that would be returned as a result of resolving that URN.

## 3. International Standard Book Numbers

### 3.1 Overview

An International Standard Book Number (ISBN) identifies an edition of a monographic work. The ISBN is defined by the standard NISO/ANSI/ISO 2108:1992 [ISO1]

Basically, an ISBN is a ten-digit number (actually, the last digit can be the letter "X" as well, as described below) which is divided into four variable length parts usually separated by hyphens when printed. The parts are as follows (in this order):

- \* a group identifier which specifies a group of publishers, based on national, geographic or some other criteria,
- \* the publisher identifier,
- \* the title identifier,
- \* and a modulus 11 check digit, using X instead of 10.

The group and publisher number assignments are managed in such a way that the hyphens are not needed to parse the ISBN unambiguously into its constituent parts. However, the ISBN is normally transmitted and displayed with hyphens to make it easy for human beings to recognize these parts without having to make reference to or have knowledge of the number assignments for group and publisher identifiers.

### 3.2 Encoding Considerations and Lexical Equivalence

Embedding ISBNs within the URN framework presents no particular encoding problems, since all of the characters that can appear in an ISBN are valid in the identifier segment of the URN. %-encoding, as described in [MOATS] is never needed.

Example: URN:ISBN:0-395-36341-1

For the ISBN namespace, some additional equivalence rules are appropriate. Prior to comparing two ISBN URNs for equivalence, it is appropriate to remove all hyphens, and to convert any occurrences of the letter X to upper case.

### 3.3 Additional considerations

The ISBN standard and related community implementation guidelines define when different versions of a work should be assigned the same or differing ISBNs. In actuality, however, practice varies somewhat depending on publisher as to whether different ISBNs are assigned for paperbound vs. hardbound versions of the same work, electronic vs. printed versions of the same work, or versions of the same work distinguished in some other way (e.g., published for example in the US and in Europe). The choice of whether to assign a new ISBN or to reuse an existing one when publishing a revised printing of an existing edition of a work or even a revised edition of a work is somewhat subjective. Practice varies from publisher to publisher (indeed, the distinction between a revised printing and a new edition is itself somewhat subjective). The use of ISBNs within the URN framework simply reflects these existing practices. Note that it is likely that an ISBN URN will often resolve to many instances of the work (many URLs).

## 4. International Standard Serials Numbers

### 4.1 Overview

International Standard Serials Numbers (ISSN) identify a work that is published on a continued basis in issues; they identify the entire (often open-ended, in the case of an actively published) work. ISSNs are defined by the international standards ISO 3297:1986 [ISO2] and ISO/DIS 3297 [ISO3] and within the United States by NISO Z39.9-1992 [NISO1]. The ISSN International Centre is located in Paris and coordinates a network of regional centers. The National Serials Data Program within the Library of Congress is the US Center of this network.

ISSNs have the form NNNN-NNNN where N is a digit, the last digit may be an upper case X as the result of the check character calculation. Unlike the ISBN the ISSN components do not have much structure; blocks of numbers are passed out to the regional centers and publishers.

### 4.2 Encoding Considerations and Lexical Equivalence

Again, there is no problem representing ISSNs in the namespace-specific string of URNs since all characters valid in the ISSN are valid in the namespace-specific URN string, and %-encoding is never required.

Example: URN:ISSN:1046-8188

Supplementary comparison rules are also appropriate for the ISSN namespace. Just as for ISBNs, hyphens should be dropped prior to comparison and occurrences of 'x' normalized to uppercase.

### 4.3 Additional Considerations

The ISSN standard and related community implementation guidelines specify when new ISSNs should be assigned vs. continuing to use an existing one. There are some publications where practice within the bibliographic community varies from institution to institution, such as annuals or annual conference proceedings. In some cases these are treated as serials and ISSNs are used, and in some cases they are treated as monographs and ISBNs are used. For example SIGMOD Record volume 24 number 2 June 1995 contains the Proceedings of the 1995 ACM SIGMOD International Conference on Management of Data. If you subscribe to the journal (ISSN 0163-5808) this is simply the June issue. On the other hand you may have acquired this volume as the conference proceedings (a monograph) and as such would use the ISBN 0-89791-731-6 to identify the work. There are also varying practices

within the publishing community as to when new ISSNs are assigned due to the change in the name of a periodical (e.g. Atlantic becomes Atlantic Monthly); or when a periodical is published both in printed and electronic versions (e.g. The New York Times). The use of ISSNs in URNs will reflect these judgments and practices.

## 5. Serial Item and Contribution Identifiers

### 5.1 Overview

The standard for Serial Item and Contribution Identifiers (SICI) codes, which has recently been extensively revised, is defined by NISO/ANSI Z39.56-1997 [NISO2]. The maintenance agency for the SICI code is the UnCover Corporation.

SICI codes can be used to identify an issue of a serial, or a specific contribution (e.g., an article, or the table of contents) within an issue of a serial. SICI codes are not assigned, they are constructed based on information about the issue or issue component in question.

The complete syntax for the SICI code will not be discussed here; see NISO/ANSI Z39.56-1997 [NISO2] for details. However, an example and brief review of the major components is needed to understand the relationship with the ISSN and how this identifier differs from an ISSN. An example of a SICI code is: 0015-6914(19960101)157:1<62:KTSW>2.0.TX;2-F

The first nine characters are the ISSN identifying the serial title. The second component, in parentheses, is the chronology information giving the date the particular serial issue was published. In this example that date was January 1, 1996. The third component, 157:1, is enumeration information (volume, number) for the particular issue of the serial. These three components comprise the "item segment" of a SICI code. By augmenting the ISSN with the chronology and/or enumeration information, specific issues of the serial can be identified. The next segment, <62:KTSW>, identifies a particular contribution within the issue. In this example we provide the starting page number and a title code constructed from the initial characters of the title. Identifiers assigned to a contribution can be used in the contribution segment if page numbers are inappropriate. The rest of the identifier is the control segment, which includes a check character. Interested readers are encouraged to consult the standard for an explanation of the fields in that segment.

## 5.2 Encoding Considerations and Lexical Equivalence

The character set for SICIs is intended to be email-transport-transparent, so it does not present major problems. However, all printable excluded and reserved characters from the URN syntax are valid in the SICI character set and must be %-encoded.

Example of a SICI for an issue of a journal:

```
URN:SICI:1046-8188(199501)13:1%3C%3E1.0.TX;2-F
```

For an article contained within that issue:

```
URN:SICI:1046-8188(199501)13:1%3C69:FTTHBI%3E2.0.TX;2-4
```

Equivalence rules for SICIs are not appropriate for definition as part of the namespace and incorporation in areas such as cache management algorithms. It is best left to resolver systems which try to determine if two SICIs refer to the same content. Consequently, we do not propose any specific rules for equivalence testing through lexical manipulation.

## 5.3 Additional Considerations

Since the serial is identified by an ISSN, some of the ambiguity currently found in the assignment of ISSNs carries over into SICI codes. In cases where an ISSN may refer to a serial that exists in multiple formats, the SICI contains a qualifier that specifies the format type (for example, print, microform, or electronic). SICI codes may be constructed from a variety of sources (the actual issue of the serial, a citation or a record from an abstracting service) and, as such are based on the principle of using all available information, so there may be multiple SICI codes representing the same article [NISO2, Appendix D]. For example, one code might be constructed with access to both chronology and enumeration (that is, date of issue and volume, issue and page number), another code might be constructed based only on enumeration information and without benefit of chronology. Systems that use SICI codes employ complex matching algorithms to try to match SICI codes constructed from incomplete information to SICI codes constructed with the benefit of all relevant information.

## 6. Security Considerations

This document proposes means of encoding several existing bibliographic identifiers within the URN framework. This document does not discuss resolution; thus questions of secure or authenticated resolution mechanisms are out of scope. It does not address means of validating the integrity or authenticating the source or provenance of URNs that contain bibliographic identifiers. Issues regarding intellectual property rights associated with objects identified by the various bibliographic identifiers are also beyond the scope of this document, as are questions about rights to the databases that might be used to construct resolvers.

## 7. References

- [ISO1] NISO/ANSI/ISO 2108:1992 Information and documentation -- International standard book number (ISBN)
- [ISO2] ISO 3297:1986 Documentation -- International standard serial numbering (ISSN)
- [ISO3] ISO/DIS 3297 Information and documentation -- International standard serial numbering (ISSN) (Revision of ISO 3297:1986)
- [Moats] Moats, R., "URN Syntax", RFC 2141, May 1997.
- [NISO 1] NISO/ANSI Z39.9-1992 International standard serial numbering (ISSN)
- [NISO 2] NISO/ANSI Z39.56-1997 Serial Item and Contribution Identifier
- [Sollins & Masinter] Sollins, K., and L. Masinter, "Functional Requirements for Uniform Resource Names", RFC 1737, December 1994.



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