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O. Lendl
enum.at
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The ENUM Branch Location Record
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Abstract

This documents defines the ENUM Branch Location record (EBL) which is used to indicate where the ENUM tree for special ENUM application is located. The primary application for the EBL record is to provide a temporary solution for the Infrastructure ENUM tree location.

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1. Introduction

ENUM as defined in [RFC3761](#) [1] (User-ENUM) is based on the concept of a single "golden" tree (e164.arpa) which stores telephone number to URI mappings.

Experience has shown that this single tree is not suitable for all applications and usage scenarios. The rules regarding administrative control of domains, opt-in requirements, and delegation hierarchy can vary between applications. See e.g. Infrastructure ENUM [4].

While non-terminal NAPTRs (see [2]) can redirect the ENUM resolution algorithm to another DNS tree, their semantics are not powerful enough to support an integration of Infrastructure ENUM into e164.arpa.

A more generic application-specific redirection mechanism is thus needed.

The ENUM Branch Location (EBL) Record as defined by this document contains information which drives a generalized algorithm which transforms a telephone number into a domain name. This extends the original algorithm as defined in [section 2.4 of RFC3761](#) [1].

2. The generalized ENUM Application

To recap, [RFC3761](#) uses the following algorithm:

1. Remove all characters with the exception of the digits.
2. Put dots (".") between each digit.
3. Reverse the order of the digits.
4. Append the string ".e164.arpa" to the end.

Any application which uses EBL records to generalize the basic ENUM algorithm needs to define where EBLs for this application are located in the DNS. The EBL itself contains three parameters which enter into the translation algorithm: SEPERATOR, POSITION, and APEX.

The generalized algorithm to derive the initial FQDN for the NAPTR lookup is defined as:

1. Apply the application-specific algorithm to translate the "Application Unique String" (AUS, the telephone number) to a fully qualified domain name.

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2. Query the DNS for an EBL record at the location of this FQDN, and retrieve the triple (SEPERATOR, POSITION, APEX) from this record.

If multiple records are present, take the first one.

If no EBL record was found, use the triple ("", 0, "e164.arpa") as default. This corresponds to the [RFC3671](#) "golden tree".

3. Build a list of labels from all digits appearing in the AUS.
4. If SEPERATOR is not the empty string, then insert a label consisting of SEPERATOR after POSITION labels into this list. If the list was shorter than POSITION elements, then report an error.
5. Reverse the order of the list.
6. Append a label containing APEX at the end of the list.
7. Create a single domain name by joining the list together with dots (".") between each label.

[Section 4](#) contains examples.

3. The EBL Resource Record

The RR type code for the EBL RR is /IANA-ACTION/.

3.1. The EBL RDATA Format

The RDATA for a EBL RR consists of a position number, separator string and an apex domain. <character-string> and <domain-name> refer to the definitions of [RFC 1035](#) [3].

```

0  1  2  3  4  5  6  7
+---+---+---+---+---+---+---+
|           POSITION           |
+---+---+---+---+---+---+---+
/           SEPARATOR        /
+---+---+---+---+---+---+---+
/           APEX             /
+---+---+---+---+---+---+---+
```

where POSITION is a single byte, SEPARATOR is a <character-string> and APEX is a <domain-name>. Name-compression is not to be used for the APEX field.

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3.2. The EBL Presentation Format

The master file format follows the standard rules in [RFC 1035](#). POSITION is represented as decimal integer. SEPARATOR is a quoted string, APEX is a domain name and thus does not require quoting.

4. Examples

This example shows the use of EBL records as defined by the interim solution to infrastructure ENUM as defined by [draft-ietf-enum-combined-01](#) [5].

This application defines that the EBL resides at "infrastructure".<country-code>.e164.arpa. Thus for example:

```
infrastructure.3.4.e164.arpa.    IN EBL 2 "i" e164.arpa.
infrastructure.1.e164.arpa.     IN EBL 4 "i" example.com.
infrastructure.9.4.e164.arpa.   IN EBL 0 "" ie164.arpa.
```

These records indicate how the transformation from E.164 number to ENUM domains for the application "Infrastructure ENUM" should be done for numbers in country code +43, +1, and +49. This leads to the following mappings:

```
+43 15056416          6.1.4.6.5.0.5.1.i.3.4.e164.arpa
+1 5551234567         7.6.5.4.3.2.1.i.5.5.5.1.example.com
+49 891234567         7.6.5.4.3.2.1.9.8.9.4.ie164.arpa
```

Here is the list of the intermediate steps for the first example to visualize how the algorithm as defined in [Section 2](#) operates on "+43 15056416":

1. According to the I-ENUM spec, retrieve the country-code from the number and build a FQDN using "infrastructure", the reversed, dot-separated country-code and "e164.arpa", yielding "infrastructure.3.4.e164.arpa".
2. The EBL lookup for this domain sets SEPARATOR to "i", POSITION to "2" and APEX to "e164.arpa".
3. The list of labels is ("4","3","1","5","0","5","6","4","1","6").
4. The SEPARATOR is "i", POSITION is 2, thus "i" is inserted between the second and the third label, yielding:
("4","3","i","1","5","0","5","6","4","1","6")

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5. Reversing the list: ("6","3","4","6","5","0","5","1","i","3","4")
6. Appending APEX:
("6","3","4","6","5","0","5","1","i","3","4","e164.arpa")
7. Concatenation with dots: "6.3.4.6.5.0.5.1.i.3.4.e164.arpa"

5. Security Considerations

EBLs are used to direct ENUM resolvers to other places in the DNS. The security of DNS in both the location of the EBLs and wherever they point to need to be maintained.

Applications need to be careful when designing their EBL location: Information concerning which numbers have been dialed could be leaked to the nameserver hosting the EBL records.

6. IANA Considerations

This document allocates the Resource Records Type field for the EBL record.

7. Acknowledgements

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8. References

8.1. Normative References

- [1] Faltstrom, P. and M. Mealling, "The E.164 to Uniform Resource Identifiers (URI) Dynamic Delegation Discovery System (DDDS) Application (ENUM)", [RFC 3761](#), April 2004.
- [2] Mealling, M., "Dynamic Delegation Discovery System (DDDS) Part Three: The Domain Name System (DNS) Database", [RFC 3403](#), October 2002.
- [3] Mockapetris, P., "Domain names - implementation and specification", STD 13, [RFC 1035](#), November 1987.

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8.2. Informative References

- [4] Lind, S. and P. Pfautz, "Infrastructure ENUM Requirements", [draft-ietf-enum-infrastructure-enum-regs-02](#) (work in progress), April 2006.
- [5] Haberler, M. and R. Stastny, "Combined User and Infrastructure ENUM in the e164.arpa tree", [draft-ietf-enum-combined-01](#) (work in progress), October 2006.

Author's Address

Otmar Lendl
enum.at GmbH
Karlsplatz 1/9
Wien A-1010
Austria

Phone: +43 1 5056416 33
Email: otmar.lendl@enum.at
URI: <http://www.enum.at/>

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