F. Centralized usTLD Database and Enhanced Shared Registration System

HIGHLIGHTS

- **NeuStar will implement an Enhanced Shared Registraion System to simplify the process for delegated managers and registrars to provision the usTLD registry**

- **NeuStar will run a thick registry that stores registrant information in a central usTLD database.**

- **Whois data for all nameholders, including delegees, subdelegees, and registrants, will be available through a free public, web-based interface that allows for multiple string and field searches.**
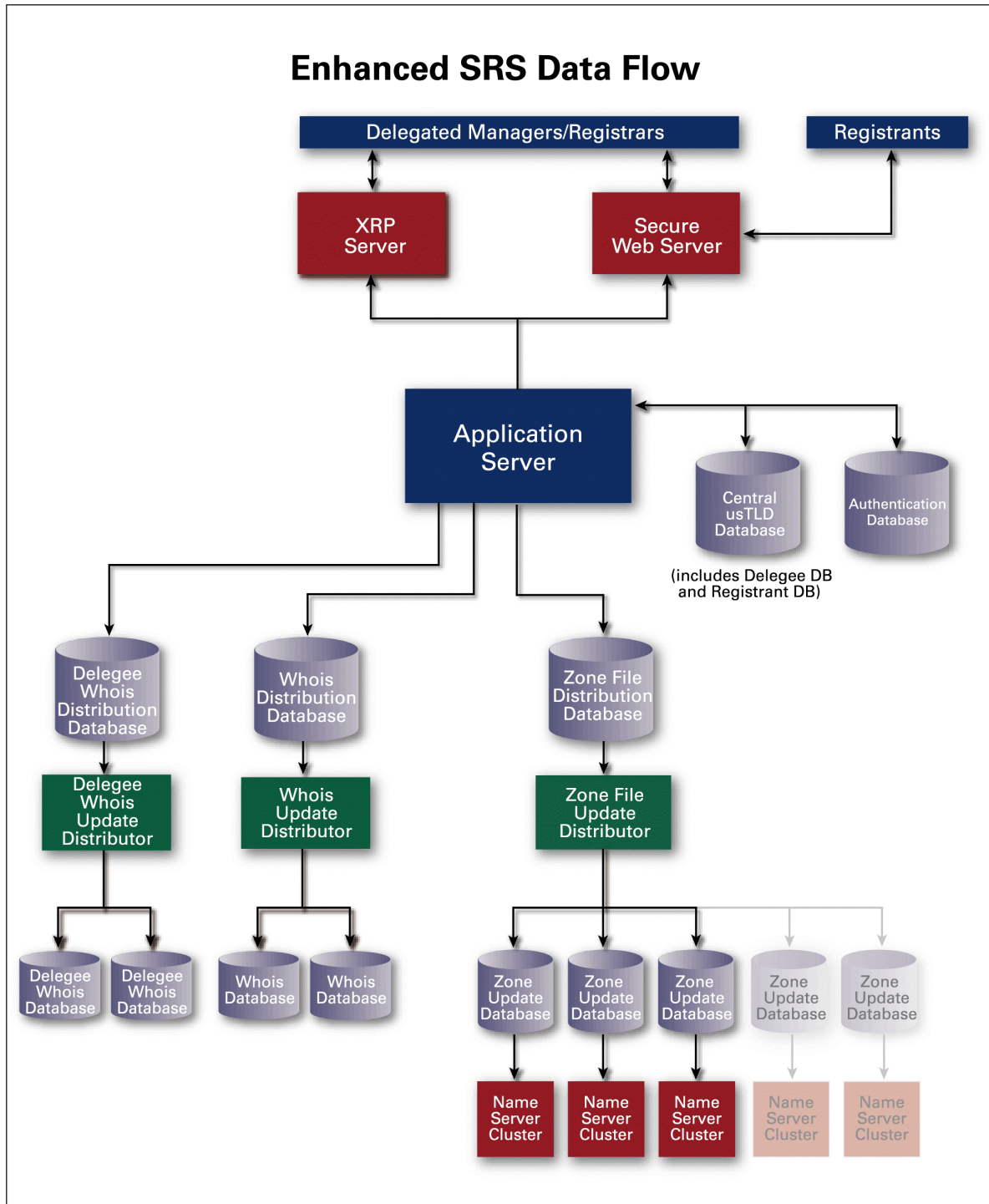
NeuStar's Centralized usTLD Database and Enhanced Shared Registration System will modernize the usTLD registry and promote registration in the space.

The infrastructure of the usTLD has not evolved along with other leading Internet registries. DNS standards and policies created at the IETF and ICANN have advanced significantly since the inception of the usTLD and the introduction of RFC 1480, and the usTLD has not kept pace with these advances. Yet it is reasonable for the user community to expect that the registry will be consistent with appropriate industry standards and policies. An outdated infrastructure causes potential users to question the value of acquiring a name in the usTLD name space, and most members of the user community have chosen to register names in other TLDs.

There are four specific areas where the usTLD infrastructure is lacking.

1. The current usTLD administrator has not deployed an automated registration system for the usTLD. The registration process is manual. This makes the process of updating zone files, creating a central database, tracking changes, and providing a Whois extremely difficult. It also introduces an opportunity for errors.

2. Delegees and subdelegees are not required to submit registrant information to the current registry. Consequently, there is no centralized, complete, and accurate database of registrant information for the usTLD.

3. Because of the hierarchical structure of the usTLD, it was expected that delegees and subdelegees would maintain their own databases and Whois servers. Although some delegees have followed this recommendation, others have not, and no complete and accurate, centralized Whois service exists for the usTLD. Further, because there is there is no centralized database of registrant information, a centralized Whois cannot be generated.

4. Although e-mail addresses are available for third-level delegees, there is little evidence of a central, publicly available or privately held database of all delegees and subdelegees.

If it is to become the model for the world's country code TLDs, the usTLD must have a robust, secure, and reliable infrastructure equal to or better than any other Internet registry. In order to modernize the usTLD infrastructure and provide the services and functions outlined in Section B of this proposal, NeuStar will leverage an enhanced shared registration system as shown in Exhibit F-1, Enhanced SRS, and a centralized usTLD database. This Enhanced SRS and Centralized usTLD database are the central components of NeuStar's usTLD registry, and, in turn, they create the necessary zone files and Whois service required to round out the usTLD infrastructure.

Enhanced SRS Data Flow

034a.usTLD

Exhibit F-1. *Enhanced SRS Data Flow illustrates the data flow for processing requests and the data distribution to external systems.*

F.1   Enhanced Shared Registration System

As stated above, the manual registration process currently used by the usTLD administrator introduces difficulties into the processes of updating zone files, creating a centralized database, tracking changes, and providing a centralized Whois service. Currently, registrants have no guarantee that their registrations have been entered into a database or into the zone file. NeuStar's solution modernizes the registration, so that all of these functions will become automated.

There are a number of methods that could be used to modernize the infrastructure of the usTLD, and nearly all of them are likely to include a Web-based user interface. In fact, an interface that would allow registrations over the Web would be expected, if not demanded by the user community. However, a Web interface that looks better to users but that has no associated capability to update the usTLD database or zone files would not solve the timeliness and reliability problems associated with the manual process. This would be unacceptable to registrars in the expanded name space. They need immediate access to accurate and up-to-date information, and they need to have a machine interface to the registry due to the high volumes of registrations that they would expect.

NeuStar's Solution—Modernizing the Registration Process

NeuStar's modernization of the usTLD registry infrastructure begins with the implementation of an Enhanced shared registration system (Enhanced SRS). The Enhanced SRS is enhanced in that it can accommodate competitive registrars in the expanded space as well as delegated managers and registrants on the locality-based space. The term Enhanced SRS refers to a system that has a mechanized interface to multiple registrars that provides the same service to all of the interconnected registrars. In addition to supporting competitive registrars, NeuStar's Enhanced Enhanced SRS will support delegated managers that are the only entity allowed to register names in their name space. The Enhanced Enhanced SRS will automate the registration process for all name holders.

Due to the nature of the usTLD name space, it is necessary to define the three different registration processes, as shown in Exhibit F-2: (1) registrations in the expanded name space, (2) registrations in the locality-based space where NeuStar is the registrar, and (3) registrations in the locality-based space with existing delegees or subdelegees.

Expanded Name Space

Registrations in the expanded name space will be very similar to registrations in a generic TLD such as .biz, as shown in Exhibit F-3. Registrars will be responsible for the registration of names in the expanded name space, and NeuStar will not act as a registrar for that space. In order for registrars to interface over a mechanized interface with the usTLD registry, NeuStar has developed a protocol called XRP (eXtensible Registry Protocol). This protocol has been developed and is undergoing implementation for the .biz registry. NeuStar is also an active participant at the IETF Provreg Working Group, which is developing an industry standard protocol for an interface between registrars and a registry. NeuStar will ensure that XRP is functionally compatible with the standard developed by the IETF Provreg WG. All usTLD-accredited registrars will be provided with an XRP software toolkit, free of charge.
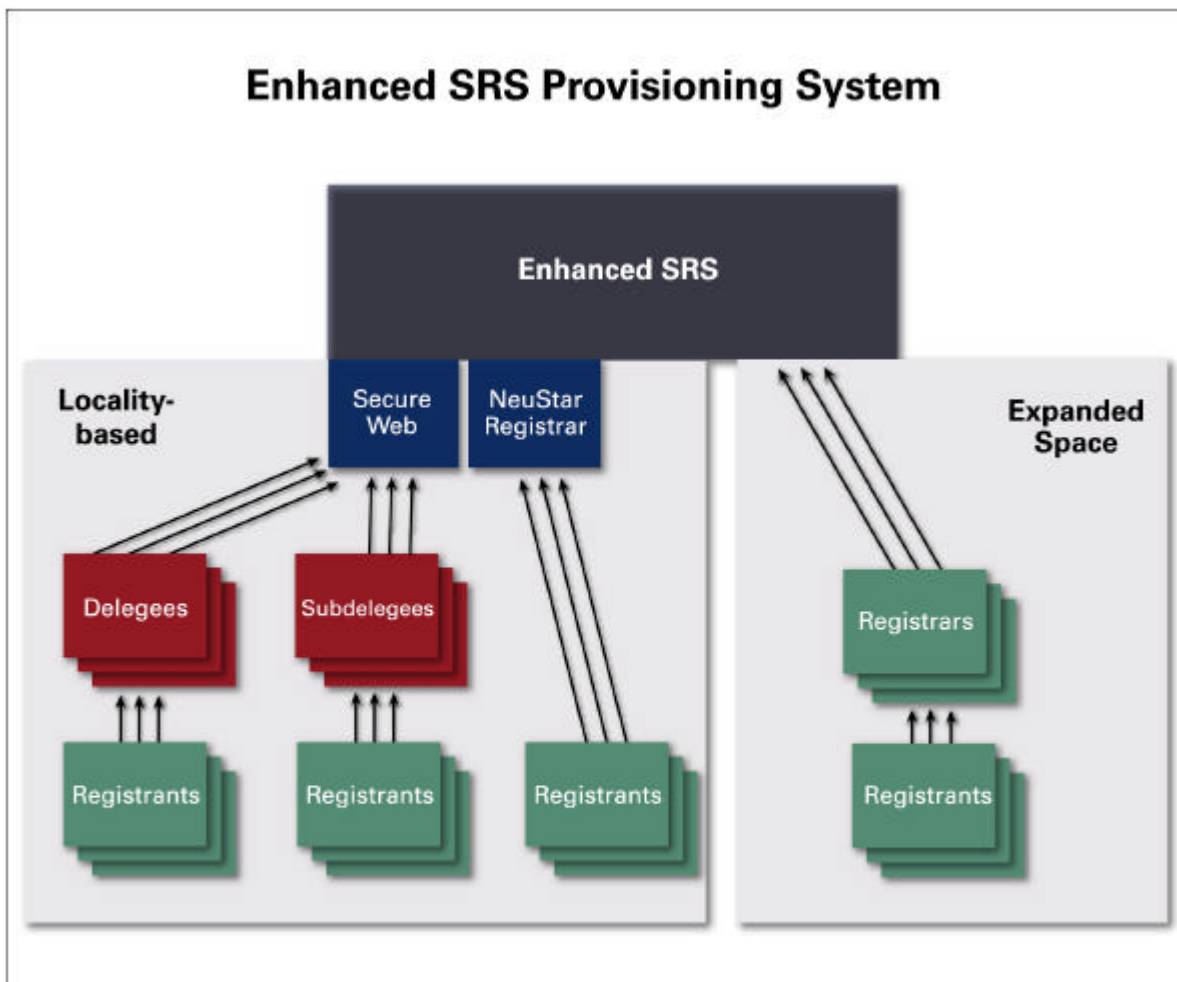
Enhanced SRS Provisioning System

Exhibit F-2. *NeuStar's Enhanced SRS provides automated registration service to both competitive registrars, in the expanded space and delegated managers in the locality-based space. Profile-based business rules ensure security and integrity for each of the registrars and delegated managers.*

NeuStar will deploy a thick registry, which means that registrars will submit name, registration, and contact information about registrants to the registry, and the registry will store that information in the central usTLD database. This information will allow the registry to create a centralized Whois and populate the zone file with the appropriate resource record.

Locality-Based Name Space Where NeuStar is the Registrar

NeuStar will be required to act as a registrar in the locality-based name space in cases of undelegated third-level names. To fulfill this role, NeuStar will implement a Web-based interface for registrants to register names in that space. This interface will be very similar to the way registrants register names with registrars today in generic top level domains (gTLD), such as .com. Upon initial registration registrants will be provided with authenticating information that will need to be submitted for future changes and updates to the registration. This will permit an extra level of security and ensure that the appropriate registrant is modifying the name.

Just like in the expanded space NeuStar will gather information about the registrant to populate the central usTLD database, create a Whois record, and update the zone file. In addition, NeuStar needs to clear the payment and enter the registrant in NeuStar's Registrant database. There is a clear difference between managing a name for a registrar and managing a name for a registrant. NeuStar understands the importance of treating these two types of registrations differently.

Locality-Based Name Space for Existing Delegees and Subdelegees

Existing delegees and subdelegees will continue to provide registration services to registrants within their designated localities. However, their functions will be expanded so that NeuStar can store information for all of the registrants in the usTLD name space. Delegees and subdelegees will be responsible for providing NeuStar with registration information for each name that they register, as well as contact information for each registrant so that NeuStar can update the central usTLD database and create a Whois record for the registrant. If the delegee or subdelegee chooses to host the registered names on their own name servers then they do not need to provide resource record information to NeuStar. As an additional service, NeuStar will host resource records in the usTLD zone file created at the

Exhibit F-3. *All Registrars are provided the same level of access to NeuStar's high availability Enhanced SRS.*

registry. In cases where delegees and subdelegees choose to take advantage of this option, they will need to provide NeuStar with the appropriate resource record information.

NeuStar will provide a secure Web site where delegees and subdelegees will provision this information with the registry. Each delegee and subdelegee will be provided with authenticating information to ensure that they are modifying records within their name space. However, if a delegee or subdelegee would prefer to interface with the registry over a mechanized interface, they can choose to implement the XRP interface by downloading the tool kit from the usTLD web site.

F.2   Centralized usTLD Database

As noted earlier in this section, RFC 1480 made no provision for a centralized database and Whois in the usTLD space, in the hopes that delegees and subdelegees would maintain their
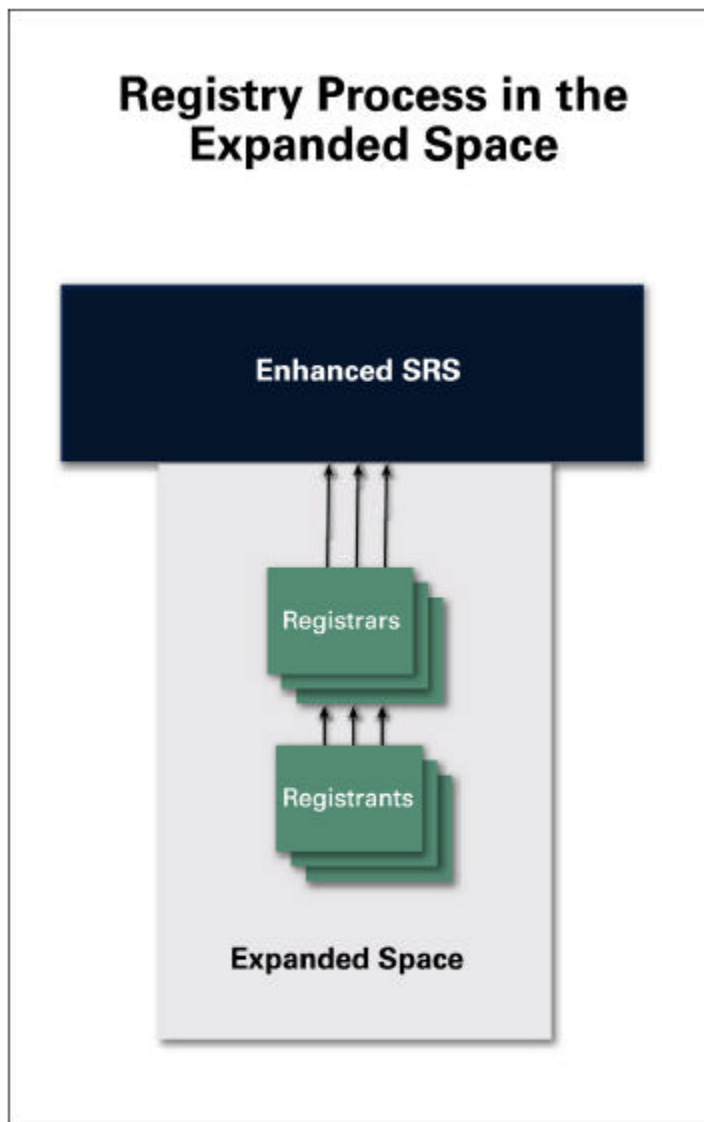
own database and Whois. As the domain name system evolved, it became obvious that this was not the best way to maintain and administer such an important public resource. It is important that the domain name community can easily determine the entities responsible for a domain name. This is important for the proper functioning of the system and the names as well as for ensuring that the entity responsible for the name is complying with appropriate policies and practices. If that information is not centralized, it is difficult to ensure consistency and accuracy.

Additionally, there is little evidence of a publicly available or privately held database of all delegees and subdelegees. While there is a simple contact list which provides delegated names and email addresses this is not sufficient for the purposes of ensuring the proper operations of an important public resource. Delegees and subdelegees are clearly held to a higher standard of operations since they are responsible for managing other names. It is critical that the usTLD administrator and the public have very specific and up-to-date information regarding these entities.

In an attempt to provide Whois services, the current administrator implemented a Referral Whois (Rwhois) service, in which delegees and subdelegees were asked to install Rwhois, so that Whois requests could be referred, through the main Rwhois server, down to the individual delegees. This is a solution that could be implemented in both the expanded space as well as the existing locality space. Registrars would maintain the database and Whois data for their customers in the expanded space and delegees and subdelegees would maintain their customer's data and Whois in the locality-based space.

However, Rwhois is generally considered by the technical community to be an inferior and unreliable protocol. Rwhois is not widely deployed and therefore not well understood. This is particularly a problem when the administrator would be relying on potentially thousands of entities (i.e., delegees, subdelegees, and registrars) to deploy and maintain it. A distributed Whois also creates the likelihood of there being inconsistent policies and treatment of name holders. Furthermore, it would be extremely difficult to monitor the compliance of delegees, subdelegees, and registrars if the database and Whois were distributed.

Since the database itself is not publicly accessible (only the Whois data is), a distributed architecture would virtually ensure a lack of consistency to the data that is stored and the manner that it is stored. For example one entity could store data on an Excel spreadsheet where another entity could store data in an Oracle database. One entity could store different data than another entity. This would make the process of transferring registrants from one entity to another much more difficult.

But the most convincing evidence that a distributed database and Whois approach does not work is the fact that this is the current solution deployed in the usTLD, and it is well understood that it is not sufficient.

NeuStar's Solution—A Centralized usTLD Database

In an effort to create a centralized Whois, and in order to be able to provide complete information about nameholders, NeuStar will centralize all pertinent information regarding all names registered in the usTLD name space. There are two broad categories of name holders: (1) registrants and (2) delegated managers, including all delegees, subdelegees. Registrants will register names through a delegated manager in the locality-based name space, and they will register through competitive registrars in the expanded name space. All name holders and registrars will be included in the central usTLD database and the central Whois database.

The Centralized usTLD database will be escrowed on a regular basis with an escrow agent that is acceptable to both NeuStar and the Contracting Officer's Technical Representative (COTR). The Centralized usTLD database is the heart of the usTLD registry; the publicly accessible Whois, the delegated manager Whois and the zone file will all be created from this database.

NeuStar

Centralizing and escrowing the registration information will ensure the integrity, security, and reliability of the entire name space.

All Whois information will be free and publicly available over a Web-based interface that will allow for multiple string and field searches. NeuStar will provide a Web site for this purpose as well as providing access over the IANA-approved port 43.

The following table provides details on the Whois information that will be available through the usTLD Web interface and port 43.

Whois Information Under the usTLD

Registrants in Locality Space

1. Name of the domain registered
2. Internet Protocol (IP) address of the primary nameserver and secondary nameserver(s) for the registered domain name
3. Corresponding names of those nameservers
4. Identity of the delegated manager under which the name is registered
5. Creation date of the registration
6. Name and postal address of the domain name holder
7. Name, postal address, e-mail address, voice telephone number, and (where available) fax number of the technical contact for the domain name holder
8. Name, postal address, e-mail address, voice telephone number, and (where available) fax number of the administrative contact for the domain name holder

Delegated Managers in Locality Space

1. Name of the delegated manager
2. Delegated Manager ID
3. IP address of the primary nameserver and secondary nameserver(s) for the delegation
4. Corresponding names of those nameservers
5. Date of delegation
6. Name and postal address of the delegated manager
7. Name, postal address, e-mail address, voice telephone number, and (where available) fax number of the technical contact for the delegated manager
8. Name, postal address, e-mail address, voice telephone number, and (where available) fax number of the administrative contact for the delegated manager
9. Web site or other contact information through which registrations can be accepted under the delegation

Registrants in Expanded Space

1. Name of the domain registered
2. IP address of the primary nameserver and secondary nameserver(s) for the registered domain name
3. Corresponding names of those nameservers
4. Creation date of the registration
5. Name and postal address of the domain name holder
6. Name, postal address, e-mail address, voice telephone number, and (where available) fax number of the technical contact for the domain name holder
7. Name, postal address, e-mail address, voice telephone number, and (where available) fax number of the administrative contact for the domain name holder

Registrars in Expanded Space

1. Name of the registrar
2. Registrar ID
3. Registrar status (e.g., active, pending)
4. Name and postal address of the registrar
5. Name, postal address, e-mail address, voice telephone number, and (where available) fax number of the technical contact for the registrar
6. Name, postal address, e-mail address, voice telephone number, and (where available) fax number of the technical contact for the registrar
7. Name, postal address, e-mail address, voice telephone number, and (where available) fax number of the billing contact for the registrar

It is necessary to divide the methods for provisioning this information into two categories, existing information and new information. The technical and functional interfaces and methods for provisioning new information are defined earlier in this section.

Provisioning existing information will require an outreach effort to the current delegated managers. The first step is to contact the delegated managers through contact information provided by the current usTLD Administrator, we will request this information as outlined in our Transition Plan, discussed in Section T. This name and contact information can be supplemented by writing a script to "walk the tree." Walking the tree refers to the process of performing a recursive search of the usTLD, which gathers zone file information from delegees

and subdelegees and includes all delegations and direct registrations. The zone files of delegated managers include contact information for the delegated manager, and they also include all registrations under the delegated manager's name space. NeuStar has already starting walking the tree and analyzing the results to develop a database of delegated manager contact information and a database of all of the names in the usTLD name space, so that NeuStar will be able to initiate our outreach effort beginning on the day of contract award.

Once the delegated managers have been contacted, they will be provided with a list of the information we would expect to receive from them including a list of names for which we believe they are responsible. We will offer them options as to how they provide us this information. They will be able to provision it on a secure website or they will be able to send us a file in a format provided by NeuStar. It may be necessary for the delegated manager to contact their registrants for some of the information we will be requesting. This will be an iterative process with regular contact between NeuStar and the delegated manager until the information is verified.

Because NeuStar will not necessarily be hosting the resource records associated with names registered to delegated managers, it is possible for the delegated manager to register a name and forget to update NeuStar. In order to ensure that our Centralized usTLD database is accurate and up to date, NeuStar will "walk the tree" continuously and compare the results with information in that database. If there is a difference, we will contact the delegated manager to correct the discrepancy.

Conclusion

If the usTLD is to be considered on par with or better than the rest of the available top-level domains, its registry must contain accurate and up-to-date information pertaining to name registrations and name holders. To accumulate this information on an ongoing basis, NeuStar will use standard practices now common in the domain name registry community. We will provide easy-to-access and easy-to-use tools by which registrants, delegated managers, and registrars can provide this information to us. Accumulating existing information is simply a matter of using data and tools at our disposal to reach out to the existing name holders. While this will be a time consuming task, NeuStar welcomes this as a good opportunity to develop a relationship with the existing user community.