ENUM
Internet-Draft
Expires: September 23, 2006

S. Lind
AT&T Labs
P. Pfautz
AT&T
March 22, 2006

Infrastrucure ENUM Requirements
draft-ietf-enum-infrastructure-enum-reqs-01

Status of this Memo

Copyright Notice

Abstract

This document provides requirements for "infrastructure" or "carrier" ENUM (E.164 Number Mapping), defined as the use of RFC 3761 technology to facilitate interconnection of networks for E.164 number addressed services, in particular but not restricted to VoIP (Voice over IP.)

Conventions used in this document

RFC2119 [1] provides the interpretations for the key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" found in this document.

Table of Contents

1. Infrastructure ENUM

1.1. Definition

Infrastructure ENUM is defined as the use of the technology in RFC3761 [2] by the carrier-of-record for a specific E.164 number [3] to map a telephone number into a URI [4] that identifies a specific point of interconnection to that service provider's network that could enable the originating party to establish communication with the associated terminating party. It is separate from any URIs that the end-user, who registers their E.164 number, may wish to associate with that E.164 number.

In User ENUM, the entity or person having the right-to-use in a number has the sole discretion about the content of the associated domain and thus the zone content. From a domain registration perspective, the end user number assignee is thus the registrant. Within the infrastructure ENUM namespace, we use the term "carrier of record" for the entity having discretion over the domain and zone content and acting as the registrant. The "carrier of record" will typically be a service provider authorized to issue E.164 numbers for the provisioning of Public Switched Telephone Network (PSTN) service under the authority of a National Regulatory Authority (NRA), but generally exhibits one or more of the following properties:

o it has been assigned one or more national number ranges by an NRA.

o it has been assigned a number range directly by the International Telecommunications Union (ITU), for instance a code under "International Networks" (+882) or "Universal Personal Telecommunications (UPT)" (+878).

o it can be the recipient of a number porting operation.

o it provides a PSTN point-of-interconnect for the number.

It is understood that definition of carrier or record is ultimately a matter for national authorities to determine.

1.2. Background

Voice service providers use E.164 numbers currently as their main naming and routing vehicle. Infrastructure ENUM in e164.arpa or another publicly available tree allows service providers to link Internet based resources such as URIs to E.164 numbers (Note: this is the other way round then User ENUM). This allows service providers in addition to interconnecting via the PSTN (or exclusively) to peer via IP-based protocols. Service providers may announce all E.164

numbers or number ranges they host, regardless of whether the final end-user device is on the Internet, on IP-based closed Next Generation Networks (NGNs) or on the PSTN, provided an access (e.g., Session Border Controller (SBC) or gateway) to the destination service provider's network is available on the Internet. There is also no guarantee that the originating service provider querying infrastructure ENUM is able to access the ingress network element of the destination provider's network. Additional peering and accounting agreements requiring authentication may be necessary. The access provided may also be to a shared network of a group of providers, resolving the final destination network within the shared network.

2. Requirements for Infrastructure ENUM

1. Infrastructure ENUM SHALL provide a means for a provider to populate DNS resource records (RRs) in a common publicly accessible namespace for the E.164 numbering resources for which it is the carrier-of-record.
2. Queries of infrastructure ENUM fully qualified domain names MUST return a result, even if the result is NXDOMAIN. Queries must not be rejected, e.g., based on access control lists.
3. Infrastructure ENUM SHALL support RRs providing a URI that can identify a point of interconnection for delivery of communications addressed to the E.164 number.
4. Infrastructure ENUM SHALL support an IRIS [5] capability that allows qualified parties to obtain information regarding the E.164 numbering resources and the corresponding carrier-of-record. Determination of what information, if any, shall be available to which parties is a national matter.
5. Implementation of Infrastructure ENUM MUST NOT restrict the ability of an end-user, in a competitive environment, to choose a Registrar and/or Tier 2 name server provider for end-user ENUM registrations.
6. Infrastructure ENUM SHALL be implemented under a top level domain that can support reliability and performance suitable for PSTN applications.
7. Infrastructure ENUM MUST meet all reasonable privacy concerns about visibility of information an end user has no control over, for example discovery of unlisted numbers, or inadvertent disclosure of user identity.
8. Proposed implementations of Infrastructure ENUM SHOULD:
   A. Minimize changes required to existing requirements that are part of RFC 3761
   B. Work with open numbering plans

C. Restrict the need for any additional resolver functionality to service provider resolvers.
D. Minimize the number of lookups required to obtain as many NAPTR (Naming Authority Pointer) records (end-user and infrastructure) as possible.
E. Minimize the client knowledge of the numbering plan required.
F. Maximize synergies with end-user ENUM
G. Support interworking with private ENUM trees.

3. Security Considerations

Existing security considerations for ENUM detailed in [2] still apply. Note that some registration validation issues concerning end user ENUM may not apply to infrastructure ENUM. Where the Tier 1 registry is able to identify the provider serving a number e.g., based on industry data for number block assignments and number portability, registration might be more easily automated and a separate registrar not required.

Some parties have expressed concern that an infrastructure ENUM could compromise end user privacy by making it possible for others to identify unlisted or unpublished numbers based on their registration in ENUM. This can be avoided if providers register all of the their allocated (as opposed to assigned) numbers. Unassigned numbers should be provisioned to route to the provider's network in the same fashion as assigned numbers and only then provide an indication that they are unassigned. In that way, provider registration of a number in ENUM provides no more information about status of a number than could be obtained by dialing it.

4. IANA Considerations

IANA considerations will depend on the architecture ultimately chosen to meet the requirements.

5. Normative References

[1] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.

[2] Faltstrom, P. and M. Mealling, "The E.164 to Uniform Resource Identifiers (URI) Dynamic Delegation Discovery System (DDDS) Application (ENUM)", RFC 3761, April 2004.

[3] International Telecommunications Union-T, "The International Public Telecommunication Number Plan", Recommendation E.164",

May 1997.

[4] Berners-Lee, T., Fielding, R., and L. Masinter, "Uniform Resource Identifier (URI): Generic Syntax", STD 66, RFC 3986, January 2005.

[5] Newton, A. and M. Sanz, "IRIS: The Internet Registry Information Service (IRIS) Core Protocol", RFC 3981, January 2005.

Authors' Addresses

Steven Lind
AT&T Labs
180 Park Ave
Florham Park, NJ 07932-0971
USA

Email: slind@att.com

Penn Pfautz
AT&T
200 S. Laurel Ave
Middletown, NJ 07748
USA

Email: ppfautz@att.com

Intellectual Property Statement

Disclaimer of Validity

Copyright Statement

Acknowledgment

Funding for the RFC Editor function is currently provided by the Internet Society.