NANP Administration Services

Scope of Work Change Proposal #6

NANP Administration System (NAS) to the Cloud

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1 Conformance with Contract

In accordance with Neustar's contract[1] and our constant effort to provide the best support and value to both the Federal Communications Commission (FCC) and the telecommunications industry, Neustar, as the North American Numbering Plan Administrator (NANPA), hereby submits this scope of work change to the FCC for approval. This change order complies with the contractual requirements set forth NANPA Contract FCC12C0023, awarded June 18, 2012.

2 Proposed Scope of Work Change

Introduced in 2004, the NANP Administration System (NAS) provides an automated system for processing number resource applications, collecting resource utilization and forecast data and issuing notifications to the industry on numbering matters. NAS is the primary tool used by federal and state regulators, service providers, service provider consultants and the NANPA in the assignment and administration of the various NANP resources.

In accordance with the North American Numbering Plan Administration Technical Requirements Document, dated March 2012, NAS provides a state-of-the-art, feature rich, secure and scalable system engineered to meet or exceed requirements with the highest levels of quality. Since its deployment more than 12 years ago, NAS has been available 99.9% of the time and both the service provider and the regulatory communities have come to rely on its functionality, the veracity of its data, and its accessibility via the NANPA website.

In 2012, when the FCC awarded the NANP Administration contract to Neustar, we proposed and implemented a technical refresh of NAS based upon a hardware configuration that consisted of two fully-duplicated and redundant environments, each providing ample capacity to meet the projected needs of NAS users over the duration of the contract (July 2012 to July 2017). The primary environment resides in Neustar's data center facilities located in Sterling, Virginia and the secondary (backup) system is in Charlotte, North Carolina. At any time, the hardware at either facility is capable of individually supporting the NAS applications in a production environment.

As we move toward the end of life for the current NAS hardware, Neustar proposes to transfer the NAS platform to a qualified cloud platform, namely Amazon Web Service (AWS). This migration is expected to improve scalability, provide the reliability of geographically discrete instances, and improve recovery time in a true disaster scenario, should such a situation ever occur. Further, this proposal eliminates the need to purchase new hardware to replace existing NAS equipment (e.g., application and web servers, database servers and network equipment) that will be five years old at the end of the current contract.

[1] Contract Number FCC12C0023 and the NANPA Technical Requirements Document, Attachment A, effective July 9, 2012.

3 Neustar's Proposed Solution

Neustar proposes to move NAS to the cloud, similar to the Routing Numbering Administration System (RNAS) and Pooling Administration System (PAS). RNAS migration to the cloud was completed in March 2016. PAS migration to the cloud was completed in June 2016. Both systems have been operating efficiently and in conformance with the stated requirements since their migration.

Similar to RNAS and PAS, Neustar has chosen Amazon Web Services (AWS) as the vendor it would use to move NAS to the cloud. AWS is a FedRAMP-compliant cloud service provider; it has been assessed and authorized through the FedRAMP and FCC authorization processes, and has agency-approved Authority to Operate.

To mirror the redundancy and reliability of the Sterling and Charlotte data centers, Neustar will utilize at least three availability zones[2] for NAS in the cloud. NAS will use at least two primary availability zones in the AWS US eastern region and at least one in the AWS US western region. The multiple availability zone strategy will provide improved failover times in the event of any unexpected interruption to the service, and will be otherwise comparable to the two data centers in which we presently operate. AWS also provides the ability to promptly use additional availability zones in its western region, should that be necessary. This will afford customers an additional layer of protection against unavailability, as would AWS' other US locations available to Neustar in an emergency situation.

Other advantages of migrating to AWS include:

- Use of Infrastructure As A Service (IAAS), which will enable us to create code to automate routine maintenance tasks, quickly rebuild virtual servers in the event of a failure, and automatically deploy new builds — all things that today require human intervention.
- A high level of scalability, lowering the need for infrastructure that accommodates peak usage at all times.
- Component isolation -- an issue with one component will not affect others.
- Automation: the multiple automation options offered by AWS take advantage of component architecture.

Prior to the migration to a cloud-based infrastructure, Neustar will perform extensive testing, including but not limited to:

- Saturation testing, which replicates the system being under load for a long period of time (several days) to assure that the infrastructure is resilient and fault tolerant;
- Monitoring and alerting processes and procedures, to validate that they operate as expected;
- Security confirmation, Neustar's risk management team will audit all security protocols;
- Simulating failure scenarios, to assure business continuity.

[2] Amazon Web Services (AWS) operates in Regions which are geographically different from one another. An availability zone is an isolated location within an Amazon Region. Availability zones in an Amazon region can be thought of as dedicated data centers with low latency network connectivity between them.

4 Assumptions and Risks

As part of its assessment of this change order, NANPA is required to identify the associated assumptions and risks that can have an impact on its operations.

Assumptions:

- NAS will continue to perform in accordance with the NANPA contract.

- NAS migration to the cloud will be completed prior to the end of the current NANPA contract (July 8, 2017). More specifically, it is proposed this migration be completed during the 1H17 (i.e. in late March/early April).

- To ensure continuity of system operation, Neustar will secure AWS services beyond the life of the current contact to facilitate a smooth and transparent transition, if necessary, between the existing contract and any future contract.

Risks:

- Neustar examined the risk events listed below and determined that in the AWS environment, the risks are no greater than, and generally less than those in the current environment:

    - Outages,
    - Internet Weather, i.e., large amounts of traffic or ISP disruption,
    - DDOS attacks,
    - System vulnerability causing unwanted security events,
    - Loss of connection to other data centers, and
    - Loss of connection to the internet.

5 Cost Assumptions and Summary

In developing this proposal, Neustar considered the costs associated with implementing the proposed solution, including the architecture, development and quality assurance resources needed to successfully complete this migration. NANPA will leverage the same resources used in the RNAS and PAS cloud implementation in order to effectively apply the knowledge and experience gained from these system migrations to AWS. NANPA has determined that the cost associated with migrating and hosting the NAS platform on the AWS cloud is $134,997.50.[3]

[3] AWS hosting costs cover a three year time period, providing the FCC with considerable flexibility assuming the current contract is extended and/or the transition to a new NANPA contract is required.

The cost associate with hosting NAS on AWS was compared to the cost of obtaining new hardware to replace existing equipment that is reaching end of life. This cost is estimated to be over $200,000.00.[4] This cost included new database, application, FTP and reporting servers as well as new network equipment (e.g., switches, firewalls and load balancers) required for both the primary and redundant NAS locations.

Neustar did not consider and would not recommend retaining the current hardware and securing extended maintenance agreements. Current NAS equipment was acquired nearly five years ago and thus reaching end of life. Further, this approach only delays the need to invest in newer technology that will be required in the near future. Neustar's recommendation is to invest these funds now in a cloud-based solution, providing a platform that continues the technological evolution of the system.

Since this change order will require significant software development and quality assurance testing, the estimated timeline for completion and implementation into NAS Production is approximately 6 months. This includes scheduling the transition to the AWS cloud outside of the semi-annual utilization and forecast reporting window (i.e., January/February 2017). As such, Neustar will provide monthly progress reports on its development and testing efforts, similar to the reports required by the FCC during the CLIN 1 phase (Automated Systems Development) of the NANPA contract. Similarly, Neustar will invoice the FCC on a monthly basis ($135K/6 months), beginning one month after the approval date of this change order.

6 Conclusion

Neustar, as the NANPA, hereby seeks the FCC's approval for this Scope of Work Change. Upon approval by the FCC, NANPA will notify the industry that it is accommodating this Scope of Work change order.

[4] Vendor list pricing was used in determining this cost. Even with a 50% discount, the costs are similar to the AWS costs for hosting NAS over the next 3 years. Further, these vendor costs do not include the maintenance agreements for the software that resides on this hardware.