

## Mass Updates/Mass Ports

Mass Updates/Mass Ports are necessary when the attributes (for example, LRNs and DPC/SSNs) associated with a large number of telephone number-level records must be updated at the request of a Service Provider.

While the functional requirements refer only to updating fields in existing SVs or blocks, the provisioning team offers a full-featured batching and scheduling system that addresses all types of LNP porting activities—create, release, cancel, activate, modify, disconnect, dash-X creation, block activation, block modification, and block deletes.

An important part of Mass Updates/Mass Port is notification suppression to manage capacity and volume. Notifications generated are scenario specific and can be complicated. Often, a User's SOA system does not need to receive all of the notifications that result from a particular project. On the other hand, missing important notifications can result in operational problems for connected systems. Neustar provides dedicated personnel to deal with these types of operations and guide the customer through the process of defining the proper configuration of notification suppression as well as with retrieving missed notifications.

"The Mass Change, Mass Update team including <sup>Security-Related Information</sup> , are the main people that I deal with on a daily basis. They are FANTASTIC, they respond quickly, they always get whatever is asked of them done very quickly, I couldn't be happier to be dealing with them on a daily basis. Thank you for all you do!"

NPAC Survey 2011

## SPID Migrations

A SPID Migration is a coordinated update of the SPID associated with NPAC/SMS network and telephone number-level data and is required, for example, when an existing NPA-NXX code is reassigned to another Service Provider. Data potentially impacted by a SPID migration includes network data—codes (NPA-NXXs), pooled blocks (NPA-NXX-Xs), and LRNs—and telephone number-level data—(active) Subscription Versions—for telephone numbers drawn from those codes and pooled blocks and using those LRNs. However, SPID migration changes only the SPID associated with NPAC data; no other attributes associated with the telephone number-level records (Subscription Versions or SVs) are changed by the SPID migration process.

SPID Migrations can be scheduled and processed either online or offline. A SPID Migration that involves a change in a code only (NPA-NXX) is processed by the NPAC and the code change is broadcast to LSMSs and SOAs that have chosen to opt-in to the online SPID Migrations. A SPID Migration that involves pooled blocks (NPA-NXX-Xs), LRNs, and active telephone number-level data is processed independently by each LSMS operator and by the NPAC without broadcasting the changes to the LSMS operators.

To facilitate SPID migration activity, Neustar coordinates the SPID migration request details with Service Providers involved in the migration and then provides pertinent information to the Industry via prompt notifications as well as by maintaining and publishing a calendar of planned migrations. The system enforces Industry-determined limits on the quantity of migrations in a single region and nationally so as to not over-burden downstream systems. On the night before each migration is scheduled to occur, NPAC personnel initiate cancellation of pending SVs that otherwise would prevent the migration. At the start of the NPAC scheduled maintenance window, the NPAC Operations Team

generates the final Selection Input Criteria—SPID Migration Update Request Files (SIC-SMURF files) for the scheduled SPID Migrations and places the SIC-SMURF files in the Providers' FTP directories. An SP that is not performing an online SPID migration uses the final SIC-SMURF files to independently perform the SPID Migration process on their systems. For offline migration activity, our provisioning team also uses the final SIC-SMURF files to process the scheduled SPID Migrations in the NPAC/SMS system.

## NPA Splits

In the event an NPA split occurs, the NPAC provides an e-mail notification to NPAC Users announcing the impending split. Well before the Permissive Dialing is scheduled to begin, the NPAC/SMS broadcasts all codes involved with the split with their new NPAs. When Permissive Dialing begins, callers can start using either the old or the new area code for their calls to numbers in the affected NPA-NXXs. During the Permissive Dialing Period, the Industry modifies the NPAC records for numbers affected by the split, replacing LRNs containing the old NPA with LRNs that remain valid after the split. As the number records are modified with the new LRNs, the modified records are broadcast to all LSMS operators. At the end of the Permissive Dialing Period, the NPAC broadcasts a delete of the old-NPA versions of all the codes involved in the split.

## 1.1.9 Provide Interactive Voice Response (IVR) Services

The NPAC Interactive Voice Response (IVR) System provides Service Providers and Law Enforcement Agencies the carrier contact name and phone number for ported and pooled TNs in the NPAC/SMS. The IVR System, active in both the primary Data Center and secondary Data Center, is available 24x7x365. Service Providers and Law Enforcement Agencies can access the IVR via a toll free phone number. Security-Related Information

The NPAC Customer Experience team is instrumental in working with Service Providers during the registration process to obtain valid company contact information used within the NPAC Automated Telephone Number Look-up System. Once the information is provided, it is then loaded to the NPAC IVR system. Law Enforcement Agencies, Public Safety Answering Point Providers, and Service Providers must first register with the NPAC Help Desk to obtain access to the IVR system. Security-Related Information



### Security-Related Information

- **Law Enforcement Agencies**—agencies in the United States or of a State or political subdivision thereof that are empowered by law to conduct investigations of or to make arrests for violations of federal, state, or local laws; and
- **Public Safety Answering Point Providers**—entities in the U.S. that perform Public Safety Answering Point (PSAP) functions in the performance of their official duties.

Neustar's IVR system has consistently delivered—handling over 50,000 calls per month (on average) while maintaining well above the 99.9% availability requirement. Neustar has refreshed the IVR's hardware and software platform <sup>Security-Related Information</sup> to ensure we continue to meet and exceed Industry expectations.

We will implement new Interactive Voice Response functionality that will provide a response for non-ported and non-pooled TN's similar to what the LEAP solution currently provides. Our extensive experience with the current IVR and LEAP solutions will allow for a seamless design, build, and deployment of the next generation IVR system. The new IVR solution will provide the same great service expected by the Industry with accurate and efficient IVR responses.

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#### Security-Related Information

### 1.1.10 Manage Billing and Collections

Neustar has the most extensive Number Portability billing experience in the world. Neustar has provided Number Portability for U.S. and Canadian carriers since 1998. Given this vast experience, no other bidder can match our ability to capture, compile, calculate, reconcile, and invoice hundreds of millions of Number Portability transactions to literally thousands of carrier accounts.

Our customers have instituted very strict requirements to meet billing accuracy and timeliness metrics. Our billing service is regularly audited under the Gateway Evaluation Process (GEP) and we have successfully met all accuracy and timeliness requirements. Neustar's team of billing experts is well-versed in all things related to billing for LNP services and provides timely responses to questions from customers on pricing, collections, receivables, etc. Additionally, Neustar conducts a monthly conference call with Users to review the past month's invoices, monthly transaction variances, porting volume trends, and other billing issues. Our premier billing solutions meet the needs and the requirements of the Industry.

Neustar provides several ways for payment processing, invoice viewing, and general account management. The solution is fully compliant with the entire list of key billing functions outlined in the RFP and also supports certain administrative functions. LNP transactions are easily differentiated from direct charges. In addition, Neustar provides summary billing information to the NAPM LLC and it's designates through the issuance of monthly reports. Service Providers are able to access their Number Portability account online using a Web interface to the billing system to obtain detailed and accurate billing information. It should be noted that, for security reasons, only certain authorized personnel within Neustar have access to the Billing System or any of its component databases.

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Neustar has customized its billing software to align with the complexities of the U.S. LNP contract—no existing out-of-the-box billing solution would accommodate the involved pricing structures. Our billing personnel manage the following system capabilities on a daily basis, specifically, our NPAC Billing System can:

- Compile porting transaction usage on a per Service Provider basis
- Compile porting transaction usage on an allocated model per Service Provider
- Generate usage measurements on the number of ported records for each Service Provider and collectively for all Service Providers
- Generate measurements of messages processed by type
- Produce detailed reports for Service Providers on a scheduled and ad hoc basis

- Create a full billing report of all billable porting transactions, along with any non-porting related fees
- Render Service Provider invoices
- Monitor and record amounts paid, amounts open, amounts pending, and amounts in litigation by Service Provider

The Billing Accuracy and Timeliness requirements of the contract allow no room for error. In response, not only do we have a robust service, but we also have developed strong relationships with our vendors to align with guidelines in mailing timeliness. Neustar will offer customers the option to opt-in to receiving e-invoices in lieu of paper invoices in response to customer inquiries and to reinforce our commitment to environmental preservation. We will work with the NAPM LLC to determine any impacts to the GEP as a result of this service offering. Also billing will be included as a module within the new NPAC Portal with additional functionalities designed jointly with the Industry.



Neustar is ISO and SOX compliant. Our billing team continuously focuses on process improvements and routinely looks for opportunities to automate to address the complex contractual requirements outlined in our contract. Neustar has consistently and effectively managed and met all GEP metrics target over the last five years.

### 1.1.11 Industry Reporting

The LNPA issues a variety of reports to support the NAPM LLC's administration of the LNP contract. In addition to system-generated reports that Users of the NPAC can request via the NPAC User Interface, Neustar issues various reports to the NAPM LLC on performance, new NPAC customers, porting and pooling activity, summaries of regional billing data, and also assists with ad-hoc requests for reports such as NPAC record growth each week or the billable transactions data broken into p-LRN versus conventional LRN transactions. There are also audit reports, such as:

- Neutrality audit reports issued by both E&Y and Piper Rudnik
- GEP Audit reports
- IPTN and LEAP customer and associated revenue audit reports
- Annual Data Center audit reports

Neustar will continue to provide all existing reports to the NAPM LLC, LNPA, and FCC. These reports are critical to both carriers and Industry bodies responsible for monitoring and managing NPAC activities. The accuracy and timeliness of these reports will continue to be our priority.

In addition to meeting the current distribution requirements for the reports, we will publish a performance dashboard on the secure portion of the NPAC website which will serve as a place for authorized users of the NPAC, LLC members, and designated IT Operations personnel to obtain up-to-date, near real-time information on performance metrics. As shown in Exhibit 1.1-9, this dashboard will also provide a window into the health and performance of the entire LNP ecosystem, including the NPAC and connected LSMSs and SOAs. Information will be published at a regional level and will not display any proprietary, SPID-specific information.



A sample listing of the metrics available via this new dashboard:

- Real-time NPAC SLR performance
- Industry partial failure counts
- NPAC inbound queues
- SOA/LSMS outbound queues

The dashboard will consist of several processes, each working in concert to allow for monitoring, alarming, and reporting. This near real-time dashboard will depict the speed with which the NPAC processes transactions, including those generated by Mass Porting projects. The dashboard will allow customers to understand the relationship between their SOA/LSMS performance relative to the NPAC and will depict performance of an entire NPAC region, information that can be used prior to performing technology migrations or new product launches.

### **1.1.12 Monitor the Ecosystem—Service Management**

As the LNPA, we keep a watchful eye on the entire numbering ecosystem to not only protect the NPAC environment but also to help Service Providers identify issues with their LSMSs or SOAs before these become problems. Neustar personnel are responsible for providing the following services:

#### **Coordination of Annual NPAC Failover Exercise**

Given the criticality of NPAC services to Service Providers as well as to help prepare for disaster situations, it is important to ensure that the NPAC is always available and operating in an efficient manner. In order to ensure Business Continuity and to demonstrate and verify that the NPAC can fail-over smoothly to the backup data center, Neustar performs a fail-over exercise <sup>Security-Related Inform</sup>. The exercise also includes pre and post-failover consultation with NPAC Users. The Annual Failover exercise Security-Related Information

Neustar personnel work with NPAC customers that experience difficulty performing fail-over functions and assist with trouble shooting and analysis. We work jointly with the Users to define solutions for ensuring their systems will seamlessly connect to the backup site should the need arise. Neustar reviews results of the failover exercise with the NAPM LLC to keep them apprised of any issues faced and corrective actions being pursued with customers.





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## Security-Related Information



Security-Related Information



## System Outages, Notifications, and Root Cause Analyses

In rare cases when the NPAC system does experience an unplanned outage, Neustar quickly engages the Industry with timely notifications of outages and meaningful updates as new information becomes available. Later, formal root cause analyses and corrective action plans are provided.

Specifically, when unplanned outages occur, NPAC customers want and get from Neustar the following:

- To be notified promptly upon detection of an outage event. It is critical to ensure system service unavailability (outage) notifications are sent to NPAC Users with meaningful information that can provide insight into the situation to assist SPs with assessing impacts to them.
- To be provided with RCAs in a timely manner. At a minimum the RCA report should provide the definitive root cause for the event, SLR impacts, customer impacts, sequence of events, and immediate and long-term corrective action plans.

Neustar understands this and uses the following system outage notifications and root cause analysis processes:

1. The Neustar NPAC team sends an "outage" notification to NPAC customers <sup>Security-Related Information</sup> of an identified system outage. Over the years we have refined and tailored the User notification process to specific User types impacted. For example, if the LTI in a region is experiencing a problem, then the notification is sent only to the LTI distribution list in that region. If the outage/issue is more widespread, affecting both mechanized and LTI Users and multiple regions, then a notification is sent to each affected region and User type distribution list. This tailored approach ensures NPAC Users know that any communication they receive from the NPAC outages team has meaning to them; that they should pay attention.
2. The Neustar NPAC team sends an "outage update" notification regarding an outage/issue <sup>Security-Related Information</sup> of the initial notification. Additional update notifications, <sup>Security-Related Information</sup>, are sent while the outage is ongoing. An estimate of system restoral time is included in the update notifications where possible.
3. The Neustar NPAC team sends an "outage restored" notification immediately to the NPAC Users once both customer experience and technical staff determine the outage condition is resolved.
4. The Neustar NPAC team sends a Preliminary Root Cause Analysis (RCA) to Industry Project Executives (PE) <sup>Security-Related Information</sup> of the detection of the outage. The Preliminary RCA provides the best determination, at that point in time, as to the root cause of the outage, reasons/justification for determining the root cause, and a brief description of the techniques and practices actually used to make the determination. Table 1.1-5 describes the RCA reports provided by Neustar, the deadline, and their content.

**Table 1.1-5. Root Cause Analysis Reports Provided by Neustar**

Report Required	Report Deadline	Content
<p>Definitive Root Cause Analysis Report</p>	<p>Security-Related Information following the Preliminary Root Cause Analysis Report or Security-Related Information following Outage detection (whichever comes first)</p>	<p>Includes:</p> <ul style="list-style-type: none"> <li>• The definitive root cause for the outage and, if it's different from previous root cause reports, an explanation for the difference</li> <li>• Our best determination of the root cause, including a description of why this is not the definitive root cause and a summary of steps used to continue investigation</li> <li>• Reasons/justification for that root cause finding and a brief description of the techniques and practices actually used to make the determination.</li> </ul>
<p>Corrective Action Plan</p>	<p>Security-Related Information after the Preliminary Root Cause Analysis Report (even if not issued) or the Definitive Root Cause Analysis Report</p>	<p>A summary of the corrective action to be taken to avoid a recurrence of the outage based on the root cause (even if preliminary), justification for the action, and the schedule for implementation of the corrective action to avoid a reoccurrence of an Outage, including "work around" plans.</p>

## The Neustar Difference

Neustar's response to outages is a joint collaboration between the customer experience staff and the technical staff which immediately mobilize to resolve any potential service-impacting event. In addition, Neustar's customer support staff has years of system and service knowledge that allows them to effectively communicate technical issues with the Industry and to clearly articulate the problem and any necessary resolution.



## Industry Notifications

The LNPA issues many e-mail notifications, some to individual Users, others to all LNPA customers in one or more regions. At the individual level, the LNPA communicates with applicants to become Users through the NPAC registration and certification testing process. Routine notices involve such announcements as:

- Content of an impending release
- Schedules for certification testing of new releases
- SPID Migration schedules
- Time shifts due to daylight savings
- Planned maintenance in the test bed

Spontaneous e-mail notifications occur during a service interruption to explain what has occurred and to provide periodic updates (the RCA process). Another event that triggers unscheduled notices is an LSMS going off-line, causing many partial failures in a short period.

Neustar ensures important and helpful information is provided to NPAC customers in a timely manner. Industry notifications are sent to all NPAC Users that elect to add their company's contact information to various NPAC notification lists. Users have the ability to receive both e-mail and SMS messages.

### **1.1.13 LNPA Knowledgebase**

Neustar staff has unrivalled Number Portability expertise, having successfully designed, developed, implemented, operated, and upgraded the U.S. NPAC/SMS, seamlessly managing the implementation of multiple software releases and upgrades, technology refreshes, hardware augmentations and upgrades. Neustar has successfully grown a very complex, mission-critical system from a scale of handling 1 million transactions in our first year of operations to handling over 500 million transactions in 2012—all while satisfying the changing needs of the Industry and addressing ever-evolving regulations.

Neustar's team supporting the NPAC has been a part of portability since the beginning—either as an Industry or vendor participant. Neustar actively participates in numerous Industry organizations, including:

- Ordering and Billing Forum (OBF) Wireless Committee Chair and OBF Intermodal Subcommittee
- Alliance for Telecommunications Industry Solutions (ATIS), including the Industry Numbering Committee (INC)
- Communication Technology Industry Association (CTIA)
- Local Number Portability Administration Working Group (LNPA WG)



Neustar's pool of telecom, numbering, and number portability experts assist NPAC customers in a wide range of ways ranging from:

- Participating in their LNP system trouble shooting
- Assisting with drafting Industry documents about LNP issues or proposals for new NPAC/SMS functionality
- Answering questions about LNP in general
- Training customers about inter-carrier communication processes
- Validating information, for example, limits on cross-boundary porting
- Addressing specific NPAC/SMS functionality
- Acting as an Industry resource about anything involving LNP or numbering

Our participation at these Industry forums means that we can provide accurate answers to questions being raised by the Industry in real-time to facilitate productive and informative meetings.

Further, Neustar provides a comprehensive website for NPAC-related topics and maintains the official website of the LNPA-WG. Our NPAC.com site offers information on change orders and FRS/IIS documentation for each NPAC release, the official LNP process flows, and general information about LNP. The secure portion of the site, which is available only to authorized Users, offers a plethora of information such as reports summarizing NPAC network data, monthly transaction volumes, Industry M&Ps, and a two-year forecast of LSMS record storage requirements.

Since 1997, our personnel have actively participated in every meeting of the LNPA WG (and its Technical & Operations committee predecessor). We provide the LNPA WG with a resource pool of unmatched number portability expertise. Knowledgeable Neustar personnel participate in every meeting to provide answers to questions as they occur during the working group's technical discussions. We perform the LNPA WG's Change Management function and support the LNPA WG's website. Besides our active meeting participation in the LNPA WG and its subcommittees, we also provide off-line support to LNPA WG participants attempting to prepare descriptions of LNP problems and proposed solutions (PIMs) and proposals for new NPAC/SMS functionality (change orders) for eventual submission to the LNPA WG for consideration.

We were given the responsibility of porting with very little knowledge of how it works. Over the last 5-6 years Neustar has taught me everything there is to know about SOA & porting. They are always so willing to help.

NPAC Survey 2008

### **1.1.14 Assist with Disaster Preparedness**

Neustar understands number portability is more than just the ability for customers to keep a specific phone number when switching Service Providers. Our personnel have gained unmatched numbering experience which allows us to recognize that number portability is an invaluable tool to assist carriers, state regulators, and the FCC with emergency and disaster preparedness by allowing changes to phone numbers from physical addresses to virtual addresses so phone numbers are no longer physically associated with a switch. These changes are immediately and simultaneously reported to all telecommunications Service Providers throughout the country, so that all service providers always have the same critical information for routing calls. With this in mind, Neustar makes available a staff of experts that work with Service Providers on a regular basis to provide emergency preparedness services to minimize disruption or damage to the communications infrastructure in the wake of events like hurricanes, earthquakes, attacks etc.

Specifically, as shown in Exhibit 1.1-10 we send our notifications to Service Providers throughout the United States describing the services we can provide in the event of a disaster and how to request the same. We also update carriers on status of proactive NPAC outreach activities including LATA ID edit suspension and discussion with FCC on Portability Waivers etc. Additionally, we manage Mass Modification and Pooling Activation efforts between the affected Service Providers during and after the initial disasters.



Copies of our memos are also placed on our Web site, and Neustar personnel offer to contact State regulators on behalf of Service Providers to hasten any approvals needed.

In unforeseen cases of disaster, Neustar works with the Industry and governments to develop solutions where the NPAC can be used to restore communications to the affected area as quickly as possible. For example, as shown in Exhibit 1.1-11 below, immediately after the attacks on September 11, 2001, there were many unknowns. For Neustar, what was known was that the destruction of the World Trade Center towers would severely affect the telecommunications Industry. Neustar consulted with communications service providers and federal and state regulators and contacted the FCC for permission to provide emergency services in a manner that fell outside of porting and pooling guidelines. As requests were received, local number portability was used to port telephone numbers from the affected switches to working switches, and pooling functionality was utilized to port blocks of 1,000 numbers in the same manner. As a result, calls to and from Manhattan could be completed by routing them through switches physically located in Brooklyn, Staten Island, and New Jersey.

We supplement our User Support team with subject matter experts that can assist with questions on how number portability can help with service restorations. Neustar can also provide assistance in seeking the necessary approvals from state public utility commissions and the FCC to initiate any special porting activities outside prescribed geographic boundaries. As the one administrator that provides NANPA, PA, and LNP services, Neustar understands the linkages and has the necessary experience to develop a comprehensive solution in the event of a disaster and to take immediate action.

## Service Restoration Using NPAC

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**From:** [REDACTED]  
**Sent:** Monday, October 29, 2012 3:01 PM  
**To:** [REDACTED]  
**Subject:** [Northeast-Iti] Hurricane Sandy: Service Restoration using NPAC

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**Service Providers:**

Number portability was employed by several carriers to restore emergency telecommunications services in the wake of the destruction caused by Hurricane Katrina. With Hurricane Sandy coming up the East Coast, we would like to remind you that NPAC staff are available to you as a resource, should one or more of your facilities or central offices experience a major outage.

For the next few days, Neustar is supplementing our help desk with subject matter experts who can assist you in restoring service to your customers using number portability. If necessary, Neustar can also provide assistance in seeking the necessary approvals from state public utility commissions and the FCC to initiate any special porting activities outside prescribed geographic boundaries.

If you have any questions or require assistance, please call our NPAC Help Desk at 1-888-NPAC-HELP. The NPAC Help Desk is staffed from 8 AM ET to 8 PM ET Monday - Friday. For after-hours support (including holidays and weekends) simply follow the voice prompts to page a help desk representative, who will return your call within 30 minutes.

Thank you,

[REDACTED]

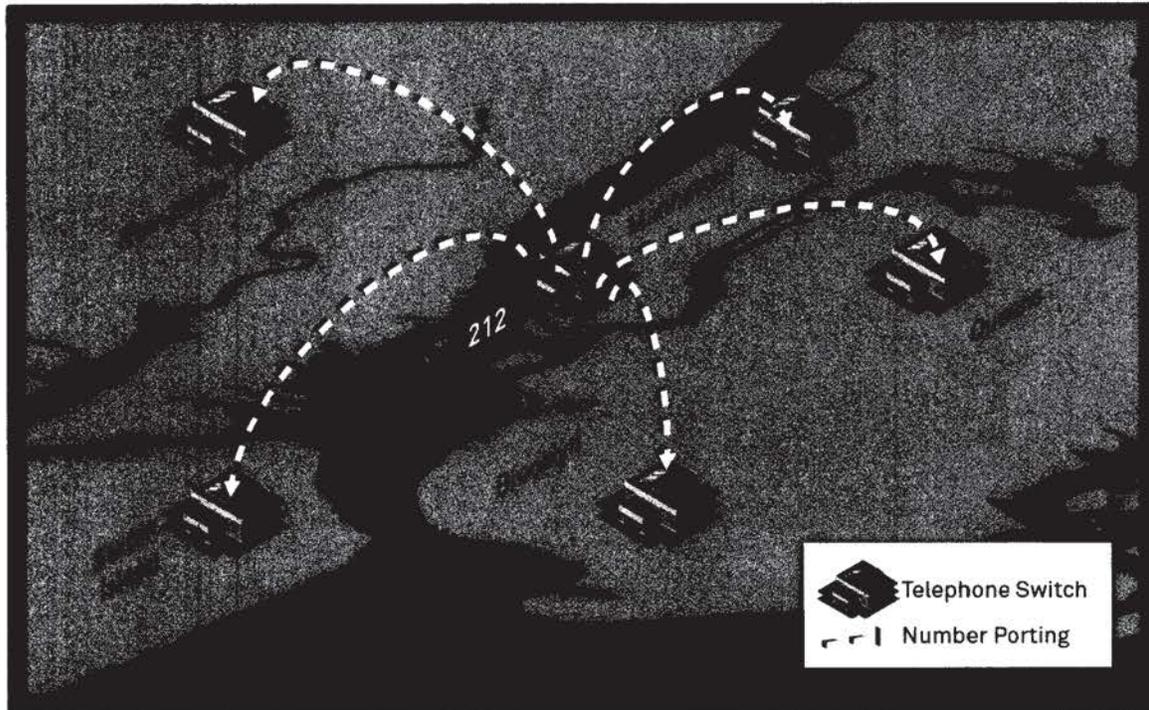
Reduce your environmental footprint. Print only if necessary.

The information contained in this e-mail message is intended only for the use of the recipient(s) named above and may contain confidential and/or privileged information. If you are not the intended recipient you have received this e-mail message in error and any review, dissemination, distribution, or copying of this message is strictly prohibited. If you have received this communication in error, please notify us immediately and delete the original message.

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**Exhibit 1.1-10:** Neustar personnel proactively reach out to the Industry to advise them of NPAC utilization in disaster recovery situations.

## Neustar Assisted Telecommunications Recovery in New York City



131.npac2013

**Exhibit 1.1-11:** Number portability allowed calls to be completed and service to be restored by porting numbers from affected switches to working switches outside of lower Manhattan.

### Neustar's LNPA Services Summary

SPs rely on the NPAC to be highly available and operate at peak performance. This has broad implications for end users of SP services as well as state and federal regulators. As the LNPA, Neustar's philosophy has been to anticipate the needs of an evolving market place and continuously originate novel solutions to address the same while never losing sight of the need to securely and reliably handle various activities on behalf of the Industry.

A recently concluded Benchmark conducted by an independent third-party auditor focused on a review of the current NPAC SLRs, contrasting these requirements against six benchmark participants and Industry Best Practices (ITSM ITIL and CobiT standards). In what we consider proof positive of our stellar service offering, the auditor found that:

“...Neustar SLR’s met and in many cases exceeded what is typically found when compared with external companies having a similar infrastructure and offering similar services. Our comparison with available Industry data also found this to be true. Performance against the SLRs was also found to meet and exceed Best Practice.”

2012 Benchmark

## 1.2 NPAC/SMS Overview

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### Why Neustar

- Over 15 years of experience architecting, developing, maintaining, and improving the NPAC/SMS to provide the highest quality of service to the Industry
- Five-Layer custom-built NPAC/SMS architecture with focused expertise at each Layer, as well as a cross-functional approach to deliver the highest levels of availability, scalability, reliability, and performance

## Security-Related Information

- Highly redundant architecture for all Layers designed to increase availability of the NPAC/SMS

## Security-Related Information

- Separate Database for reporting to ensure the live NPAC/SMS is not impacted by offline queries and reports
- Preserve and maintain the integrity of over 1000 business rules in a constantly changing environment

### New for the Next Term

- All required enhancements listed in RFP Section 7.1
- Sufficient flexibility to include all future considerations listed in RFP Section 7.2
- Further automation to guarantee 99.99% high-availability NPAC/SMS architecture
- New NPAC Portal to deliver a seamless and fully functional user experience across all NPAC services
- Additional connectivity options including Ethernet for greater choice

TMNG finds the overall NPAC operating environment to be consistently stable, robust, scalable/expandable, and well managed...

TMNG—2012 Article 14 audit

The NPAC/SMS platform operates on a custom-built 5-Layer service architecture, uniquely tailored to meet and exceed the U.S. Industry's functional specifications, interface requirements, and service level requirements. As a critical element of every Service Provider's network and subscriber operations, the NPAC/SMS must perform to the highest levels of availability, must be able to support high and varying levels of demand, must be scalable over time, and must be flexible and modular enough to accommodate new requirements without disruption.

Proposal Section 1.2, NPAC/SMS Overview, describes the elements of the NPAC/SMS's technical design, and the manner in which Neustar's uniquely designed operation provides the Industry with the highest levels of functionality, reliability, and performance. Exhibit 1.2-1 demonstrates our performance in 2012. Neustar's commitment to pristine operations and design pre-dates the current RFP; exceeding SLRs and customer expectations has been ingrained in our culture over the last 15 years, and has resulted in several aspects of the NPAC/SMS that go well above and beyond Industry requirements. For example, Neustar has developed customized NPAC/SMS monitoring tools to evaluate the health and performance of the 5-Layer architecture, and pro-actively identify any issues before they become visible to service providers. Security-Related Information

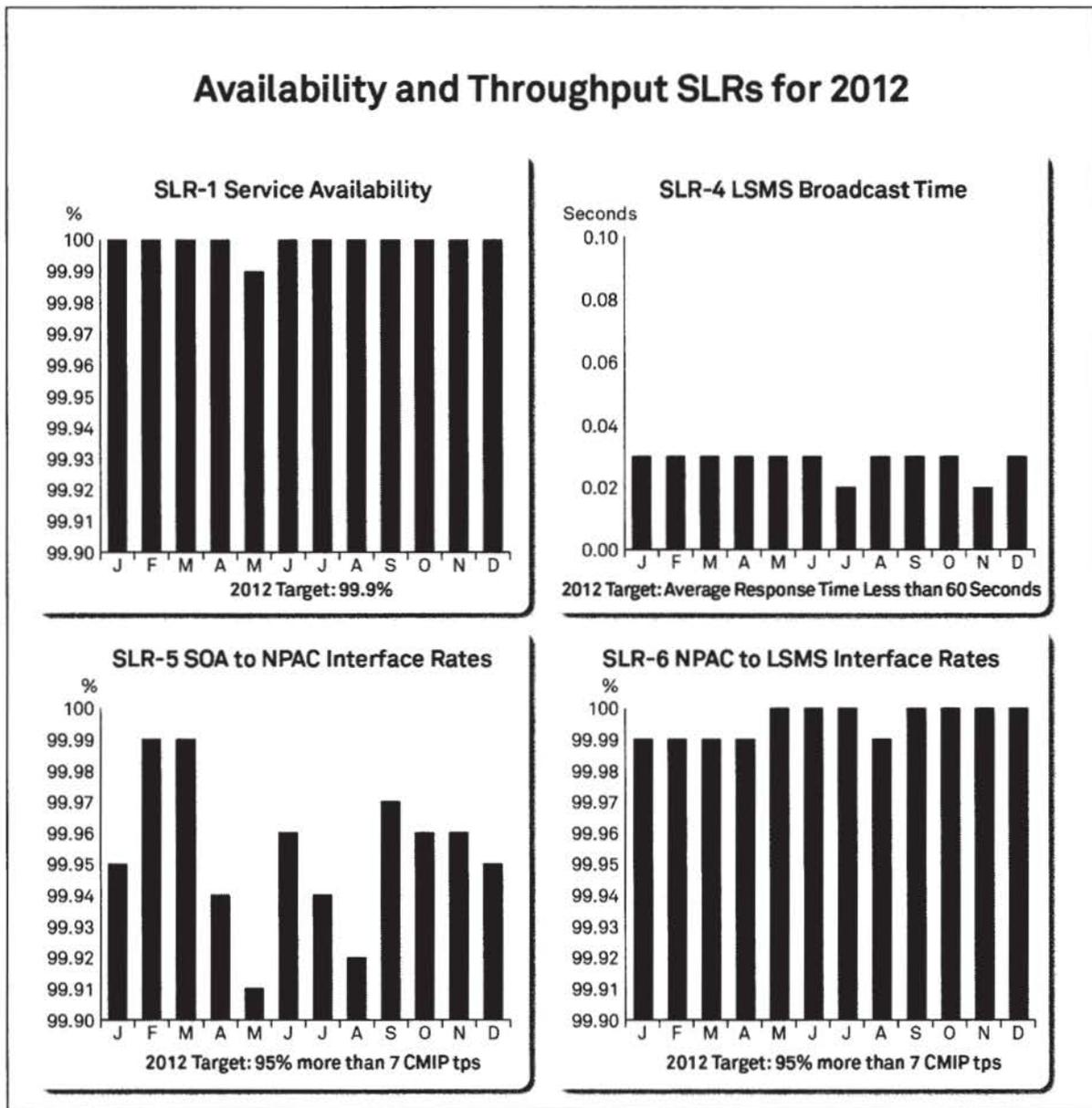
This function is not required under the FRS and was developed proactively by Neustar. Security-Related Information

These are just a few of the Neustar custom-built tools and procedures that are essential to the NPAC's operation, and which a new vendor would have to pick up on the job.

Neustar has successfully met or exceeded the requirements for 11,333 out of 11,340 NPAC/SMS service level measurements over the last five years. In addition, our data center, network, and storage systems are consistently rated as exceeding Industry best practices by independent third parties. Neustar's proposal for the next term includes building upon this performance—plus continued investment into the NPAC/SMS architecture, regular technology refreshes, and process refinements to continue raising the bar.

## **Proven Design and Development Principles**

One way to deliver an NPAC/SMS would be to outsource the deployment or operation of the platform to a third party, with the prime LNPA focused primarily on system design, implementation, and interaction with Service Providers. A vendor taking this approach would be conceding that its strengths do not lie in high performing data center operations, signifying a need to separate the key functions of the LNPA amongst multiple suppliers. Given the unique nature of the LNPA service, however—specifically the wide variety of constituents for whom responsiveness and technical knowledge is essential—the coordination and collaboration between the product team that works with the Industry to design and develop the solutions, the engineering staff that implements the solutions, and the operations staff that maintains it, is a vital ingredient for success. Any miscommunication in this chain can result in delivery of a solution that does not meet the needs of the Industry and could delay fulfillment of any number of requirements. Any changes in the delivered solution as a result of hand-offs between the LNPA and its vendors will generate further chaos and finger-pointing, potentially resulting in further delays and impacts to Service Providers.



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**Exhibit 1.2-1:** Neustar’s unique operations provide the Industry with the highest level of service.

When operations are outsourced, there are always disconnects between the entity that engineered the solution and the entity operating it, increasing the likelihood for bugs and service degradations.

The concentration of design, engineering, and operations within a single entity is the best way to ensure high levels of performance—Neustar’s experience proves this. Neustar utilizes a prevailing DevOps software development methodology (also called "agile operations") that stresses communication, collaboration and integration between Development, QA and Operations. It has been shown to be more responsive to requested changes and

enhancements and better able to deliver superior services, reliability, and availability. DevOps targets software delivery, quality testing, feature development and maintenance releases in order to improve reliability and security as well as create faster, more reliable development and deployment cycles. As business and development teams need more agility, a fundamental reorientation is needed to provide systems infrastructure in an effective manner. DevOps has been successfully implemented within the NPAC technology teams and has proven to be a valuable model with significant benefits to customers.

If another Respondent plans to rely on Neustar's application software to build an NPAC/SMS solution, it will not be able to simply recompile the code in a new data center and meet the Industry's needs—the RFP has increased performance requirements in several arenas, many of which will require updates to the existing NPAC/SMS software. Not only would the Respondent have to modify application software that was developed by Neustar and is unfamiliar to their engineers, it also would have to integrate that application software into a fully-functional service operation—including data centers, routers, switches, firewalls, security systems, databases, storage systems, and countless other elements of the total solution. Finally that Respondent would need to re-create the operational processes and procedures that enable Neustar to operate at such a high level of service quality today.

#### Security-Related Information

Security-Related Information

### New for the Next Term

During our tenure as the LNPA we have, in partnership with the Industry, evaluated 452 NANC and over 100 Illinois change orders, and deployed 380 change orders over 11 major software releases and countless point releases. Neustar has proven its ability to seamlessly enhance the NPAC/SMS platform with new service provider requirements without disruption or loss of backward compatibility. For the next term, Neustar offers the following enhancements and future considerations, which are further described in Proposal Section 1.2, System Functionality:

All enhancements required by the NPAC/SMS RFP are included in Neustar's proposal:

1. **Alternative interface**—Neustar is currently in the process of developing an <sup>Security-Related Information</sup>, in accordance with NANC Change Order 372, which will provide Service Providers a flexible and secure alternative to the existing CMIP interface.
2. **Support of IPv6**—Neustar is currently in the process of developing a plan to implement IPv6, in accordance with NANC Change Order 447, which will allow Service Providers to migrate to newer IP version.
3. **Elimination of NPAC/SMS support of non-EDR**—Per SOW 86, Neustar complies with the requirement to eliminate non-EDR support for SOA and LSMSs.

In addition, Neustar confirms that the NPAC/SMS and LNPA service are flexible enough to accommodate requirements related to **all Future Considerations** listed in the NPAC RFP Section 7.2.

1. **Automation of Processes Between the NPAC/SMS and the Pooling Administration System (PAS)**—Neustar has proposed several automations for the interaction between the Pooling Administration System and the NPAC/SMS to increase throughput and reduce the potential for costly errors.
2. **Combining Steps for Intra-Service Provider Ports**—Neustar has proposed new functionality to the intra-SP porting process, including a one-step SOA Create/Activate capability which improves the processing Service Providers' large porting projects.
3. **Inter-Carrier Communications**—the NPAC/SMS architecture can incorporate the existing ICP and LSR processes (including Intermodal) into the NPAC, reducing Service Provider costs and simplifying operations. Because this would require significant changes to Service Provider systems and business rules, Neustar also recommends that the Industry explore other options for streamlining the Inter-Carrier Process, focused on future porting requirements rather than mere duplication of existing functionality.
4. **PSTN to IP Transition**—the NPAC/SMS is a critical component of U.S. infrastructure that will enable Service Providers to efficiently manage interconnection in the transition from the PSTN to IP; because a full description of the NPAC role requires a broader discussion of the environment, Proposal Section 1.5, Future NPAC/SMS Innovations, describes our view in greater detail.
5. **Future Mandated Changes**—the NPAC/SMS is flexible enough to support any required enhancements that comes as a result of regulatory mandates.

In addition to the above commitments, Neustar is also proposing to deliver a new **NPAC Portal** that unifies all aspects of the NPAC user experience into a secure, easy to navigate user interface that uses a cross-regional login. It will support all porting functions; permit real-time, chat-based interactions with NPAC Help Desk experts; provide reporting capabilities; incorporate the existing npac.com website; facilitate Industry collaboration; and much more, all in an effort to enhance operational efficiencies, ease of use, security, and facilitate access to business-critical information. The new Portal, along with Neustar's approach for the RFP's requested enhancements, is described in Proposal Section 1.2.2, NPAC/SMS Functionality.

#### **Additional Automations to Exceed Increased Availability and Throughput Requirements**

Neustar's performance against Service Level Requirements has been achieved thanks to the NPAC/SMS's redundant, scalable, 5-Layer architecture (described in detail in Proposal Section 1.2.1, NPAC/SMS Architecture), combined with hardened system monitoring and failover procedures, regular end-of-life replacement for all relevant hardware, and expert staff capable of anticipating and resolving issues before they become visible to Service Providers or consumers. The NPAC/SMS is operated with a failover capability that transfers service to our alternate site without disruption in live transaction traffic—a feat other vendors in the U.S. have struggled to achieve.

The next ten years will generate a material increase in NPAC/SMS transaction activity, and a variety of mission critical use cases. In recognition of the Industry needs, Neustar notes the RFP's requirements to increase SLR 1 availability thresholds from 99.9% to 99.99%, SLRs 5 and 6 thresholds from 95% of all transactions processed at seven per second to 99.9%, and SLR 7 thresholds for SOA/LSMS interface availability from 99% to 99.9%. We also note the new SLR 3, for Partial Service Availability (availability for even a single user). Although Neustar has

consistently performed well above these requirements over the last five years, and expects to continue doing so over the next term, we have determined that additional automation, instrumentation, and “always-on” enhancements will be required to guarantee the requisite service availability and throughput.

#### Security-Related Information

Our extensive experience with replication technology, failover execution, and the NPAC/SMS architecture will give us the insight to craft a stable but automated Failover capability. Prior to the start of the new contract term, Neustar will engage further discussions within the Industry forums to evaluate impacts and propose the least impactful and most beneficial approach to automation.

As for SLRs 5 and 6, Neustar consistently exceeds the current SOA-to-NPAC and NPAC-to-LSMS interface transaction rate SLRs of 95% of all transactions at seven transactions per second, with an average measurement of 99.9% of transactions meeting the requirement during calendar year 2012, across all U.S. regions. To guarantee continued performance at these levels, Neustar will pursue additional application-level enhancements that further optimize the allocation of interface processes to Service Provider connections, as well as perform continuous analysis of usage and performance patterns (including simulations in the Neustar Lab) to identify any opportunities for continued improvement. These potential investments are internal to the NPAC/SMS and will not result in any impacts to Service Providers.

Neustar’s performance throughout 2012 for SLR 7 (SOA/LSMS Interface Availability) was 100%. In recognition of the Industry’s raised requirements for the new term, and in response to Service Provider requests, Neustar is in the process of adding an Ethernet connectivity option, with a total of four redundant network providers connected to four different entrance facilities across Neustar’s geographically diverse data centers.

### **Future Architectural Considerations**

The enhancements described above will not impact compliance with the NAPM LLC's requirements in the current RFP, including that of synchronous replication across Neustar's geographically diverse data centers. In our continued effort to improve service, Neustar regularly evaluates new methods and best practices, and considers various alternatives with external experts. When appropriate, we share those methods and practices with the LNPA Working Group and the NAPM LLC, to jointly evaluate new ways to support U.S. Service Providers with NPAC/SMS enhancements. In light of the raised system availability SLR, Neustar has considered various means to implement the Industry's requirements for redundancy and failover, including changes to the data synchronization mechanisms across the primary and back-up data centers.

### **Security-Related Information**

### **Security-Related Information**

Thinking further into the future, there are additional design considerations at the Application Layer that could eliminate the need for synchronous database replication altogether. Neustar has implemented Active/Active designs in several of its commercial services, which place the burden on the Application Layer to manage failure detection and failover automation to execute high availability, data integrity, and consistency across multiple database instances and sites, rather than rely on replication technology to perform the synchronization. Moving in this direction for the NPAC/SMS would allow NPAC users to connect to either or multiple active sites at any time, improving availability and redundancy for the entire ecosystem.

As already stated, we are compliant with the Industry's requirement of ensuring synchronous replication between data centers without making the suggested changes noted above. However, in an effort to constantly improve, we believe these changes will benefit the operations of the NPAC/SMS for the entire Industry, and we look forward to engaging the Industry in discussions on this topic.

## Cloud Computing

### Security-Related Information

Neustar is in the process of deploying its next generation architecture known, as NexGen, to be used for all new services. NexGen allows us to streamline design, development, QA and deployment of services in public and private cloud environments, as appropriate. It uses a common baseline architecture that accommodates service-level selection of the operating system, virtualization, an API-layer and additional tools. We plan to migrate several existing Neustar services to the NexGen platform over the next few years starting in the coming months.

At the present time, the majority of cloud-based services are consumer-facing or internal business process services. Cloud technology is difficult to deploy (on available architectures) for services with required four or five nines availability, or latency of less than a few hundred milliseconds for the lion's share of traffic. Neustar believes that geographically diverse, redundant, but *dedicated* resources for database and application services are more appropriate for the NPAC/SMS than an immediate migration to Cloud technology, given the relatively constant flow of system usage and transaction demand.

Neustar has developed the procedures to determine what benefits and obstacles cloud computing offers to our customers, and over the long term we expect the majority of our services to be cloud based. We recommend that the Industry continue to evaluate the latency and reliability concerns attendant to Cloud technology over the next few years, and as they are overcome, consider the service provider implications of taking advantage of that technology. As the demand for transaction services increases with the deployment of IP networks and machine-to-machine, Neustar will continue to support the investments necessary to meet service provider requirements.

## NPAC/SMS Technical Design

Neustar developed and operates the NPAC/SMS using scalability, extensibility, and security as guiding principles to ensure the system meets or exceeds requirements today and into the next 10 years with the highest levels of reliability, performance, throughput, capacity, functionality, availability. The following subsections, highlighted below, describe the NPAC/SMS in detail.

- **Proposal Section 1.2.1 NPAC/SMS Architecture** outlines the five Layers that comprise the NPAC/SMS:

- Security-Related Information

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- **Proposal Section 1.2.2 NPAC/SMS Functionality** provides a comprehensive list of the NPAC/SMS' current and potential future capabilities and functionalities that we develop and maintain in partnership with the Industry.
- **Proposal Section 1.2.3 System monitoring** highlights Neustar-developed and third-party systems and proactive processes in place to ensure high performance and availability of the NPAC/SMS.
- **Proposal Section 1.2.4 System Recovery and Backup** outlines the systems and processes in place to ensure continued availability of the NPAC service to the Industry in the event of an outage.

Neustar's experience and expertise as the LNPA provides a solution to the Industry that continues to deliver excellence. Our staff is dedicated to providing the highest quality service to the communications Industry. We will continue to sustain and improve our exceptional performance, and deliver new value to Service Providers, in the next term.