

NORTH AMERICAN NUMBERING COUNCIL  
LOCAL NUMBER PORTABILITY ADMINISTRATION WORK-  
ING GROUP  
WHITE PAPER ON  
NON-GEOGRAPHIC NUMBER PORTABILITY

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***INTRODUCTION***

In response to FCC Chief Technology Officer Henning Schulzrinne’s<sup>1</sup> presentation regarding the PSTN to IP transition “*Technology Transition: Numbering*”<sup>2</sup>, the Local Number Portability Administration Working Group (LNPA WG) created a sub-team to determine the probable impacts of implementing Non-Geographic Number Portability (NGNP). As described further below, NGNP is the ability to port telephone numbers without regard to the current Rate Center (geographic) requirements.

The NGNP sub-team established the following Mission Statement:

<sup>1</sup>The FCC Chief Technology Officer January, 2012 to August, 2014

<sup>2</sup>Refer to [http://www.nanc-chair.org/docs/mtg\\_docs/Technology\\_Transition\\_Numbering\\_Presentation.pptx](http://www.nanc-chair.org/docs/mtg_docs/Technology_Transition_Numbering_Presentation.pptx) from the February 21, 2013 NANC meeting.

**Identify the issues and impacts to being able to port telephone numbers anywhere in the United States and prepare a report to the LNPA WG.**

Currently, under the Act and the FCC's rules, number portability is defined as the "ability of users of telecommunications services to retain *at the same location* [emphasis added], existing telecommunications numbers without impairment of quality, reliability, or convenience when switching from one telecommunications carrier to another."<sup>3</sup>

In today's Time Division Multiplexing (TDM) Public Switched Telecommunications Network (PSTN) environment, Service Providers port numbers while maintaining the number's original Rate Center designation following the port. This is true regardless of whether the Service Providers are wireline, wireless or VoIP. This LNPA WG white paper will discuss potential impacts of NGNP.

NGNP, for the purpose of this document, refers to the ability of users of telecommunications services to keep their assigned telephone numbers when relocating within the United States, regardless of the Rate Center associated with the phone number's origin, or the distance between the associated Rate Center and the end user's physical location. In other words, an end user could retain a phone number when moving to a new physical location within the same local access transport area (LATA), within the same State or in a different State.

Under NGNP, the end user's telephone number may no longer indicate the geographic location of the end user's physical location, residence, or service area.

During NGNP discussions in the LNPA WG meeting, the topic of lifting of LATA restrictions during Hurricane Katrina led to a suggestion that, as a starting point, the NGNP sub-team should reference the Katrina report, "LNPA WG Interim Report on Out of LATA Porting & Pooling For Disaster Relief After Hurricane Katrina"<sup>4</sup>.

After a review of the Katrina paper, the NGNP sub-team determined the report did not expand enough on the potential impacts of full NGNP. The sub-team then spent several meetings developing a list of possible impacts of NGNP. That list was then grouped into the following three major impact areas: Regulatory, Technical, and Consumer which are discussed in subsequent sections of this report.

The team considered two approaches for implementing NGNP and evaluated the possible regulatory and technical constraints associated with each approach. One approach considered for implementing NGNP is to consolidate Rate Centers and LATAs thereby allowing a telephone number (TN) and LRN to be utilized in a much wider area than available today. Another NGNP approach considered is to permit the LRN associated with the TN to be changed, thereby allowing a TN to be associated with any LRN in the United States. The LRNs could continue

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<sup>3</sup>47 U.S.C. § 153 and 47 C.F.R. § 52.21(k)

<sup>4</sup>Refer to [http://www.nanc-chair.org/docs/nowg/Jan06\\_Hurricane\\_Impact\\_Report.doc](http://www.nanc-chair.org/docs/nowg/Jan06_Hurricane_Impact_Report.doc)

to be assigned within specific LATAs and/or Rate Centers. Other approaches for achieving NGNP may arise and each would need to be individually evaluated. Ultimately, the NGNP sub-team concluded an industry standards body, such as ATIS, would be the appropriate forum to develop the technical methodology and standards associated with NGNP. The LNPA WG would determine and develop any necessary changes to the number porting processes and systems.

## ***REGULATORY IMPACTS OF NGNP***

In this section, several regulatory related areas are discussed at a high level. Each area will require more detailed analysis to determine the full impact of implementing number portability without regard to the original Rate Center designation. These impacted areas include, but are not limited to, Emergency Routing/911, Numbering Resources, Location Routing Number (LRN) Assignment, LATA Rules/Regulations, State Public Service/Utility/Regulatory Commissions, Federal Rules, and Interconnection and LNP Trading Partnerships.

### **Emergency Routing/911**

Regulations governing E911, Public Safety Answering Point (PSAP) systems, emergency Service Providers, and telecommunications Service Providers will need to be updated to reflect that E911 PSAPs and emergency Service Providers may be required to accommodate calls with NPA-NXXs from other counties and/or states. National Emergency Number Association (NENA) and Emergency Services Interconnection Forum (ESIF) should conduct the analysis and evaluation of the full impacts of NGNP on the emergency routing systems.

### **Numbering Resources, LRN Assignment, and LATA Rules/Regulations**

It may be beneficial for NGNP to be evaluated in conjunction with non-geographic number assignment. Regulators and industry standard groups must decide how existing numbering assignment rules and LNP rules should be updated to support NGNP. The ATIS Industry Numbering Committee (INC) should address impacts to non-geographic number assignment, Numbering Resource Utilization/Forecast (NRUF) Report impacts, and number management rules and standards.

The LNPA WG concludes that regulatory changes made as a result of NGNP implementation should be technology and provider agnostic. Customer confusion may result if a subset of providers is allowed to port any number nationwide while other Service Providers are limited by existing rules that require numbers be associated with specific geographic locations. Additionally, NGNP would need to be implemented across all providers simultaneously for increased efficiency and decreased customer confusion.

The LNPA-WG anticipates NGNP will drive changes to the existing routing and rating mechanisms requiring a full regulatory impact analysis and potential subsequent FCC action. In addition, regulatory considerations may be needed in the following areas:

- Large-scale Rate Center consolidation<sup>5</sup>
- Changes in the link between Rate Centers and LATAs<sup>6</sup>
- A nationwide ten-digit uniform dialing plan<sup>7</sup>
- Any NPA/NXX codes or blocks that are not marked portable or set to support pooling would need to be evaluated
- Changes in LRN assignment practices
- Changes to toll tariffs and taxing rules

The current LRN Assignment Practices (*ATIS -0300065*) allow Service Providers to establish one LRN per switch per LATA served by the switch from an assigned NXX for each recipient switch or point of interconnection (POI). LRNs are 10-digit numbers, in the format NPA-NXX-XXXX, that uniquely identify switches or POIs. The NPA-NXX portion of the LRN is used to route calls to numbers that have been ported. LRN assignment rules that require associating LRNs with LATAs would have to be changed if LATAs are no longer needed.

The use of LRNs is covered in the ATIS Packet Technology Systems Committee (PTSC) (formerly T1S1) standards<sup>8</sup> and the FCC North American Numbering Council Local Number Portability Administration Working Group (LNPA WG) best practices<sup>9</sup>. An FCC mandate to implement NGNP would most likely be required before Service Providers would undertake the re-engineering of systems which were built using the current LRN and TN guidelines.

If Rate Centers and LATAs are to continue in an NGNP environment and the ported number takes on the rating characteristics of the new Rate Center when ported across Rate Center boundaries, potential impacts requiring analysis include:

- Determination if a new call rating paradigm would have to be developed in this NGNP environment. Calls are rated today

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<sup>5</sup>ATIS INC has provided to the FCC a White Paper "*Large-Scale Rate Center Consolidation Considerations in the Transition from the PSTN to All-IP*" to address the impacts of large-scale Rate Center consolidation during the transition from PSTN to IP. <http://www.atis.org/legal/committee.asp#INC>

<sup>6</sup>See <http://www.fcc.gov/document/fcc-releases-connect-america-fund-order-reforms-usficc-broadband> which removes terminating switched access

<sup>7</sup>See ATIS INC documents ATIS-0300076 "*Numbering and Dialing Plan within the United States*" and ATIS-0300059 "*Uniform Dialing Plan*"

<sup>8</sup>See ATIS-1000002, "*Number Portability Switching Systems*," an ATIS Standard developed by the PTSC.3 Subcommittee under the ATIS PTSC

<sup>9</sup>See LNPA WG Best Practices <<http://www.npac.com/lnpa-working-group/lnp-best-practices>>

based on a comparison of the first six digits (NPA-NXX) of the calling and called telephone numbers. The NPA-NXX is geographically significant in terms of its associated Rate Center. Analysis would be required to determine if development of new signaling parameters are necessary to identify the originating and terminating Rate Centers involved in a call for rating purposes. Any new rating paradigm to identify the originating and terminating rate centers for a call would require modification of the billing systems. This would need to be done in a consistent manner across the industry.

- In areas where 1+ dialing is in effect, the switch determines when a 1 prefix is required based on the dialed NPA-NXX or dialed NXX. If the 1+ prefix is to continue as a toll indicator, a new toll alert mechanism may be required because the local vs. toll nature of a call may not be able to be determined until after an LNP query is completed.

While not recommended, if Rate Centers and LATAs are to continue in an NGNP environment and the ported number retains the rating characteristics of the old Rate Center when ported across Rate Center boundaries, potential impacts requiring analysis include:

- The ability of network elements and Service Provider systems to potentially support every Rate Center within the boundary of NGNP.
- Impact to the consumer who, as an example, could call their next-door-neighbor who ported in from another Rate Center and be billed for a toll call.

The implementation of flat rate calling plans and the potential consolidation or elimination of Rate Centers are other factors that have a significant influence on these impacts and should continue to be included in the NGNP discussion and analysis.

### **State Public Service/Utility/Regulatory Commissions**

State public service, utility, and regulatory commissions have oversight over intrastate telecommunications services including conserving numbering resources, tariffs for Extended Calling Areas (EAS) and Local Calling Areas (LCA), and designating Rate Center boundaries. Any new FCC Rules requiring NGNP implementation that includes dissolution or altering of Rate Centers or LATAs could impact the numbering oversight capabilities of state public service, utility, and regulatory commissions.

### **Federal Rules**

In addition to the more specific elements listed above, a number of Federal rules<sup>10</sup> for determining inter vs. intra state jurisdiction and local vs. interexchange service will need to be reviewed to determine if they are still needed or require modification, and if so, if the rules comport with new methodologies developed for NGNP. Additionally, allowing Service Providers to recover costs associated with a required NGNP implementation would need to be evaluated at the Federal level.

### **Interconnection and LNP Trading Partnerships**

Implementation of NGNP most likely would impact the established LNP relationships Service Providers have with one another. Non-national providers may need to expand porting arrangements to include additional Service Providers that operate outside of their local area. Many Interconnection Agreements (ICAs) have language which limits porting within the established Rate Centers. This language would need to be modified in an NGNP environment. In an all-IP environment, some providers may be able to reduce the number of POIs they have in place<sup>11</sup>. In order to properly implement NGNP, restrictions and policy rules regarding POIs will need to be re-evaluated and revised. Contract language and reports that reference or use elements related to local number portability will all have to be evaluated and may need to be renegotiated or revised to support NGNP.

## ***TECHNICAL IMPACTS OF NGNP***

When considering technical constraints for implementing NGNP several industry impacts were identified: Service Providers, NPAC, BIRRDs/LERG<sup>TM</sup>, Numbering, E911 and toll free routing. Each one is explained in more detail below.

### **Service Provider Impacts**

The implementation of NGNP would remove the association of a TN from the geographic location of a specific Rate Center thereby making it more difficult to determine the originating and terminating caller's physical location for routing and billing purposes.

The decision to implement NGNP will require further analysis of the following technical areas:

- The potential need for non-national providers to expand their systems, including National NPAC connectivity, to allow any TN in any NPA NXX

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<sup>10</sup>Examples of Federal rules that will need to be reviewed (not an exhaustive list); 47 C.F.R §51.209 (Toll dialing parity), 47 C.F.R §51.318 (Definition of local number assignment), 47 C.F.R §52.7 (Definitions), 47 C.F.R §52.15 (Central office code administration), and 47 C.F.R §52.19 (Area code relief)

<sup>11</sup>See ATIS SIP Forum NNI Joint Task Force, "IP Interconnection Routing Report" (IPNNI- 2014-00083R14) located at [http://access.atis.org/apps/group\\_public/document.php?document\\_id=18837&wg\\_abbrev=ipnni](http://access.atis.org/apps/group_public/document.php?document_id=18837&wg_abbrev=ipnni)

to be ported in their area.

- The likely need for significant changes to carrier operations support systems (OSS) and billing systems.
- Determination of the size of the impacts to geographical reporting and reference tables driven by changes to NPA NXXs, Rate Centers<sup>12</sup>, and LATAs.
- The possible need for Service Provider existing SS7 networks to be augmented to accommodate and support LNP query dips as all NPA NXX's would need to be queried for call routing.
- Number Management system changes that may be required for a majority of Service Providers that have systems based on Rate Center and LATA rules.
- The ability to allow all NPA NXXs in a state or across the country to reside in every switch/Home Location Register may require system and switch equipment to be significantly upgraded or completely replaced. Switch vendors would need to evaluate any system limitations associated with NPA NXX expansion.
- New ways of billing calls may be required if Local Calling Areas, Extended Area Service, and toll calls go away and all intrastate calls are now local.
- System enhancements to support State and/or Federal taxation changes may be required.
- Depending upon how NGNP is implemented, N-1 call routing responsibilities would need to be reviewed for potential impacts.
- Impacts to toll free services and the service providers who offer them would need to be investigated as the current toll free environment operates based on geographic location of NPA-NXX's and LATAs<sup>13</sup>.
- Service Providers would need to evaluate the impacts to their Caller Name products, as many providers use caller name designations such as "Florida Caller" based on the NPA-NXX rather than the end users actual name.
- Operator Services validation and screening tables would need evaluation as there may be limits on the amount of entries currently allowed.
- Number portability processes and systems need to be considered as the industry numbering testbed activities progress.

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<sup>12</sup>For further details see "ATIS INC Input on Large-Scale Rate Center Consolidation" sent by the Alliance for Telecommunications Industry Solutions dated September 19, 2014 to Mr. Scott Jordan, FCC CTO and Mr Henning Schulzrinne, FCC Technology Advisor: <http://www.atis.org/legal/Docs/INC/ATIS%20INC%20RCC.pdf>

<sup>13</sup>Reference the FoN white paper about the current issues with geographical routing for toll free numbering resources at this link.

[http://www.nanc-chair.org/docs/mtg\\_docs/Dec14\\_White\\_Paper\\_Geo\\_Routing%20Toll\\_Free%20Services.pdf](http://www.nanc-chair.org/docs/mtg_docs/Dec14_White_Paper_Geo_Routing%20Toll_Free%20Services.pdf)

## **Number Portability Administration Center (NPAC) Impacts**

The NPAC today has seven distinct and separate regional databases which would require significant changes to implement NGNP depending on the scope and boundaries of the NGNP implementation (e.g. will NGNP be implemented across a state, LATA, consolidated Rate Centers, entire United States?).

Change Order NANC 319 requires the NPA NXX of the TN and of the LRN to be in the same LATA. Implementation of NGNP would require a modification to the way LRNs are associated with TNs in the NPAC. This requirement and its associated NPAC edit were temporarily relaxed during Hurricane Katrina. The LNPA WG Hurricane Katrina report identified positive and negative service impacts as a result of relaxing the edit<sup>14</sup>.

Additionally, allowing TNs to be ported anywhere in the US could require significant NPAC software code changes to enable each of the seven regional databases to communicate with each other and exchange porting information. Another architectural alternative would be to develop a single, national NPAC database. A single NPAC database would obviate the need for communication between NPAC databases, but would introduce additional, capacity implications to support the increased storage requirements of additional ported and pooled numbers.

## **BIRRDs/LERG™ Impacts**

The BIRRDs/LERG™ provides routing information to Service Providers and currently houses nationwide NPA Information, LATA codes by region, Rate Center details, LRNs by Switch, Postal Codes, and other Geographical data elements. The rating and routing information within the BIRRDs/LERG™ would have to change to support NGNP. BIRRDs/LERG™ would need to evaluate changes to its data structures and the functionality of LRNs would also need to be assessed as a result of how NGNP was implemented. The net changes to the BIRRDs/LERG™ would cause a significant impact.

## **Emergency Routing Impacts**

The emergency services in the U.S. today utilize geography in their current processes. The geographic location of the caller is the basis for determining which PSAP to contact when 911 is dialed. There would be impacts to E911 PSAPs if all NPA-NXXs from other LATAs and/or states need to be accommodated. Additionally, number portability changes related to service and jurisdiction boundaries would require review and modification of standards, technology, and operations by NENA and ESIF.

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<sup>14</sup>Refer to [http://www.nanc-chair.org/docs/nowg/Jan06\\_Hurricane\\_Impact\\_Report.doc](http://www.nanc-chair.org/docs/nowg/Jan06_Hurricane_Impact_Report.doc)



## ***CONSUMER (END USER) IMPACTS OF NGNP***

A few consumer related areas are mentioned in this section and each will require more detailed analysis to determine the full scope of impacts that must be considered in order to be able to port numbers without regard to the original Rate Center designation. These impacted areas include, but are not limited to, Education, Calling Plans, and Cost to Consumers.

### **Education**

Consumers have long questioned why there are limitations to porting their telephone numbers. The general public understanding is that number portability means they can port their telephone number (TN) anywhere they please. Consumers do not understand that FCC regulations prohibit, for example, customers relocating from Maryland to Virginia to port their TNs to a new service provider and Rate Center in Virginia. With the implementation of NGNP, such ability may be granted to consumers. Education will be required to ensure the public fully comprehends the magnitude of such a numbering change as it relates to current wireline/wireless/VoIP services, calling scopes/plans, directories, and consumer advertising. An extensive educational campaign will be required to provide consumers with details regarding the use of 10-digit dialing in states that allow 7-digit dialing.

### **Calling Plans**

Through NGNP, consumers would have the ability to port their telephone number across Rate Centers, LATAs, and/or state boundaries. This could impact state approved Service Provider tariff calling plans, for example, by requiring the elimination of distance-based calling plans altogether and expanding Local Calling Areas and Extended Area Calling for consumers. Any changes to the calling plans will require consumer education. Some consumers could become confused and frustrated that their calling plans they have had for years are changing. However, there are other consumers who may desire a simpler calling plan. Future consumer education could become easier as Service Providers will no longer have to explain dialing plans or local calling scopes.

### **Cost to Consumers**

Phone systems and equipment programming may require changes to implement 10-digit dialing from 7-digit dialing. Some examples include alarm systems, PBXs, life safety systems, voicemail systems, fax machines, etc. The change in equipment programming could cost consumers in the beginning, but future changes could become easier with the possibility of simpler unlimited local calling plans. It is noted that the impact to phone systems and equipment may be mitigated as more consumers migrate to IP-based services and the equipment that supports IP-based services.

Another potential concern to consumers is change of printed telephone numbers, especially for business customers for advertising and directories. In areas that have limited or no experience with NPA overlays, the nationwide 10-digit dialing, needed to support NGNP, may necessitate changes to business cards, billboards, flyers, yellow pages, and any other printed materials with a 7-digit phone number. An extended transition period could help minimize costs and spread them over a longer duration. As consumers and businesses migrate to marketing solely via the internet, the impacts in this area may be lessened.

During the original implementation of Local Number Portability, Service Providers were granted the ability to recover costs associated with the rollout. If cost recovery is allowed in an NGNP implementation, those costs could be passed along to all consumers.

The implementation of NGNP is not without impact to the consumers. However, if proper education is provided, the risk of negative consumer opinion is reduced.

## ***SUMMARY***

Any implementation of NGNP will encounter significant consumer, industry, regulatory, and technical challenges as documented in this paper and will require collaboration and support by all parties involved. An industry move to NGNP will require a mandate by the FCC. The current regulations, standards, and infrastructure were constructed for the TDM network and are based upon a premise that telephone numbers and geography are intertwined.

Efforts to implement NGNP in a TDM environment (or an environment transitioning from TDM to IP) would require significant re-engineering of legacy TDM infrastructure, would require an extended duration of time to design and implement, and will necessitate a thorough review for impacts on the underlying number assignment and number portability rules, regulations, systems and processes. Some Service Providers may already be making plans or undergoing system and switch upgrades to support and implement IP with upgraded equipment and given the industry is moving away from TDM-based networks, the re-engineering of the TDM environment to support NGNP would be costly and the benefits short-lived.

A single approach to implement NGNP has not yet been determined and once determined, the massive complexity and cost of this undertaking will certainly require significant analysis and an extended duration of time to design, re-engineer, and implement. As the industry infrastructure evolves more toward an all IP environment, the LNPA WG will need to re-evaluate NGNP in that context, and continue to work collaboratively with industry standards bodies such as ATIS.