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The E.164 to Uniform Resource Identifiers (URI) Dynamic Delegation Discovery System (DDDS) Application for Infrastructure ENUM

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Abstract

This document defines the use case for Infrastructure ENUM and proposes its implementation as a parallel namespace to "e164.arpa", as defined in RFC 3761, as the long-term solution to the problem of allowing carriers to provision DNS records for telephone numbers independently of those provisioned by end users (number assignees).

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1. Introduction

ENUM (E.164 Number Mapping [1]) is a system that transforms E.164 numbers [2] into domain names and then uses the DNS (Domain Name Service) [3] to discover NAPTR records that specify what services are available for a specific domain name.

ENUM as originally defined was based on the end-user opt-in principle. While this has great potential to foster new services and end-user choices in the long term, the current requirements for IP-based interconnection of Voice over IP (VoIP) domains require the provisioning of large numbers of allocated or served (hosted) numbers of a participating service provider, without the need for individual users to opt-in. This way, service providers can provision their own ENUM information that is separate, distinct, and likely to be different from what an end-user may provision. This is particularly important if Infrastructure ENUM is used for number-portability applications, for example, which an end-user would be unlikely interested in provisioning but which a service provider would likely find essential.

In addition, while it is possible that service providers could mandate that their users opt-into e164.arpa through end-user contract terms and conditions, there are substantial downsides to such an approach. Thus, for all these reasons and many others, ENUM for end-user provisioning is ill-suited for use by service providers for the interconnection of VoIP domains.

As VoIP evolves and becomes pervasive, E.164-addressed telephone calls need not necessarily traverse the Public Switched Telephone Network (PSTN). Therefore, VoIP service providers have an interest in using ENUM on a so-called "Infrastructure" basis in order to keep VoIP traffic on IP networks on an end-to-end basis, both within and between service provider domains. This requires a means of identifying a VoIP point of interconnection to which calls addressed to a given E.164 number may be delivered; Infrastructure ENUM provides this means. Calls that can originate and terminate on IP networks, and do not have to traverse the PSTN, will require fewer or no points of transcoding, and can also involve additional IP network services that are not possible on the PSTN, among other benefits.

Requirements for Infrastructure ENUM are provided in [4].

2. Terminology

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 BCP 14, RFC 2119 [5].

3. Zone Apex for Infrastructure ENUM

This document proposes that Infrastructure ENUM be implemented by means of a parallel namespace to e164.arpa dedicated to Infrastructure ENUM, in a domain that is yet to be determined. Use of a parallel namespace allows carriers and end-users to control their ENUM registrations independently, without forcing one to work through the other.

Infrastructure ENUM Tier 2 resource records in the Infrastructure ENUM tree will be controlled by the service provider that is providing services to a given E.164 number, generally referred to in various countries as the "carrier-of-record" (see [4]). The definition of a carrier-of-record for a given E.164 number is a national matter or is defined by the entity controlling the numbering space.

See also Section 3, "Requirements for Infrastructure ENUM", of [4].

4. IANA Considerations

IANA has created a registry for Enumservices as originally specified in RFC 2916 and revised in RFC 3761. Enumservices registered with IANA are valid for Infrastructure ENUM as well as end-user ENUM.

5. Security and Privacy Considerations

This document proposes a new zone apex for ENUM to meet the requirements of Infrastructure ENUM. The over-the-network protocol of ENUM is unchanged by the addition of an apex and, as such, the Security Considerations of RFC 3761 [1] still apply. Specific considerations related to the security of an Infrastructure ENUM apex are given in more detail in Section 4, "Security Considerations", of [4].

Infrastructure ENUM registrations proposed by this document should resolve to service provider points-of-interconnection rather than to end-user equipment. Service providers need to take appropriate measures to protect their end-user customers from unwanted communications as with other types of interconnections.

6. Acknowledgements

The authors wish to thank Lawrence Conroy, Patrik Faltstrom, Michael Haberler, Otmar Lendl, Steve Lind, Alexander Mayrhofer, Jim Reid, and Richard Shockey for their helpful discussions of this document and the concept of Infrastructure ENUM.

7. Normative References

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