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A Uniform Resource Name Namespace for the EPCglobal Electronic Product Code (EPC) and Related Standards

Status of This Memo

Abstract

This document describes URN namespaces that will identify various objects within the EPCglobal system for identifying products within ecommerce and supply chain management applications.

1. Introduction

The EPCglobal Architecture Framework [6] is a set of specifications for reading, managing, and acting on object codes and other sensor data as physical objects pass through a supply chain. Events and metadata about physical objects are exchanged via EPCglobal Electronic Product Code Information Services (EPCIS) that are essentially web services that implement agreed upon schema and interfaces.

Each object that is tracked by the EPCglobal Architecture Framework is identified by one or more managed identifiers. In many cases, these identification systems existed prior to the Internet becoming widely used. One such namespace is the Global Trade Item Number, or GTIN [7]. GTINs are widely used in global commerce and are managed by GS1. In order for the EPCglobal Architecture Framework to leverage the Internet to the fullest extent possible, the GTIN namespace (and others, such as Global Location Numbers (GLNs), Serialized Shipping Container Code (SSCC), etc. [7]) need to be directly compatible with the URI family of identifiers.

The use of GTINs, GLNs, and SSCCs are all managed by GS1. Their use within the EPCglobal Architecture Framework is managed by the GS1 subsidiary known as EPCglobal, Inc. For these, and possibly future

identification systems, a single Uniform Resource Name (URN) Namespace ID (NID) is being requested: 'epc'. Each of the identifier namespaces mentioned will have a separate sub-space beneath the top level 'epc' NID.

In addition to physical object identifiers, the EPCglobal Architecture Framework requires new namespaces for naming system components. In many cases, an interface within the EPCglobal Architecture Framework is XML [11] based and as such will require naming schemes for its XML schema [9] and various namespaces [10]. For these uses, another Uniform Resource Name (URN) Namespace ID (NID) is being requested: 'epcglobal'. Each specification or system component within the EPCglobal Architecture Framework will have a separate sub-space beneath the top level 'epcglobal' NID.

Since the EPCglobal Architecture Framework is engineered for widespread and general use, this namespace specification is a formal one, and the namespace IDs that are being requested are 'epc' and 'epcglobal'. It is important to note that it is the explicit intent that various sub-namespaces of the 'epc' NID actually name real, physical objects and/or corporeal entities. In contrast, sub-namespaces of the 'epcglobal' NID name logical or software constructs, such as schema namespaces.

2. 'epc' Registration Template

Namespace ID:

"epc"

Registration Information:

Registration Version Number: 1
Registration Date: 2008-01-16

Declared registrant of the namespace:

EPCglobal, Inc. is a subsidiary of GS1
Princeton Pike Corporate Center
1009 Lenox Drive, Suite 202
Lawrenceville, NJ 08648, USA
bhogan@epcglobalinc.org
Tel: +1-609-620-4585

Declaration of structure:

The normative specification of the structure of the 'epc' namespace is "EPC Tag Data Standards" [5]. The examples given below are not normative.

The 'epc' namespace is a set of sub-namespaces that can be extended in the future. The following ABNF [2] defines how the sub-namespaces are identified and any restrictions on their syntax (definitions not specified below can be found in RFC 2141 [1]):

```
EPC-URN     = "urn:epc:" sub-ns-name ":" sub-ns
sub-ns-name = let-num [ 1*let-num-hyp ]
sub-ns      = 1*<URN chars>
let-num     = upper / lower / number
let-num-hyp = upper / lower / number / "-"
upper       = %x41-5A ; "A" - "Z"
lower       = %x61-7A ; "a" - "z"
number      = "0" / "1" / "2" / "3" / "4" / "5" / "6" / "7" /
              "8" / "9"
```

For example, the sub-namespace 'sgtin' has the following definition (this ABNF is non-normative):

```
SGTIN-URI        = "urn:epc:id:sgtin:" SGTINURIBody
SGTINURIBody     = 2*(PaddedNumericComponent ".") NumericComponent
NumericComponent = ZeroComponent / NonZeroComponent
ZeroComponent    = "0"
NonZeroComponent = NonZeroDigit *Digit
PaddedNumericComponent = *Digit
Digit = "0" / NonZeroDigit
NonZeroDigit = "1" / "2" / "3" / "4" / "5" / "6" / "7" / "8" / "9"
```

This equates to a namespace that has three period separated series of digits:

urn:epc:id:sgtin:900100.0003456.1234567

The first series is a company prefix, the second denotes a product reference assigned by that company, and the third is a serial number for a specific instance of their product. Note that leading zeros are significant.

Relevant ancillary documentation:

The standards that define the EPCglobal Architecture Framework and the processes for creating new sub-namespaces are managed by EPCglobal, Inc. and can be found on its website. Several sub-namespaces are defined in the "EPC Tag Data Standards" [5].

Identifier uniqueness considerations:

The namespaces that make up the ’epc’ namespace are all managed by an organization with almost 50 years of namespace management experience. In all cases (existing or new), the uniqueness of each namespace is an inherent part of the EPCglobal Architecture Framework.

Identifier persistence considerations:

The assignment process guarantees that names are not reassigned and that the binding between the name and its resource is permanent, regardless of any standards or organizational changes.

Process of identifier assignment:

Names are assigned by the EPCglobal standards publication process and by any entities that are sub-delegated by EPCglobal. It is important to note that in many cases the names assigned will explicitly denote physical objects and not an electronic representation of that object.

Process of identifier resolution:

Certain sub-namespaces are resolved via the Object Naming Service, defined in "Object Naming Service (ONS) Version 1.0" [4], which is a valid implementation of the Dynamic Delegation Discovery System that is defined in RFC 3401 [3].

Rules for Lexical Equivalence:

The entire URN is case-sensitive.

Conformance with URN Syntax:

There are no additional characters reserved except as noted in the ABNF above.

Validation mechanism:

In the case of each sub-namespace, there will be namespace-specific rules for determining validity. In each case, the reader is referred to the appropriate EPCglobal-maintained documentation.

Scope:

Global

3. 'epcglobal' Registration Template

Namespace ID:

"epcglobal"

Registration Information:

Registration Version Number: 1
Registration Date: 2007-03-06

Declared registrant of the namespace:

EPCglobal, Inc. is a subsidiary of GS1
Princeton Pike Corporate Center
1009 Lenox Drive, Suite 202
Lawrenceville, NJ 08648, USA
bhogan@epcglobalinc.org
Tel: +1-609-620-4585

Declaration of structure:

The normative specifications for the structure of the 'epcglobal' namespace are various standards available at EPCglobal's public website. The examples given below are not normative.

The 'epcglobal' namespace is a set of sub-namespaces that can be extended in the future. The following ABNF defines how the sub-namespaces are identified and any restrictions on their syntax (definitions not specified below can be found in RFC 2141 [1]):

```
EPCGLOBAL-URN = "urn:epcglobal:" subnsname ":" subns
subnsname     = let-num [ 1*let-num-hyp ]
subns         = 1*<URN chars>
let-num       = upper / lower / number
let-num-hyp   = upper / lower / number / "-"
upper         = %x41-5A ; "A" - "Z"
lower         = %x61-7A ; "a" - "z"
number        = "0" / "1" / "2" / "3" / "4" / "5" / "6" / "7" /
                "8" / "9"
```

For example, the identifier "urn:epcglobal:ale:xsd:1" is defined in the "Application Level Events 1.0 Specification" [8] for use as an XML namespace identifier for XML documents conforming to that specification.

Relevant ancillary documentation:

The standards that define the EPCglobal Architecture Framework and the processes for creating new sub-namespaces are managed by EPCglobal, Inc. and can be found on its website.

Identifier uniqueness considerations:

The namespaces that make up the ’epcglobal’ namespace are all managed by an organization with almost 50 years of namespace management experience. In all cases, the uniqueness of each namespace is an inherent part of the EPCglobal Architecture Framework.

Identifier persistence considerations:

The assignment process guarantees that names are not reassigned and that the binding between the name and its resource is permanent, regardless of any standards or organizational changes.

Process of identifier assignment:

Names are assigned by the EPCglobal, Inc. standards publication process.

Process of identifier resolution:

No resolution mechanism is required or provided.

Rules for Lexical Equivalence:

The entire URN is case-sensitive.

Conformance with URN Syntax:

There are no additional characters reserved except as noted in the ABNF above.

Validation mechanism:

In the case of each sub-namespace, there will be namespace-specific rules for determining validity. In each case, the reader is referred to the appropriate EPCglobal-maintained documentation.

Scope:

Global

4. IANA Considerations

This document includes two URN Namespace registrations that have been entered into the IANA registry for URN NIDs.

5. Namespace Considerations

Due to EPCglobal, Inc. being a subsidiary of an internationally recognized authority for the identifiers embedded within the 'epc' namespace, as well as being the internationally recognized standards body for the standards that define identifiers in the 'epcglobal' namespace, these namespaces represent the best approach to naming products and entities within the world of supply chain management and ecommerce in general. There are no other alternative namespaces that have the level of authority and industry acceptance that the EPC does.

6. Community Considerations

The EPCglobal Architecture Framework is intended to bring the Internet to the world of supply chain management and beyond. It can be used to tie physical objects to their virtual descriptions and as such has many wide ranging applications for the average Internet use. Thus, it is very much the intent that this namespace, and the entire EPCglobal Architecture Framework, considers the entire Internet as the scope of its community.

7. Security Considerations

The EPCglobal Architecture Framework is based almost exclusively on Internet and Web standards. Thus, the security impacts of each of its underlying technologies should be examined for weaknesses and threats. The primary threats will come from the fact that these names will identify physical things that can be of high value, thus the temptation to spoof metadata about that identifier (its cost, size, etc) will be much greater. Therefore, the role of digital signatures, secure resolution mechanisms, and trust relationships is very fundamental to the system.

8. References

8.1. Normative References

[1] Moats, R., "URN Syntax", RFC 2141, May 1997.

[2] Crocker, D., Ed. and P. Overell, "Augmented BNF for Syntax Specifications: ABNF", RFC 4234, October 2005.

[3] Mealling, M., "Dynamic Delegation Discovery System (DDDS) Part One: The Comprehensive DDDS", RFC 3401, October 2002.

[4] EPCglobal, Inc., "EPCglobal Network Object Name Service (ONS) 1.0", August 2003.

[5] EPCglobal, Inc., "EPC(tm) Tag Data Standards Version 1.3", February 2004.

[6] Traub, K., Allgair, G., Barthe, H., Burstein, L., Garrett, J., Hogan, B., Rodrigues, B., Sarma, S., Schmidt, J., Schramek, C., Stewart, R., and K. Suen, "The EPCglobal Architecture Framework", July 2005.

[7] GS1, "GS1 General Specifications v7.1", January 2007.

[8] EPCglobal, Inc., "The Application Level Events (ALE) Specification, Version 1.0", September 2005.

8.2. Informative References

[9] Thompson, H., Maloney, M., Beech, D., and N. Mendelsohn, "XML Schema Part 1: Structures Second Edition", World Wide Web Consortium Recommendation REC-xmlschema-1-20041028, October 2004, <http://www.w3.org/TR/2004/REC-xmlschema-1-20041028>.

[10] Layman, A., Tobin, R., Bray, T., and D. Hollander, "Namespaces in XML 1.1", World Wide Web Consortium FirstEdition REC-xml-names11-20040204, February 2004, <http://www.w3.org/TR/2004/REC-xml-names11-20040204>.

[11] Bray, T., Maler, E., Yergeau, F., Sperberg-McQueen, C., and J. Paoli, "Extensible Markup Language (XML) 1.0 (Third Edition)", World Wide Web Consortium FirstEdition REC-xml-20040204, February 2004, <http://www.w3.org/TR/2004/REC-xml-20040204>.

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