MODERN Working Group   J. Brewer
Internet-Draft   Peerless Network, Inc.
Intended Status: Informational   T. McGarry
Expires: August 27, 2016   Neustar, Inc.
                                                        C. Wendt
                                                         Comcast
                                                February 24, 2016

              Nationwide Number Portability: a MODERN Use Case
                     draft-mcgarry-nnp-use-case-00.txt

Abstract

   A proposed solution for geographic number portability in the USA
   calls for a new non-geographic numbering resource. This draft uses
   this proposal as a use case for a MODERN solution. While this
   focuses on an effort occurring in the USA the concepts are
   applicable to any country.

Status of this Memo

   This Internet-Draft is submitted in full conformance with the
   provisions of BCP 78 and BCP 79.

   Internet-Drafts are working documents of the Internet Engineering
   Task Force (IETF). Note that other groups may also distribute
   working documents as Internet-Drafts. The list of current Internet-
   Drafts is at http://datatracker.ietf.org/drafts/current/.

   Internet-Drafts are draft documents valid for a maximum of six
   months and may be updated, replaced, or obsoleted by other documents
   at any time. It is inappropriate to use Internet-Drafts as
   reference material or to cite them other than as "work in progress."

   This Internet-Draft will expire on August 27, 2016

Table of Contents

1. Introduction

The Federal Communications Commission (FCC) in the USA has asked the North American Numbering Council, an advisory body, to recommend actions to enable nationwide number portability (NNP). NNP is the ability to port a geographic TN to a different geographic area than the one to which it is associated. One solution proposes establishing a new non-geographic numbering space to be used for call routing for NNP TNs.

The format of a USA TN is:

o   NXX-NXX-XXXX, where N=digits 2-9 and X=digits 0-9

o   The first 3 digits (NXX) is called the area code

      o The area code is assigned to a geographic area or a specific
         service

o   The first 6 digits (NXX-NXX) is called the central office code
    (CO Code)

      o The CO code in a geographic area code is assigned to a
         specific service provider and switch and is used as an
         address for that switch

   o In some geographic areas all ten thousand TNs in a CO code
      (NXX-NXX-0000 to 9999) are assigned to that service provider
      as inventory

   o In most geographic areas one thousand TNs identified by the
      first 7 digits (NXX-NXX-X) are assigned to service providers
      as inventory

o The full 10 digits is called the line number

   o Line numbers are ultimately assigned to users

Area codes can be either geographic or non-geographic. Geographic
area codes are assigned to a specific geographic region. For
example, the 202 area code is assigned to Washington, DC. TNs
within the 202 area code are assigned as inventory to service
providers. Service providers use this inventory to assign TNs to
users who have a presence on their networks in Washington, DC. CO
codes assigned to switches in the 202 area code have a connection to
the PSTN in the Washington, DC area. Mobile and landline networks
both use CO codes and TN inventory in the same geographic area
codes.

Non-geographic area codes do not designate a specific geographic
region. They are considered nationwide, i.e., TNs within the area
code can be assigned to a User anywhere in the country. Today non-
geographic area codes are used to designate a specific service. For
example, the 800 area code is used to designate toll free service.

Networks use the CO codes of geographic TNs to route calls. For TNs
that have been ported the TN is assigned a routing number (RN). (In
the USA, the term local routing number (LRN) is used. The term RN
is used in this document.) The assignment of the RN to the TN is
done in an industry database called the number portability
administration center (NPAC). Networks use the CO code of the RN to
route calls to a ported TN. Today all calls to geographic TNs are
routed based on a CO code.

Portability is limited to the geographic area associated with the
TN. One of the ways this is achieved is by implementing an edit in
the NPAC that ensures the RN and the TN are in the same geographic
area. The request by the FCC is asking the industry to remove this
limitation.

One way to enable NNP is to remove the NPAC edit and allow the TN
and RN to be in different geographic areas. However, there are many
technical and operational aspects of the communications networks

that rely on the TN and RN being in the same geography. These would
have to be investigated, tested, and resolved. It's been reported
that a call of this type in certain older technology switches will
fail. If so, then new software would have to be developed for these
switches to implement this solution.

An alternative solution has been proposed that would use a new non-
geographic area code for RNs. These are called non-geographic
routing numbers (NGRN). They would be hosted on an all-IP network
of switches called non-geographic gateways (NGGW), rather than the
existing TDM tandems operated by the incumbent local exchange
carriers (ILECs). The non-geographic area code would indicate to
older technology infrastructure the need to send the call to an IP
network for call processing. Once on the IP network the NGGW is
identified and the call is routed.

A call to an NGRN can involve four entities:

o Originating CSP - the CSP that has performed the number
   portability dip and is routing to the NGRN

o NG Transport Provider - the network that can route the call to
   the correct NGGW

o NGGW - the switch that hosts the NGRN

o Terminating CSP - the CSP that is connected to the NGGW and is
   assigned the NGRN or NGTN and completes the call to the User

Some of these entities can be collapsed, for example NGGW and
terminating CSP or originating CSP and NG transport provider. There
can also be additional entities involved in transporting the call.
It's also been proposed that TNs within the non-geographic area code
can be used for assignment to Users for traditional voice and text
service. These are called non-geographic TNs (NGTNs). Today
consumer voice and text service is limited to TNs from geographic
area codes.

This document is a MODERN use case for a new non-geographic
numbering space proposed to enable GNP in the USA. It uses the
following assumptions:

o Numbering space to be managed is a non-geographic area code in
   the format of NXX-NXX-XXXX

o Both NGRNs and NGTNs are assigned from this space

o NGRNs are assigned on a 10-digit basis - not a 6-digit basis, as
   they are for geographic RNs

o The service provider and the NGGW associated with an NGRN can
   change

o NGTNs are assigned on a 10-digit basis to CSPs - not in blocks,
   as they are for geographic TNs

o NGTNs have an associated NGRN, i.e., calls to NGTNs are routed
   based on the NGRN

o The service provider, NGRN, and NGGW associated with an NGTN can
   change

This document uses definitions from [I-D.peterson-modern-problems].
It also assumes that either a single authoritative registry or a
distributed registry can perform the Registry functions. Here the
term Registry is used to cover both types of solutions.

2. Definitions

These mostly address terms associated with numbering in the USA or
new terms created for this document.

o Nationwide number portability (NNP) - the ability to port a
   geographic TN to a different geographic area than the one to
   which it is associated

o Area code - the first 3 digits of a TN that is assigned to a
   geographic area or a service

o Central office code (CO code) - the first 6 digits of a TN that
   is assigned to a specific service provider and switch

o Routing number (RN) - a geographic TN that is associated with a
   ported TN for the purposes of call routing

o Non-geographic routing number (NGRN) - a TN from a non-geographic
   area code that is used to route calls to NNP TNs

o Non-geographic gateway (NGGW) - an IP switch that hosts NGRNs

o Number portability administration center (NPAC) - an industry
   database that manages number portability information

3. Use Cases

   The use cases cover processes for actors acquiring, managing, and
   retrieving data related to NGRNs and NGTNs.

3.1. CSP Acquires an NGRN from a Registry

   A CSP is preparing to offer NNP service to its Users. The first
   step would be to register as a CSP with the Registry by providing
   profile information. The CSP profile should be data that will be
   referenced whenever the CSP attempts a transaction with the
   Registry. This could include administrative data such as CSP
   contact information. There could be multiple contacts in the CSP
   such as, administrative, billing, and technical. It could include
   administrative data about the CSP's NGGW provider(s). It could also
   include service data such as addressing data for the NGGW(s).

   During the registration process the Registry should certify that the
   CSP is qualified to request an NGRN. This could be a credential or
   some other authorization provided by the Numbering Authority. It
   could also include verification that the CSP has the ability to
   offer service to the NGRN, such as an agreement with an NGGW
   provider. Upon assignment the CSP assigns it to an NGGW provider
   and NGGW addressing information and shares this with the Registry.
   The CSP and the NGGW provider can be the same company.

   The Registry would make the assignment data available to others
   based on local policies. It can do this by providing an API or by
   distributing the data. Administrative data is more likely provided
   by API, reference addresses and service data could be provided by
   distribution.

   There should be policies as to which and how many NGRNs the CSP can
   request. It could request a specific NGRN, or perhaps the Registry
   would assign one randomly or in sequence. Given that there should
   be a relatively small number of NGGWs there should be some
   limitation on how many NGRNs a CSP can request, perhaps some number
   per NGGW.

   When the Registry assigns the NGRN they would issue a credential to
   the CSP. The credential can be used in future transactions.

3.2. User Ports a Geographic TN to an NGRN

   There are seven regional NPACs that manage the process of porting
   geographic TNs. These are divided geographically by area code.
   Each area code is dedicated to a specific NPAC and no area code is

   shared across two NPACs. For example, A CSP would port a 212 TN
   from New York in the Northeast regional NPAC. Geographic RNs are
   also specific to a region. Some CSPs only connect to some regions,
   i.e., a CSP may only connect to one region. If so, they can only
   port TNs and get porting information in the region(s) to which they
   connect. Those CSPs have arrangements with other CSPs to handle
   portability call processing for TNs in other regions. This is
   likely a transport provider that has connectivity to all NPACs.

   NGRNs would have to be able to be in any and multiple regions. This
   is possible with current NPAC processes. The most efficient way to
   port numbers in this environment is to maintain the ported TN-to-
   region association. For example, if a CSP is porting a 212 TN to an
   NGRN, they would port it in the Northeast region.

   When a CSP is porting a TN to an NGRN the CSP will first register
   the NGRN in the region associated with the porting TN. Then they
   will port the TN as they would today, except it is to an NGRN, not a
   geographic RN. The NPAC downloads the ported TN-to-NGRN data to all
   interconnected service providers.

3.3. User Acquires an NGTN from a CSP

   A User requests service from a CSP, the CSP submits its credential
   to the Registry and requests an NGTN. It provides the Registry with
   NGGW information, administrative and service, related to the NGTN.
   The Registry verifies the CSP and assigns an NGTN along with a
   credential for that NGTN. The CSP could provide the User with the
   credential for them to use in future transactions.

   The User provides contact information to the CSP. The CSP can
   either store the contact information and provide a reference address
   to the Registry, or it could send the contact data to the Registry
   for storage.

   The CSP establishes service to the User and NGTN.

3.4. Call to an NGRN Via an NG Transport Provider

   The originating CSP provisions the non-geographic area code as a
   valid area code on its network. When a call originates to an NNP
   TN, the CSP will perform an NP dip and will receive an NGRN. It
   routes the call based on the area code of the NGRN to an NG
   Transport Provider that it has an agreement with. The NG Transport
   Provider routes the call to the NGGW based on routing information
   related to the NGRN.

The routing information could simply be the NGRN itself. Most CSPs
use traditional PSTN routing and interconnection techniques when
routing IP traffic. They create SIP trunk groups (SIP TGs) between
their session border controllers (SBCs). They choose a SIP TG based
on the CO code. Because the number of NGGWs and NGRNs will be
relatively small, it would be possible to create routing tables
based on 10 digit NGRNs. Also there will be no need to route calls
based on the first 6 digits of an NGRN, therefore there will be no
conflict with the 10 digit tables.

Alternatively there could be some other routing information
associated with the NGRN, such as a unique service provider
identifier or a URI. This could be used to consolidate multiple
NGRNs into a smaller number of identifiers. But this would likely
require changes to the SIP protocol to add the new identifier to NP
call processing.

3.5. Call to an NGTN from a TDM Network

The CSP provisions the NG area code as a valid area code in its
network. When a call originates to an NGTN it can either do the NP
query and hand the call off to an NG Transport Provider (as
described above), or it can send the call to the NG Transport
Provider and let it perform the NP dip.

Once on the NG Transport Provider's network it will route to the
correct NGGW, as described above.

4. Security Considerations

[TBA]

5. IANA Considerations

This memo includes no request to IANA.

6. Normative References

[1]   Peterson, J. and McGarry, T. (Editors), "draft-peterson-
       modern-problems-02.txt", October 19, 2105

         Authors' Addresses

   Tom McGarry
   Neustar, Inc.
   46000 Center Oak Plaza
   Sterling, VA 20164
   USA

   Email: tom.mcgarry@neustar.biz

   Jim Brewer
   Peerless Network, Inc.
   222 S. Riverside Plaza, Suite 2730
   Chicago, IL 60606
   USA

   Email: jbrewer@peerlessnetwork.com

   Chris Wendt
   Comcast
   One Comcast Center
   Philadelphia, PA 19103
   USA

   Email: chris-ietf@chriswendt.net