

ENUM FORUM WORKING DOCUMENT

ENUM Implementation for Tollfree Non-Geographic Codes 6002_0_2

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ENUM Implementation for Tollfree Non-Geographic Codes

1. SCOPE OF THIS DOCUMENT

This document provides the specifications necessary to implement the components for ENUM for toll-free non-geographic numbering resources within the North American Numbering Plan countries (NANP). The work in this document will therefore be limited to the NPA and NXXs assigned to toll free services (i.e., 800, 888, 877, and 866) that are available for assignment in the toll-free portability database.

The ENUM Forum has published a document that specifies the domestic infrastructure requirements for ENUM; 6000_1_0. This specification document includes the architecture for the Tier 1 and Tier 2 name servers, as well as detailed functional descriptions and message flow specifications for the various entities necessary to ENUM: Tier 1 providers, Tier 2 providers, registrars, telephone & application service providers, and end users. This document will only provide those specifications that are unique to the implementation of toll-free resources. Therefore, all other specifications should be referenced to 6000_1_0.

2. INTRODUCTION

The toll-free NPA resources of 800, 888, 877 and 866 are in use by most service providers throughout the countries in the North American Numbering Plan (NANP). The list of countries in the NANP include:

- Anguilla
- Antigua & Barbuda
- Bahamas
- Barbados
- Bermuda
- British Virgin Islands
- Canada
- Cayman Islands
- Dominica
- Grenada
- Jamaica
- Montserrat
- St. Kitts & Nevis
- St. Lucia
- St. Vincent & the Grenadines
- Trinidad & Tobago
- Turks & Caicos Islands
- the United States (including Puerto Rico, the U.S. Virgin Islands, Guam and the Commonwealth of the Northern Mariana Islands)
- Dominican Republic

This use of the tollfree resources can be via the toll-free database or by means of dedicated NXX codes. A partial list of NXX assignments, which are not in the toll-free database, are shown in Table 1¹:

<u>SAC</u>	<u>NXX</u>	<u>Company Assignment</u>	<u>Country</u>
800	271	Textel	Trinidad
800	389	Batelco	Bahamas
800	415	All American Cables	Dominican Republic
800	534	Bartelco	Barbados
800	623	Bermuda Tel Co	Bermuda
800	703		For Future Assignment
800	740	STSJ Telephone Co	Virgin Islands (in Non-US areas)
800	744	Cable & Wireless	
800	751	Codetel	Dominican Republic
800	904		For Future Assignment
800	907	Tricom	Dominican Republic

Table 1 - NXX assignments not in the toll-free database

In addition, there are a number of additional toll-free NXX codes that are currently reserved or not in use and the entire list is presented below:

- 800-NXX's:
 - All 0XX and 1XX Codes (000-199)

¹ Note: Data was obtained from Telcordia's Routing Administration Group

- 202, 212, 271, 302, 312, 389, 402, 412, 415, 502, 512, 534, 602, 612, 623, 702, 703, 712, 740, 744, 751, 802, 812, 855, 902, 904, 907, 911, 912
- 866-NXX's:
 - All 0XX and 1XX Codes (000-199) plus 555, 911
- 877-NXX's:
 - All 0XX and 1XX Codes (000-199) plus 555, 911
- 888-NXX's:
 - All 0XX and 1XX Codes (000-199) plus 555, 911

Throughout this document the term toll-free resources will include only those resources available for assignment within the portability database and will therefore exclude any toll-free NPA NXXs assigned to providers or reserved.

To implement ENUM for these toll-free resources, substantial DNS-based infrastructure must be put into place within the NANP countries. A Registry(ies) needs to be established to contain DNS records for the domain names based on participating telephone numbers (TNs). Other nameservers also need to be established to hold the ENUM application information in NAPTR records for each participating number. A provisioning process must be established for subscribers who wish to opt-in to ENUM to populate all the necessary DNS records through the use of Registrars. The following sections in this document provide specifications necessary to implement the toll-free components for ENUM. It should provide sufficient information to allow a contracting entity to put an implementation out for bid to business organizations in the industry. As such, it describes, among other things, the reference architecture, the operational and administrative aspects of the Tier 1 Registry(ies), the provisioning, authentication and authorization process.

3. TERMS & DEFINITIONS

Resp Org

The Responsible Organization (RespOrg/RO) is the entity identified by the Toll Free Subscriber or the Subscriber's agent that assumes the duty of managing and administering the appropriate records in the SMS/800.

ENUM RegistrarRegistrar

A person or entity that, via contract with Assignees of e.164 numbers and an ENUM Tier 1 registry, provides registration services to Registrants.

ENUM Toll Free-Registrant (Toll Free-Service Subscriber)

The assignee of the e.164 Toll Free number who has chosen to subscribe to ENUM and has been authenticated.

ENUM Toll Free Applicant

The person or entity that requests ENUM registration on behalf of the prospective ~~ENUM Toll Free~~ Registrant

4. ROLES AND RESPONSIBILITIES

- Who is eligible/has the ability to register tollfree numbers
- What is the role of the ~~Resp Org~~RESPORG
- Who would be the authentication/validation entity

4.1. ~~The Resp Org~~

In the PSTN, the Resp Org acts as the number assignee's agent. The Resp Org may or may not also be (one of) the toll-free service providers for the toll-free number. The Resp Org as such will know the ~~Service Subscriber~~service subscriber associated with the toll-free numbers for which it is responsible.

Section 2.2.1 of The SMS/800 tariff (FCC Tariff #1) provides that "The Resp Org will not perform any functions using the SMS/800 which are not expressly provided for under this tariff, nor will the Resp Org access data contained in the SMS/800 which belongs to any other entity. Any violation of this paragraph may result in immediate termination of service by the Company." The SMS/800 tariff (FCC Tariff #1) also provides that "The Resp Org may access SMS/800 only to the extent required by, and incident to, the administration and management of their toll-free subscriber's telecommunications services."

If access to the SMS/800 database for the purpose of registering numbers in the ENUM database is required, changes to the SMS/800 Tariff #1 would be necessary. This new entity may be a Resp Org, or may have certain privileges currently enjoyed only by Resp Orgs, as agent of the ~~Service Subscriber~~service subscriber, with respect to access to the SMS database. Changes to the tariff may also be required in order to allow access to the SMS/800 database by the ~~ENUM Registrar~~Registrar, in order to carry out functions of authentication of Resp Org assignment to toll-free numbers.

4.2 Registrar

4.3 Applicant

4.4 ~~Registrant~~Service Subscriber

5. ~~PR~~PRINCIPLES

Architecture for a given tollfree non-geographic NPA requires a single Tier 1 in order avoid 10-digit entries into Tier 0. Specific exemptions include those 8YY NXX/reserved numbers/test codes that are set aside.

It is possible to have multiple Tier 1's, i.e., one for each NPA; 800, 888..etc.

An agreement between NANP countries would probably be required prior to implementation of ENUM for tollfree non-geographic NPAs.

6. ARCHITECTURE

Document 6001_1_0 describes, among other things, various alternatives for the implementation of the Tier 1 for countries in the North American Numbering Plan, including the US. Figure 1, below, shows one possible alternative for implementing tollfree numbers into ENUM. This particular alternative makes use of a skinny Tier 1 for the delegation of country code 1 and the delegation of particular NPAs for each country as separate Tier 1s from that skinny Tier 1. Tollfree NPAs could be delegated from the skinny Tier 1 similar to any other country that chooses to participate in ENUM.

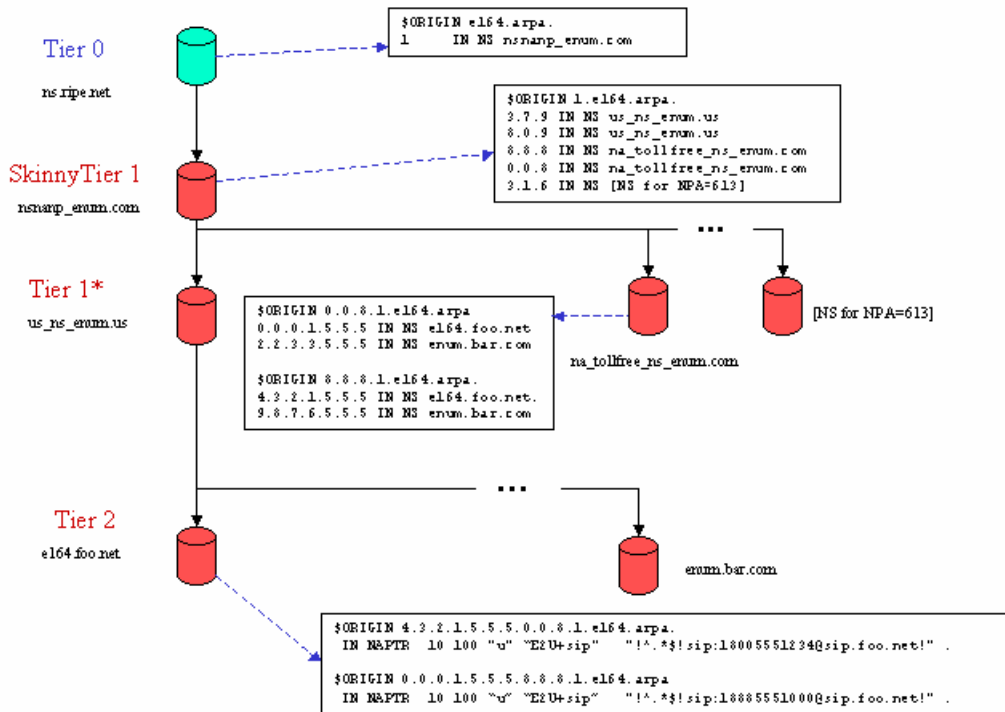


Figure 1 - Inclusion of Tollfree numbers as a single Tier 1 under a skinny Tier 1

Other potential alternatives from document 6001_1_0 include the use of multiple Tier 1s for the various tollfree NPAs as well as a single Tier 1 for all countries within the NANP.

6.1.

- Need to identify all NXX/reserved/test numbers not eligible for inclusion.

7. PROVISIONING

In general, the provisioning process for toll-free numbers will be the same as for geographic numbers. An additional entity, the Resp Org will be required for authorization purposes. Certain procedures, such as NPA splits, do not impact the toll-free number themselves but may require changes in contact information.

Three basic scenarios have been identified for the provisioning of toll free numbers into ENUM centered around the relationship between the Applicant, Registrar, Toll Free Subscriber and the RespOrg ~~or RO~~. The scenarios are:

Applicant is Registrar and Resp Org

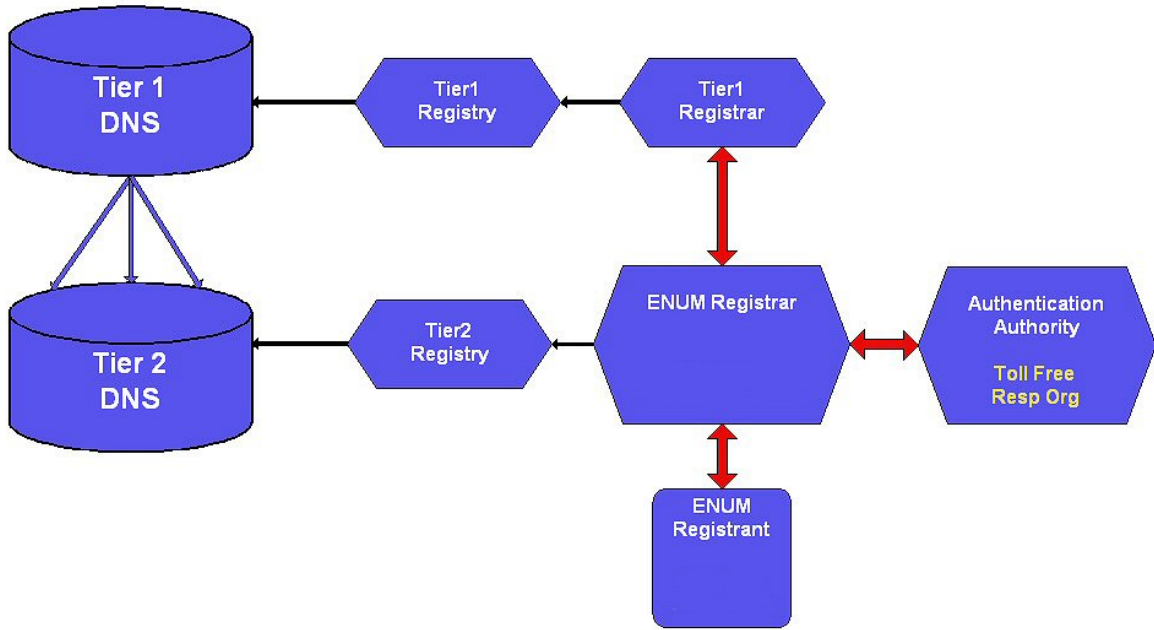
The Applicant for the toll-free number is the RO Resp Org for the toll-free number, acting as agent for the Toll Free Subscriber and also the ENUM-Registrar.

Applicant is RespOrg but not Registrar

The Applicant is the ~~RO~~ Resp Org for the number acting as agent for the ~~subscriber~~ Toll Free Subscriber, but the Registrar is an unrelated entity.

Applicant, Registrar, and RespOrg Are Unrelated

The Applicant is either the ~~toll-free number subscriber~~ Toll Free Subscriber or its agent and the ~~R~~ Registrar and ~~RO~~ Resp Org are unrelated parties.



7.1 Applicant is Registrar and Resp Org

In this scenario the Applicant is acting as agent for the toll-free subscriber and is both Resp Org for the number and an ~~ENUM Registrar~~Registrar. Accordingly, authentication of Applicant by Registrar is moot as they are one in the same. As agent, the Applicant knows the toll-free subscriber identity and must be acting on their authority. As the ~~ROResp Org~~Agent entity knows the number assignment and has verified subscriber's request to register for ENUM, this entity can register the toll-free number with the Tier 1 Registry without interacting with other entities to achieve authentication and authorization.

7.2 Applicant is RespOrg but not Registrar

In this scenario the Applicant is acting as agent for the toll-free subscriber and is RespOrg for the number but the ~~ENUM Registrar~~Registrar is a different party. The Registrar thus needs to validate:

1. The Applicant is the party they claim to be (authentication).
2. That that party is the agent of the subscriber (this can be presumed if the Applicant is verified as the ~~ROResp Org~~ for the toll-free number since the ~~ROResp Org~~ is bound to act only at the subscriber's direction). If the Registrar is an ~~ROResp Org~~ (though not the ~~ROResp Org~~ for the number being registered) they may determine ~~ROResp Org~~ identity from SMS/800.² If the Registrar is not an ~~ROResp Org~~, they will need to otherwise establish the ~~ROResp Org~~ identity or the subscriber relationship, e.g. through a toll-free service provider or documentation supplied by the Applicant from such an entity. (For example, the Registrar might be presented with a letter of agency from the subscriber along with documentation from the toll-free service provider that associates the subscriber with the toll-free number to be registered.)

7.3 Applicant, Registrar, and RespOrg Are Unrelated

This is the most complicated case. The Registrar needs to verify that:

- The Applicant is the party they claim to be (authentication).
- The Applicant is the toll-free number subscriber or their agent.³ This may require identifying the ~~ROResp Org~~ who should be able to verify number assignment.⁴ If the Registrar is an ~~ROResp Org~~ (though not the ~~ROResp Org~~ for the number being registered) they may determine ~~ROResp Org~~

² The current SMS/800 tariff may limit the ~~ROResp Org~~ in this regard and require modification to permit use of SMS/800 by an ~~ROResp Org~~ to verify ENUM registrations. If SMS/800 management transitions to an LLC, the user agreement said LLC requires of ~~ROResp Orgs~~ will need to provide for such use.

³ Verification of agency status should follow normal procedures for any ENUM registration.

⁴ It is recognized that there may be cases where the ~~ROResp Org~~ does not know the subscriber because of resale relationships. In such cases the Registrar will have to follow the chain from the ~~ROResp Org~~ though the reseller(s) verify the ultimate identity of the subscriber.

identity from SMS/800. If the Registrar is not an ROResp Org, they will need to otherwise establish the ROResp Org identity or the subscriber relationship, e.g. through a toll-free service provider or documentation supplied by the Applicant from such an entity.

Provisioning Registration with the Resp Org as Agent

A Resp Org or other authorized agent may register a toll-free number in ENUM only at the direction of the Service Subscriber Registrant assigned to that number and should be required as part of the registration agreement to certify to the ENUM Registrar Registrar that the Service Subscriber Registrant has been authenticated and has authorized the registration.

In any registration, a Resp Org will provide its own contact information and that of the Service Subscriber ENUM Toll Free Registrant for the toll-free number. A Resp Org acting as agent for the Service Subscriber ENUM Toll Free Registrant may make payment of registration fees on the Registrant Subscriber's behalf.

If a Registrant relinquishes a toll-free number back to the Toll-Free Database, the Resp Org that processes the change shall notify the Registrar accordingly, so that ENUM registration can be removed.

Resp Orgs acquiring Resp Org status on a toll-free number pursuant to the procedures described in the Toll-Free Guidelines are required to notify the Registrar that the toll-free Subscriber has changed Resp Orgs.

Where the Resp Org acts an agent to register or engage in other provisioning activities discussed in 6000_1_0 with respect to a toll free number in place of the number assignee, the ENUM Registrar Registrar will have to authenticate the party to be the entity that is shown as the Resp Org for the toll free number as discussed below.

In registration, the contact information for the Resp Org may then be provided in place of that of the ultimate number assignee.

~~Where the Resp Org acts as agent, payment of registration fees may be made by the Resp Org.~~

~~The Resp Org will be aware when a customer relinquishes a toll free number, and, if the Resp Org acted as agent in its registration into ENUM, shall notify the Registrar accordingly so that registration can be removed. Resp Orgs acting as agents for registration of toll free numbers in ENUM should be required to agree to so notify the ENUM Registrar as part of executing the registration agreement. Resp Orgs acting as agents for ENUM registration should also be required to notify the Registrar if the number assignee changes Resp Orgs.~~

8. AUTHENTICATION AND AUTHORIZATION

Two variants of authentication and authorization scenarios exist for toll free numbers. In the first, the Resp Org acts as the number assignee's agent to register the number. In the second, the number assignee registers the number directly.

8.1 Registration by Resp Org

When the Resp Org acts as the number assignee's agent to register the number, the ENUM Registrar begins validation by determining the Resp Org for the toll free number for which registration is requested. The issue of how registrars will be able to determine the identity of the RESPORG for a toll free number needs to be studied. Once the Resp Org identity has been determined, the Registrar need only authenticate the party requesting registration as being said Resp Org using the methods detailed in Section 12 of 6000_1_0 for business customers.

It should be noted that the Resp Org must not register a toll free number in ENUM except at the direction of the customer for that number.

8.1 Registration by Assignee Toll Free Subscriber

Registration directly by the number assignee Toll Free Subscriber (Registrant) would generally follow the scenarios outlined in 6000_1_0 for geographic numbers. The difference is in the process for validating the authority to register the number. Generally, the Registrar will need to determine the Resp Org for the to-be-registered number and then verify with the Resp Org the identity of the number assignee Registrant attempting to register the number. While the Registrant would need to have previously instructed the Resp Org to provide such verification, the SMS/800 tariff does not allow access by the Registrar for this purpose.

Where Should registration be handled directly by the Registrant toll free number assignee, periodic revalidation of assignment is would be required. Since disconnected toll free numbers are aged for 4 months, status should be reverified accordingly.

9. CONCLUSIONS

9.1 Avoiding ENUM Registration "SLAMS"

The Toll-Free Guidelines have been developed with a keen focus on preserving the integrity of the rights of Toll-Free Subscribers. All changes and modifications to the SMS Database are processed by Resp Orgs, at the direction of their Customers, subject to a variety of verification procedures. Disputes that arise during transfers between Resp Orgs can generally be resolved by the Resp Orgs involved.

The same problems can arise when unauthorized entities attempt to register or modify an ENUM registration as when an unauthorized person attempts a Resp Org change on a number that it does not control. This situation can result from

unintentional errors on the part of Resp Orgs or their customers, or from negligent or malicious actions. At greatest risk are high profile vanity numbers and Shared Use or bundled numbers, in which the Shared Use or Bundled Service Customers attempt to usurp the number(s) as their own.

The adequate service subscriber protections in place for Resp Org interface with the SMS must be maintained through the ENUM registration and de-registration process. This can best be accomplished by allowing access to the ENUM database only by Resp Orgs who have followed the Toll-Free Guidelines in all other respects, and not by Toll-Free Subscribers themselves.

Issues to be addressed:

- Policy issue – multiple NANP country buy-in
- Is the RESPORG the default Tier 2/Registrar?
- How do changes in the RESPORG be reflected in ENUM?