F. Delegated Manager and WHOIS database specifications and data collection

NeuStar's Centralized usTLD Shared Registration System and WHOIS database provide a modern usTLD registry and promote registration within the space.

Upon assuming administration of the usTLD, NeuStar introduced a number of innovations to modernize the infrastructure of the usTLD. Until that time, the infrastructure of the usTLD had not evolved similarly to other leading Internet registries. DNS standards and policies created at the IETF and ICANN had advanced significantly since the inception of the usTLD, and the usTLD had not kept pace with these advances. The outdated infrastructure caused potential users to question the value of acquiring a name in the usTLD name space, and most members of the Internet user community elected to register names in other TLDs.

Highlights
• **NeuStar has implemented and is operating an Enhanced Shared Registration System to simplify the process for Delegated Managers and registrars for the usTLD registry**
• **NeuStar runs a thick registry that stores registrant information in a central usTLD database.**
• **WHOIS data for all nameholders, including Delegated Managers, and registrants, is available through a free public, web-based interface that allows for multiple string and field searches.**

The evolution of the usTLD registry infrastructure began with the implementation of a Shared Registration System (SRS) by NeuStar. The SRS centralized and consolidated both WHOIS and Delegated Manager (DM) databases and established a primary authoritative database that stored all information. The SRS automated the registration process for all domain name holders.

In addition, when NeuStar took over the .US Locality space, the DM database consisted of more than 50 DNS zones that included unreliable data from many of the DM zones. NeuStar merged those zones into the core usTLD registry, thereby consolidating the data in an authoritative, centralized database.

Registrations in the second level name space are now very similar to registrations in any generic TLD such as .biz. Registrars are responsible for the registration of names in the second level name space, and NeuStar does not act as a registrar for this space. In order for registrars to interface over a mechanized interface with the usTLD registry, NeuStar developed a protocol called EPP (Extensible Provisioning Protocol). This protocol was first developed and used for the .biz registry. All usTLD-accredited registrars are provided with an EPP software toolkit at no cost.

Technical Specifications of the Database

NeuStar's system is designed as a thick registry model. Within this model, registrars submit name, registration, and contact information about registrants to the registry, and the registry stores that information in the central usTLD database. This information allows the registry to create a centralized WHOIS and to populate the zone file with the appropriate resource records.
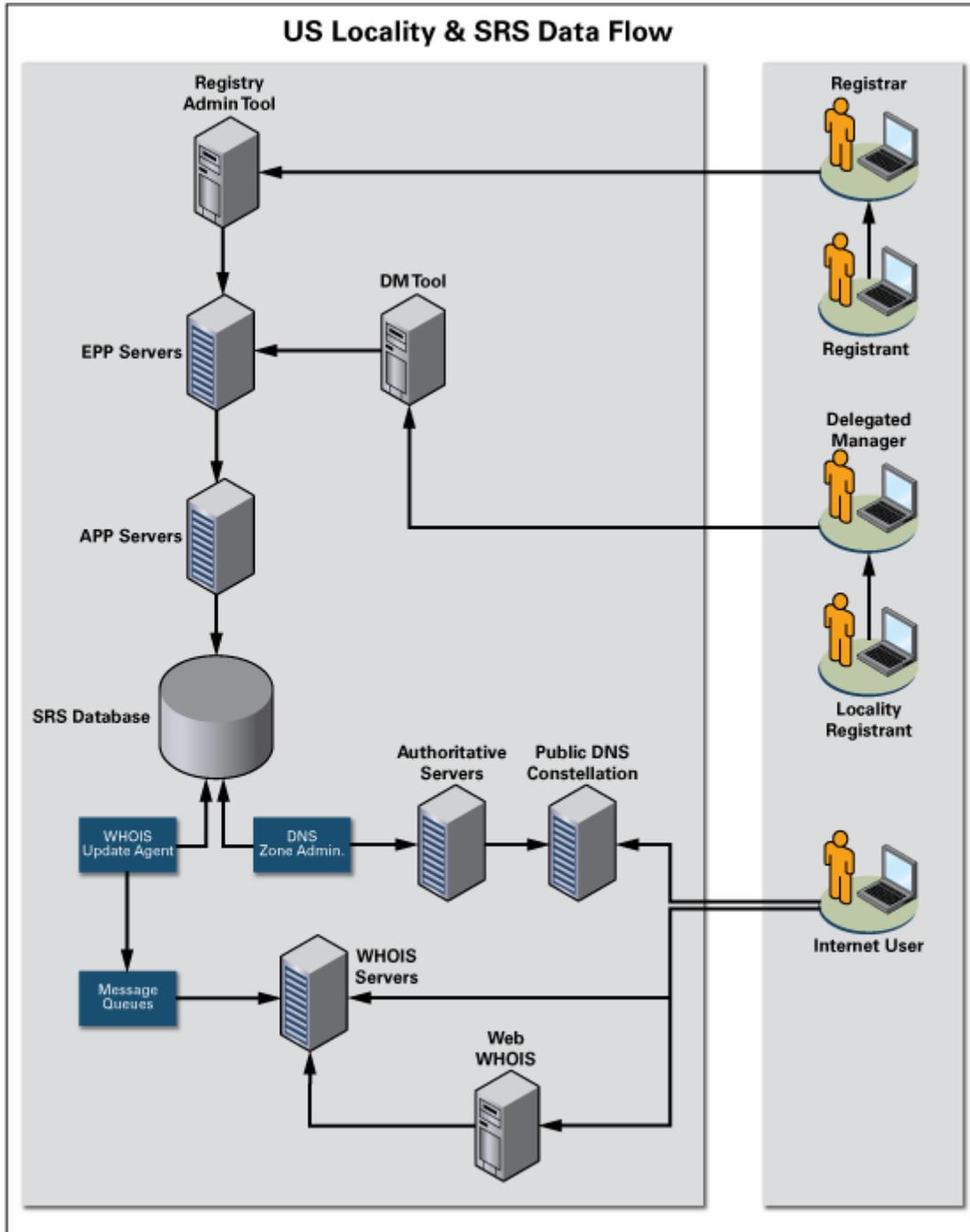
Our geographically dispersed WHOIS sites each contain multiple load-balanced servers with independent databases. NeuStar's platform is designed and has been proven to support stable

query service for well over a million domains as well as for all associated contacts and nameservers with near real-time dynamic update.

Exhibit B-11 illustrates the high-level architecture of this system.

Exhibit B-11. *SRS architecture accommodates requirements of locality space.*

NeuStar's architecture includes the following sub-components:

WHOIS Service Elements: The WHOIS is optimized for speed using an in-memory database. This architecture was developed to ensure compliance with the usTLD SLA of 95% of all queries responded to in less than 1.5 seconds. NeuStar has exceeded this requirement throughout the contract term and has, in fact, met a 100% service level for the past four years.

To ensure stability from data miners we have also designed built-in support to limit the number of queries a client may perform.

In support of potential future internationalization of the usTLD namespace our WHOIS service also has built-in support for multilingual contact information. If the domain name being queried is an international domain, the returned results include the language of the domain name, the domain name's Unicode HEX representation, and the Unicode's HTML encoding.

Web WHOIS page: NeuStar provides a usTLD WHOIS web page (www.whois.us) utilizing a farm of web servers distributed in two geographically separate data centers. This WHOIS service provides the same query capabilities (Domain, contact, nameserver and registrar) as our port 43 WHOIS servers. Our web WHOIS page also has the capability to support internationalized domains. For example, we have support for Unicode searches, we can display both Unicode and ACE-encoded forms of the domain name and we provide a Unicode to Punycode and punycode to Unicode translator.

SRS database: The SRS database is the main persistent store of the usTLD registry and the SRS Database maintains a history of WHOIS. The Update Agent uses the SRS database to compute what WHOIS updates need to be pushed out. NeuStar's near real-time process has advantages over both true real-time (instantaneous) updates and low frequency updates. While true real-time updates may seem to be the most appealing option, it imposes extra processing needs on the SRS and negatively affects the performance of registration services. In addition, customers have not expressed a need for such instantaneous updates. By using a dynamic update process, we are able to comfortably meet customer needs and our SLA of 95% within 10 minutes. Low frequency updates are simply not effective in ensuring an accurate WHOIS database.

The centralized usTLD database is escrowed on a regular basis with an escrow agent that is acceptable and approved by both NeuStar and the COTR. The Centralized usTLD database is the

heart of the usTLD registry; the publicly accessible WHOIS, contains the Delegated Manager WHOIS and the zone files are all be created from this database. Centralizing and escrowing the registration information ensures the integrity, security, and reliability of the entire usTLD.

In summary, NeuStar collects and stores all WHOIS and DM data in our core SRS database and then distributes the data to various geographically distributed servers. The collection of data occurs through multiple sources, mainly usTLD registrars, but also through the below described US Locality processes.

Collection of Data

The usTLD is unique in that the Administrator acts as a registrar in the usTLD locality name space in cases of undelegated third-level names. NeuStar has implemented a web-based interface for registrants to establish their use and management of locality domain names. Upon initial registration, registrants are provided with authenticating information that needs to be submitted for future changes and updates to the registration. This permits an extra level of security and ensures that the appropriate registrant is modifying the name.

Similar to the second level space NeuStar gathers information about the registrant to populate the central usTLD database, creates a WHOIS record, and updates the zone file. 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.

NeuStar instituted approved processes to perform a variety of functions critical to the successful management of the space. These processes include:

- "Take-downs" of US Locality domains which are either not operational or compliant with contract policies. After a through review between Neustar and the NTIA the delegations are moved to a web page with instructions for how the domain registrant can re-institute the domain if so desired.

- "Take-Backs" of US Locality domains from delegated managers who do not want to or refuse to comply with approved, published policies. This is an example where we work with existing Delegated Managers to move the zones that they manage into the usTLD infrastructure.

Existing Delegated Managers continue to provide registration services to registrants within their designated localities. However, their functions have been expanded so that NeuStar can store information for all of the registrants in the usTLD name space. Delegated Managers and Registrants are responsible for providing NeuStar with registration information for each name that they manage, 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 Delegated Manager chooses to host the registered names above third level on their own nameservers then they do not need to provide resource record information to NeuStar. As an additional service, NeuStar hosts resource records in the usTLD zone file created at the registry. In cases where Delegated Managers choose to take advantage of this option, they must provide NeuStar with the appropriate resource record information.

NeuStar provides a secure web-site where Delegated Managers can provision this information with the usTLD registry. Each Delegated Manager is provided with authenticating information to ensure that they are modifying records within their name space.

Registrants can register names through a Delegated Manager in the locality space, and they can register through competitive registrars in the second level name space. All domain name holders and registrars are included in the central usTLD database and the central WHOIS database.

All WHOIS information is free and publicly available over a web-based interface that allows for multiple string and field searches. NeuStar provides 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 is available through the usTLD web interface and port 43.

WHOIS Information Under the usTLD

Locality Space

Registrants:
- Name of the domain registered
- Internet Protocol (IP) address of the primary nameserver and secondary nameserver(s) for the registered domain name
- Corresponding names of those nameservers
- Identity of the delegated manager under which the name is registered
- Creation date of the registration
- Name and postal address of the domain name holder
- Name, postal address, e-mail address, voice telephone number, and (where available) fax number of the technical contact for the domain name holder
- 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:
- Name of the delegated manager
- Delegated Manager ID
- IP address of the primary nameserver and secondary nameserver(s) for the delegation
- Corresponding names of those nameservers
- Date of delegation
- Name and postal address of the delegated manager
- Name, postal address, e-mail address, voice telephone number, and (where available) fax number of the technical contact for the delegated manager
- Name, postal address, e-mail address, voice telephone number, and (where available) fax number of the administrative contact for the delegated manager

Second Level Space

Registrants:
- Name of the domain registered
- IP address of the primary nameserver and secondary nameserver(s) for the registered domain name
- Corresponding names of those nameservers
- Creation date of the registration
- Name and postal address of the domain name holder
- Name, postal address, e-mail address, voice telephone number, and (where available) fax number of the technical contact for the domain name holder

WHOIS Information Under the usTLD

Registrars:	• Name, postal address, e-mail address, voice telephone number, and (where available) fax number of the administrative contact for the domain name holder • Name of the registrar • Registrar ID • Registrar status (e.g., active, pending) • Name and postal address of the registrar • Name, postal address, e-mail address, voice telephone number, and (where available) fax number of the technical contact for the registrar • Name, postal address, e-mail address, voice telephone number, and (where available) fax number of the technical contact for the registrar • Name, postal address, e-mail address, voice telephone number, and (where available) fax number of the billing contact for the registrar

Provisioning existing information required an outreach effort to the current delegated managers. The first step was to contact the delegated managers through contact information provided by the previous usTLD Administrator. 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 analyzed these 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 was able to do the initial outreach effort.

Once the delegated managers were contacted, they were 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 offered them options as to how they can provide us this information. They are able to provision it on a secure website or they are able to send us a file in a format provided by NeuStar. It was necessary for the delegated manager to contact their registrants for some of the information we requested. This was an iterative process with regular contact between NeuStar and the delegated manager until the information was verified.

Conclusion

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