B.2 Core Registry Functions

NeuStar's proven experience in delivering high-quality public resource administration services will ensure that registrars, delegated managers, and registrants receive a total service package delivered in a neutral, even-handed manner.

Any administrator of the usTLD must understand the complexity of functions and services that need to be offered. In addition to understanding the needs of registrars and their registrants, this administrator must also appreciate the needs of delegated managers and registrants in the hierarchical locality space, whether they register through the registry or through a delegated manager. The ability to administer a system with three distinct types of end-users, all with their own needs and issues, requires support services that can respond to all of these needs.

HIGHLIGHTS

- **NeuStar's total service package will contribute our vision of turning the usTLD into the model of a country code top-level domain.**

- **Additional services are designed to serve all of the registry's customers, including registrars, delegated managers, and registrants.**

- **We will provide a comprehensive suite of Core Registry Functions, leveraging our Centralized usTLD Database and Enhanced SRS.**

As depicted in Exhibit B.2-1, usTLD registry services, zone file generation, and Whois services are the central components of our registry service offering. These components on their own make up a simple registry; however, there are equally important support functions that make up a truly successful usTLD registry. Our total service package, highlighted below and in Sections B.2.1 through B.2.16, includes all of the requirements listed in RFQ Section B.2 as well as the additional services and functions that we believe are necessary to serve all of our customers and to turn the usTLD registry into the model country-code top-level domain. As required, NeuStar will provide all systems, software, hardware, facilities, infrastructure, and operations to support these functions.
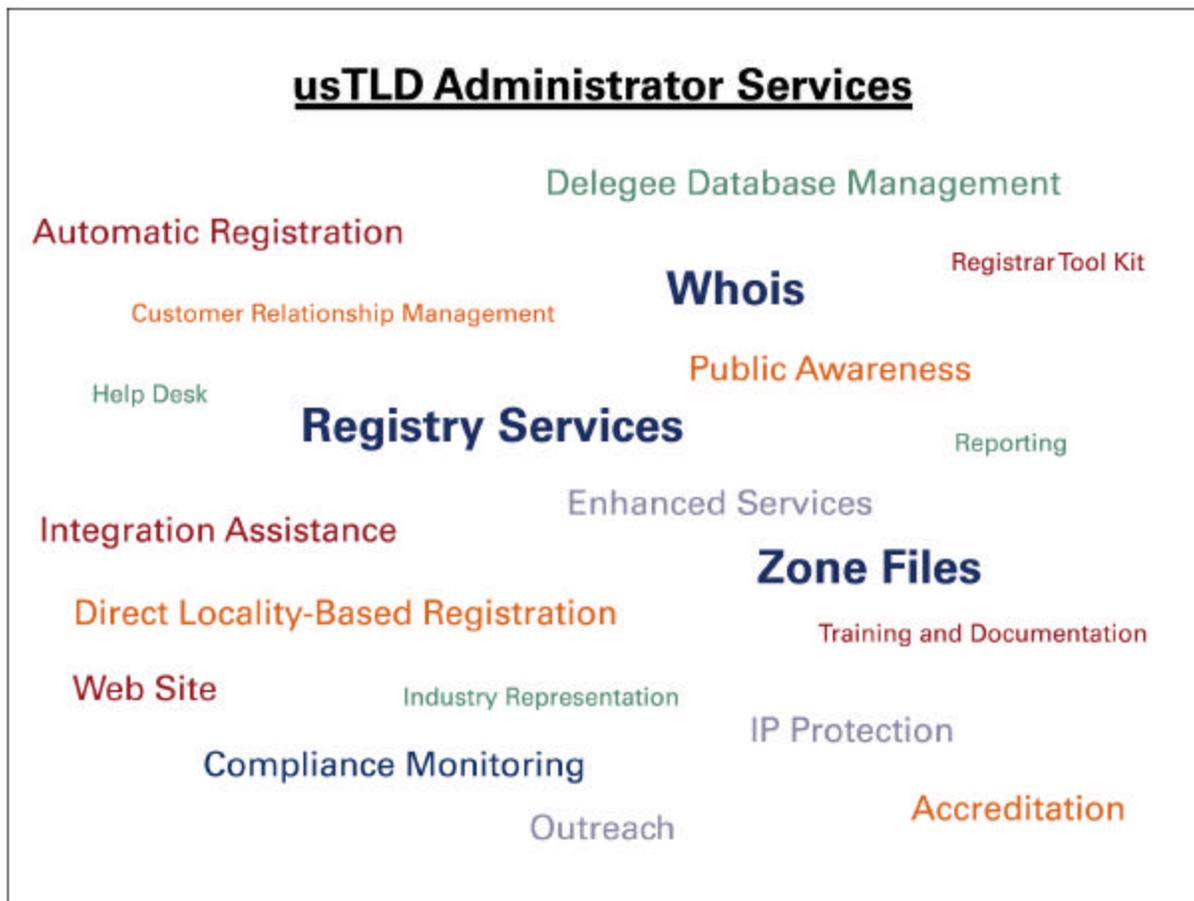
usTLD Nameserver and usTLD Zone File Administration—NeuStar's usTLD architecture is designed to be flexible, scalable and high-available to virtually eliminate downtime while providing for smooth growth. Redundant data centers in Virginia and Illinois ensure high service availability, while dynamic, near-real-time transfers of zone file data provides up-to-date, authoritative responses from the usTLD nameserver constellation.

Whois Database Administration–NeuStar will centralize the usTLD Whois database in both the expanded space and the locality space by developing and implementing two accurate and up-to-date, logical databases, one for registrants and registrars, and one for delegated managers. NeuStar's Web-based and port 43 interfaces to this enhanced Whois database will allow multiple field and string searches, freely available to the public.

usTLD Delegated Manager Database Administration—NeuStar will reach out to all delegated managers in the locality space in order to develop and implement a centralized database of delegated managers. This centralized information will serve registrants in the locality space while enabling us to contact those managers quickly to resolve issues effectively.

usTLD Administrator Services

Delegee Database Management

Automatic Registration

Registrar Tool Kit

Whois

Customer Relationship Management

Public Awareness

Help Desk

Registry Services

Reporting

Enhanced Services

Integration Assistance

Zone Files

Direct Locality-Based Registration

Training and Documentation

Web Site

Industry Representation

IP Protection

Compliance Monitoring

Outreach

Accreditation

003.usTLD

Exhibit B.2-1. *NeuStar will provide usTLD services with the best value and highest degree of quality and responsiveness.*

Data Escrow—NeuStar will arrange frequently for data escrow of the usTLD registry, to maintain continued operations and availability in the unlikely case of a catastrophic loss of data.

Industry Representation/Compliance—NeuStar's involvement with Internet standards and policy organizations will contribute to our operation of the usTLD as the model for a country code top-level domain.

Integration Assistance—NeuStar will implement an operational test-and-evaluation facility and provide registrars with Registrar Tool Kit software in order to familiarize them with our thick registry and assist them in passing our technical certification process.

Compliance Monitoring—NeuStar will monitor delegated managers for technical compliance, not only as part of our initial compliance investigation and report, but also throughout the life of their delegations. This will ensure that NeuStar's database remains up to date, that delegated managers remain compliant with usTLD technical requirements, and that the usTLD retains a U.S. Nexus. This compliance monitoring will maintain the improved integrity of the usTLD.

Web Site—NeuStar will develop and implement a usTLD Web site for the Internet community as well as for private members, including delegated managers and registrars. This Web site will provide access to registry functions, information to the Internet community, and the ability to register domain names in the undelegated locality space.

Documentation and Training—At NeuStar, we believe that clear, concise documentation and training for our staff and our customers is essential to provide the best service to those customers. NeuStar's external documentation, from our Programmer's Guide to our information on marketing the usTLD, are intended to give our customers the highest level of comfort when working with the usTLD registry.

Customer Relationship Management—NeuStar's enterprise-wide CRM program assists with channel management and outreach for the usTLD. We use CRM in combination with our extensive market and customer knowledge to ensure that we meet our commitment to timely, responsive, and high-quality customer service.

Reporting—NeuStar's Web-based reporting system will have built-in functionality to provide reporting information to registrars on all aspects of their interaction with the registry.

Progress and Quarterly Reporting—As required, NeuStar will submit progress reports to the DOC that will indicate the status of all major events and all major work performed during the reporting period.

Help Desk—NeuStar will provide Help Desk services through our IP Customer Service Center, and will provide assistance to registrars, delegated managers, and registrants in the undelegated locality space.

NeuStar's experience in providing mission-critical services to the telecommunications industry has given us an understanding of what functions constitute the best service packages. The functions and services outlined in this section represent what NeuStar has come to believe are essential for a total package solution, and our flexibility will allow us to incorporate additional services as changes in the industry require them. A registry is more than servers and databases; it must serve its customers not just as a set of servers, but also as an administrator providing services to support those customers.

B.2.1   Primary usTLD Server

The essential core function of the usTLD Registry is providing authoritative name service for its domains.

Failure of a usTLD administrator to provide a reliable, secure, and robust nameserver function represents a fatal flaw in its system and ensures an unsuccessful administration of the usTLD. NeuStar will implement a nameserver architecture that is highly superior to the traditional architecture that likely will be adopted by other bidders.

The traditional implementation begins with one nameserver acting as the primary ("master") for zone data, which would then be transferred to secondary ("slave") servers. Located in physically separate locations, these multiple authoritative servers provide robust and reliable responses to DNS queries.

The primary nameserver holds the most current authoritative data for its zone. Secondary nameservers are also authoritative, but their data must be brought up to date by zone data transfers from the primary nameserver. The same requirement for at least two authoritative servers, one primary nameserver along with one or more secondary nameservers, applies to all registrants seeking to provide name service for their delegated domains.

NeuStar's architecture and dynamic services exceed the capabilities of the traditional approach. Our proposed technical solution provides two co-active data centers in Virginia and Illinois plus one nameserver data center in California—each of which is independently capable of

processing the full data center workload. Multiple nameserver sites dispersed across the United States protect against natural or man-made disasters. Moreover, the architecture scales to support future growth of the usTLD.

Essentially, each NeuStar nameserver for the usTLD is a primary, authoritative nameserver. With near-real-time updates of zone data being handled by NeuStar's redundant, high-availability database servers, each usTLD nameserver is targeted to its primary function—providing authoritative responses to DNS queries of the usTLD.

Registry data are replicated on redundant, high-availability database servers at the data centers. Zone data are dynamically updated from these databases and propagated to all the nameservers. Zone file data on the nameservers are updated in near real time. This timely distribution of updates is a significant improvement over the traditional implementation of zone data deployment.

The benefit to the United States and the Internet community of NeuStar's enhanced approach is a solid architecture with dynamic services designed to maintain maximum stability of the usTLD and the Internet and promote user confidence.

The following sections describe the operation and maintenance of authoritative nameservers for the us TLD. NeuStar's Technical Plan is described in detail in Section O of this document.

B.2.1.1 NeuStar's Multiple Primary Nameservers

A nameserver handles resolution of usTLD domain names to their associated nameserver names and to the IP addresses of those nameservers. NeuStar's nameservers will be dynamically updated from NeuStar's usTLD Zone Update Database over secure VPN links.

Each of NeuStar's nameservers for the usTLD is a primary, authoritative nameserver because each one acquires the same authoritative zone data, in near-real-time, directly from the authoritative database of usTLD registry data. This implementation provides high availability and scalability, along with significant operational benefits compared with the more traditional approach based on primary and secondary nameservers.

B.2.1.2 General Description of Proposed Facilities and Systems

NeuStar submits that its redundant, high-availability architectures, including redundant facility implementation, high-availability cluster server architectures, redundant high-availability database technology, and redundant alternate routed network connectivity, provide significant support for mission-critical service availability. The Internet community must be able to depend on the Internet as a stable, highly available infrastructure for worldwide collaboration and commerce.

B.2.1.2.1 Facilities Sites and Availability

NeuStar's architecture, consisting of redundant data centers and multiple nameserver sites, provides a seamless, responsive, and reliable registry service. Our data center sites are geographically dispersed and interconnected with Virtual Private Network (VPN) capability to provide access to countrywide coverage and protect against natural and man-made disasters and other contingencies. The facility locations are provided in the following table:

Facility Site Locations

Data Center Sites	Site Location
NeuStar Data Center and Nameserver Site	Illinois
NeuStar Data Center and Nameserver Site	Virginia
Third Nameserver Site	California

NeuStar's proposed usTLD Registry Service Level Agreement (SLA) provides service levels commensurate with mission-critical services for availability, outages, response time, and disaster recovery. Highlights of the SLA include:

- Registry Service Availability at 99.9%, with a design goal of 99.99% per year, and

- Nameserver Service Availability at 99.999%.

B.2.1.2.2 Data Center Functional Description

High-availability registry services can be provided only from facilities that have been designed and built specifically for such a critical operation. NeuStar's data centers incorporate redundant uninterruptible power supplies; high-capacity ventilation and climate control; fire suppression; physical security; information system security; firewalls with intrusion detection; redundant, high-availability cluster technology; and redundant network and telecommunications architectures. When selecting the sites, we also considered their inherent resistance to natural and man-made disasters. The functional block diagram of our enhanced SRS data center is depicted in Exhibit B.2-2. As can be seen from the referenced exhibit, the data center is highly redundant and designed to eliminate any single point of failure.

Each data center facility provides the functions listed in the system function table below:

Data Center System Functions

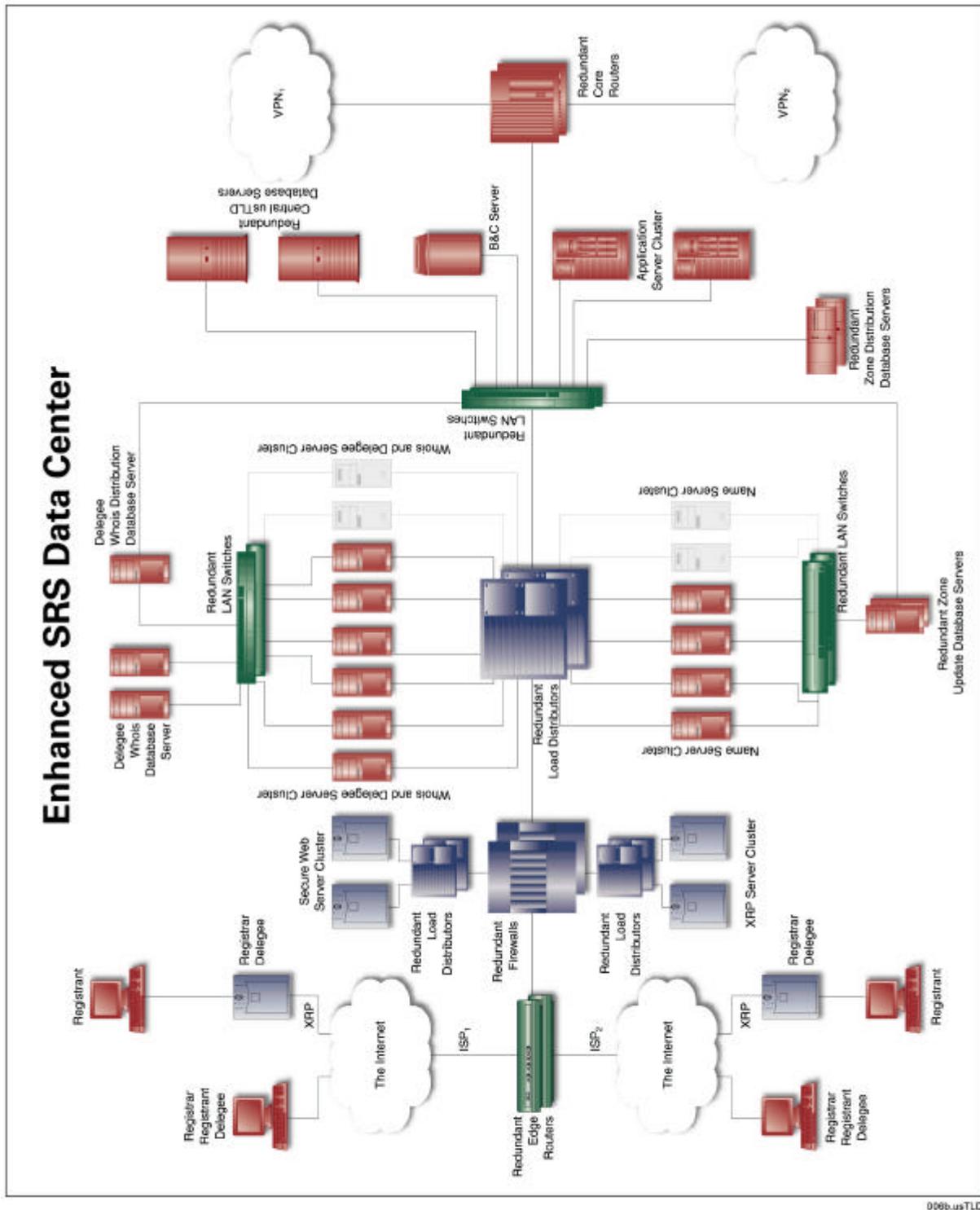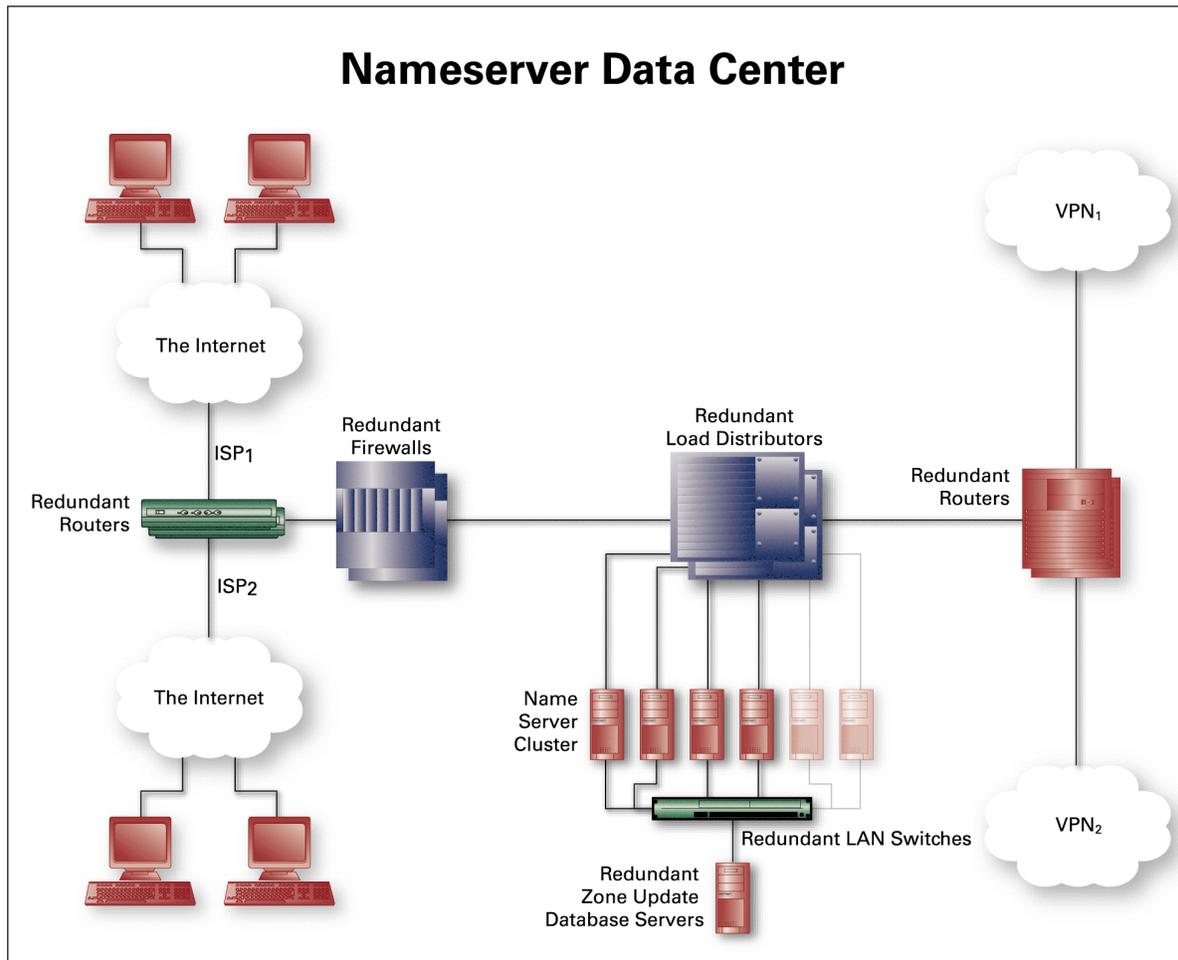|		
Web Server	Delegee Distribution Database	Systems/Network Management Console
Protocol (XRP) Servers	Delegee Distribution Clusters	Applications Administration Workstations
Application Servers	Delegee Servers	Building LAN
Central usTLD Database Servers	Zone Distribution Database	Firewall
Whois Distribution Database	Billing and Collection	Load Balancers
Whois Database Clusters	Authentication Services	Telecommunications Access
Whois Servers	Backup Server	Central Help Desk

Exhibit B.2-2. Redundant network connectivity, high availability clusters, redundant , and replication to a second data center provide 99.9% availability and scalability.

B.2.1.2.3 Nameserver Site Functional Description

NeuStar's usTLD nameservers will be colocated with the data center sites described above, with an additional nameserver in California, and their architectures are consistent with NeuStar's redundant, high-availability approach. Additional nameserver sites will be added as demand warrants.

The functional block diagram of NeuStar's nameserver sites is depicted in Exhibit B.2-3. As can be seen from the exhibit, the nameserver sites are configured to be remotely managed and operated "lights out." The hardware configuration is highly redundant and designed to eliminate any single point of failure.

Exhibit B.2-3. *Redundant network components and high availability nameserver cluster provide scalable high availability.*

The following function table lists the nameserver functions.

Nameserver System Functions	
Zone Update Database	Firewall
Nameserver	Load Balancers
Building LAN	Telecommunications Access

B.2.1.2.4 Building Environment and Security Description

Each NeuStar data center facility is located in a modern, fire-resistant building that offers inherent structural protection from such natural and man-made disasters as hurricanes, earthquakes, and civil disorder. Sites are not located within a 100-year flood plain. Facilities are protected by a public fire department and have their internal fire-detection systems connected directly to the fire department. Data centers are protected from fire by the sprinkler systems of the buildings that house them. Furthermore, each equipment room is protected by a pre-action fire-suppression system that uses Inergen gas as an extinguishing agent.

Provisions have been made for the following environmental factors:

Environmental Factors	
Ventilation and climate control	Primary electrical power
Lighting	Backup power supply
Control of static electricity	Grounding

In addition to providing physical security by protecting buildings with security guards, closed-circuit TV video surveillance cameras, and intrusion detection systems, NeuStar vigilantly controls physical access to our facilities. Employees must present badges to gain entrance and must wear their badges at all times while in the facility. Visitors must sign in to gain entrance, must display their badges, and must be escorted by a NeuStar employee.

On-site security personnel are on duty 24 hours a day, 7 days a week to monitor the images from closed-circuit television cameras placed strategically throughout the facilities. Security personnel are stationed at building access points throughout normal working hours; at all other times, individuals must use the proper key cards to gain access to the buildings. Further, access to rooms housing sensitive data or equipment is additionally secured with palm-print readers. Senior facility managers establish the rights of employees to access individual rooms, and the palm readers compile and record access logs.

B.2.1.3 Description of System Functions

This section provides descriptions of systems functions at NeuStar data center and nameserver Sites that underlie the fundamental operations of the usTLD primary nameserver(s). Key features of these sites include the following:

- Co-active redundant data centers are geographically dispersed to provide mission-critical service availability due to two-way database replication between the centers.

- Nameserver sites are designed with full redundancy, automatic load distribution, and remote management for "lights out" operation.

- A VPN provides a reliable, secure management network and dual-homed connectivity between the data centers and the nameserver sites.

- Each SRS data center and nameserver site uses high-availability cluster technology for flexibility, scalability, and high reliability.

- Registry systems are sized to handle the projected workload and can grow incrementally to accommodate workload beyond those levels.

- The registry database uses redundant, high-availability server architecture and is designed for fully redundant operations with synchronous replication between the primary and secondary nameservers.

B.2.1.3.1 Server Platforms

NeuStar is proposing cluster server platforms for installation at each site. The servers are selected for applications depending on the requirements, storage capacity, throughput, interoperability, availability, and level of security. These server platform characteristics are summarized as follows:

- Nameserver clusters and zone update servers are implemented with moderate-level Intel server clusters that include the following features:

    Rack-mounted Intel 700-Mhz, 32-bit, 2- to 6-way SMP CPUs with 8 GB of ECC memory; CD-ROM; four hot-swap disk drives (9–36 MB each); redundant hot swappable power supplies; dual attach 100 BaseT Ethernet Adapter; clustering and event management software for remote management; Red Hat Linux 6.1; and controlled access protection security.

- The redundant, high-availability servers for the Registry's database are implemented on high-end RISC server clusters with the following features:

    RISC 550-MHz CPU; 64-bit 2- to 32-way cross-bar SMP with 8x8 non-blocking multi-ported crossbar; 32 GB ECC RAM; 240 MB/sec channel bandwidth; 288 GB Internal mass storage; 50 TB external RAID storage; redundant hot swappable power supplies; dual attach 1,000 BaseTX/FX Ethernet adapter; clustering and event management software for remote management; and a Unix 64-bit operating system with controlled access protection security.

B.2.1.3.2 Data Center Systems

The data centers provide co-active fully redundant system configurations with two-way replication over a high-speed VPN network, a colocated complete nameserver, and dual-homed connectivity to Internet Service Providers (ISPs).

Complete nameserver implementations for DNS queries are colocated in each data center site and at a stand-alone site in California. Their connectivity includes redundant ISP and VPN local access links to provide alternate routed connectivity to Internet users and internal networks. Redundant Internet firewalls provide policy-based Internet Protocol (IP) filtering to protect our internal building LAN from intruders and hackers.

The redundant, high-availability database servers consist of two identical redundant, high-availability RISC systems that are designed for high-volume, online transaction processing

(OLTP) database applications. The database management software is based on a parallel database architecture with a redundant, high-availability server option capable of maintaining 24 x 7 availability. The redundant, high-availability server supports high-availability operations by implementing synchronous replication. The database enables transparent database failover without any changes to application code or the operating system. Clients connecting to a replicated database are automatically and transparently connected to the replicated pair of databases. The database replication feature enables maintaining geographically separated data services for multiple sites over a WAN to provide disaster recovery.

B.2.1.3.3 Nameserver Description

Two nameserver sites are colocated at our data centers, with a third stand-alone site located in California. The nameservers are geographically dispersed with dual-homed Internet and VPN local access telecommunications links to provide resilience and disaster recovery. Nameserver sites are configured to operate "lights out." The hardware configuration is highly redundant, is designed to eliminate any single point of failure, and has exceptionally high throughput. Nameserver subsystem functions that are critical components for operating a primary, authoritative nameserver include the following:

- **Zone Update Database—**The zone distribution database at the data center is propagated to the zone update database using replication over the VPN. The zone update database is not hit when resolving DNS queries; instead, the nameservers update their in-memory database from the zone update database, within defined service levels.

  In effect, nameservers are freed of the loading for handling zone transfers, just as the zone update functions are freed of the loading for handling DNS queries and responses. The capability to insulate systems by separating processing loads is a key feature of NeuStar's systems architecture.

- **Nameserver Cluster—**The nameserver cluster handles resolution of TLD domain names to their associated nameserver names and to the IP addresses of those nameservers. The resolution service can handle the expected load, and our load-balanced architecture allows additional servers to be added to any nameserver cluster to allow on-demand scalability.

  The nameserver cluster is based on a high-availability, rack-mounted, multiple computer cluster. A TCP/IP server load balancer switch with a dynamic feedback protocol is used to distribute the load from Internet users to ensure that traffic is not routed to overutilized servers.

- **Functions External to Nameservers—**A major feature of NeuStar's implementation is the matching of functions to platforms. Critical nameserver functions are implemented on nameserver systems. Related functions that are not specifically critical to nameserver DNS-query-response operation are located on other platforms that are external to the nameserver platforms.

  Whois servers, for example, facilitate rapid response to Whois queries without putting any load on the nameservers and without any impact on name service functionality. As mentioned above, the traditional functions of DNS query/response handling and zone transfer processing are also performed on separate platforms.

B.2.1.3.4 Data Center Networking

Networking at the data centers provides both Internet connectivity and VPN capabilities. Nameserver and data center connectivity support fundamental operational functions for name service and zone data.

Internet connectivity is provided by multiple T-class local access telecommunications links at each of our data centers, enabling each to provide usTLD services independently of the other. The bandwidth and capacity available are provisioned to handle current loads and expected growth for at least two years.

Connectivity to each data center is via redundant routers, with load balancing that distributes the query load among the nameservers in that site's cluster, and with alternate routing to provide resilience against cable faults and loss of local access telecommunications links. Telecommunications access links for VPN capabilities are dual homed and also use redundant routers and alternate routing.

The Nameserver site is connected to each data center via VPN, and the two data centers are connected by a pair of ATM links. The VPN capability provides secure networking for internal exchange of registry data. Important operational functions supported by these networking capabilities include the following:

- Nameserver database replication for updating zone data, and

- Remote administration and backup of the nameservers.

B.2.1.3.5 Nameserver Software Platform

For the DNS software platform, NeuStar will deploy an enhanced version of BIND. The DNS software will comply with the latest IETF standards [RFC 1035, RFC 2181].

B.2.1.3.6 Related Operational Requirements

For NeuStar's nameservers for the usTLD, there are operational requirements related to their roles as essential parts of the technical infrastructure of the Internet. In RFC2870, "Root Name Server Operational Requirements" (R. Bush et al, June 2000), the guidelines provided for the operation of the root nameservers are also provided as guidelines for the operation of ccTLD nameservers. The usTLD nameservers will comply with all relevant portions of the latest applicable standards for the proper, safe, and secure operation of such nameservers.

B.2.2   Secondary usTLD Servers

NeuStar proposes an architecture in which registry data are maintained on synchronized, redundant, high-availability database servers and in which zone updates are made to the usTLD nameservers in near real time. In effect, all such nameservers would be primary nameservers, and a DNS query would receive the same authoritative response, irrespective of which particular nameserver had received the query. This is desirable DNS behavior.

As described in Section B.2.1 above, secondary nameservers are components of the traditional implementation of name service.

A secondary nameserver would obtain authoritative zone data from the primary nameserver for a zone. The primary nameserver would have the responsibility for maintaining the authoritative zone data, generating the zone data file, and supporting zone data transfers. The "current" zone data would be propagated from the primary to secondary nameserver(s). Until all secondary nameservers were updated, the response to a DNS query might depend on which

particular nameserver generated the response. Getting possibly different responses to the same query is not a desirable result.

In fact, if a secondary nameserver received its zone data updates from another secondary nameserver, rather than from the primary nameserver for the zone, the overall propagation delays for updates would be doubled. This is even less desirable.

Section B.2.1 above describes the proposed operation and maintenance of primary authoritative nameservers for the usTLD. Since all of the proposed usTLD nameservers would be primary, that Section therefore describes the operation and/or administration of the constellation of authoritative servers for the usTLD.

B.2.3   usTLD Zone Files

NeuStar proposes generating zone files in near real time, a major improvement that will eliminate some serious deficiencies in the current TLD system. This capability ensures that the usTLD nameservers will respond to DNS queries with the most timely, accurate, authoritative, and consistent responses possible.

A zone file is a flat database file consisting of the technical information that the DNS requires to function correctly: the domain name, nameserver host name, and IP address are the primary data elements.

Zone file generation is the term traditionally used to describe the process of generating a zone file from the registry database, deploying it to the primary root server, and then propagating it out to the secondary servers. However, this process traditionally is batch-oriented: there are delays incurred before updates to authoritative data are actually available for use in all the authoritative nameservers.

NeuStar proposes a significant improvement over traditional zone file generation and propagation (i.e., updating the zone file data in near real time within defined service levels). Just as the current TLD system does, our proposed registry TLD would store the usual DNS resource records in the zone file database.

Unlike the current system, however, NeuStar's model does not periodically generate a zone file and then publish that new file to a set of nameservers. This proposal describes our process for creating updates for the nameserver files, including information about distributing and publishing the updates. NeuStar's Technical Plan is described in detail in Section O of this document.

B.2.3.1   Current Zone File Generation—Problems and Solution

The current zone file creation process has caused many problems for both registrars and registrants. The process is based on the traditional approach of using a single primary nameserver, which maintains the authoritative data locally, and one or more secondary nameservers, which receive transfers of the primary's data. These nameservers ultimately contain authoritative data for their zones, meaning that they can respond to queries about their zones based on their locally held data, without the need to further query other nameservers before responding. However, the traditional process incurs delays and may, at times, return inconsistent responses to queries.

Registrants, in particular, have been troubled by the long delay before their registered domain names go live (or are redelegated). The following are common issues with the current process:

- Zone file update (and propagation) is a batch process performed twice a day.

  - Because updates occur infrequently, registrants have an additional delay before their domain names become "live." This delay confuses the registrants who, assuming that a problem exists, contact the registrar. The registrars must, in turn, respond by deploying unnecessary customer support resources.

  - Currently, Web sites can easily go down when a registrant transfers a domain name to a new hosting provider. This occurs when, because of the current delay in zone file generation, the original hosting provider removes the Web site before the DNS is updated with the new delegation information. This adversely affects the general stability of the Internet.

- Zone file information does not match Whois information because the two files are often updated at different times.

  - Currently, registrants can update zone information and then check the Whois server to verify it. Because the zone file and Whois service are not synchronized, the registrants become confused. As with delayed zone file updates, this information mismatch causes additional and unnecessary customer support demands on registrars.

To solve the problems inherent in the traditionally based implementation of zone file generation, NeuStar proposes to introduce a significant improvement to zone file generation and propagation processes. We will update the zone files in near real time within defined service levels. Near-real-time updates provide the following significant advantages:

- They eliminate the synchronization problems that now occur when information is modified.

- They enable us to define and monitor service levels for the maximum allowable time between zone file updates.

The proposed approach enhances the value of the usTLD by providing the most timely, accurate, authoritative, and consistent responses possible to DNS queries of the usTLD.

B.2.3.2   Secure Access to Update Zone File Data

Under NeuStar's proposed solution, the Centralized usTLD database in the data centers stores all data used to generate and distribute the zone file updates. For security reasons, neither delegees nor internal data center staff can access this database directly; the application server tier controls all database access. Registrars/delegees access the database (through the application servers) using the XRP protocol via the protocol servers. The following procedures govern creating and modifying database information:

- Registrars/delegee are solely responsible for creating, modifying, and deleting information that updated the zone file. The XRP protocol is the only gateway available for zone file editing, and is accessed using XRP servers.

- A registrar/delegee gains access to a domain name (and associated nameserver) when registering that domain name or when the appropriate Transfer of Registrar is enacted. In the case of a Transfer of Registrar, access control is revoked from the losing registrar after the transfer.

- Access control to zone file data for XRP "Delete/Modify Domain Name" commands is granted only to the registrar/delegee that has management rights over the domain name.

- In the case of an XRP "Create/Modify/Delete Nameserver" command, access control is granted only to the registrar/delegee with management rights over the parent domain name.

Other proposal sections provide additional security related information, including information about deployment security, system and network security, and access-control authentication and authorization.

B.2.3.3   Frequency of Zone File Generation

NeuStar will generate zone file updates (diffs) at regular intervals within defined service levels. Our solution enables us to meet any reasonable service level merely by adding incremental hardware items and reconfiguring system software settings.

Any real-time zone file update procedure must not degrade the performance of the core registration system. NeuStar's solution will enable us to agree to service levels that guarantee the zone file distribution database is updated within defined intervals—initially 15 minutes—without adversely affecting core registration operations.

In addition, NeuStar will provide a Zone File Access Program, which will enable registrars and delegees to access the zone file in bulk. Our proposed query program will:

- Reduce the load placed on the nameservers by data mining programs (e.g., some ISPs use data mining to accelerate domain name availability checking) and

- Provide the entire database in a consistent format that will facilitate such services as suggesting alternate names, accelerating DNS queries, and compiling industry statistics.

Finally, NeuStar will provide for the essential functions for logging and data backup. All zone files and updates are generated using information from the registry database. All updates are recorded as database transaction logs. Information about the primary database backup and escrow systems, data center replication, and data recovery procedures is contained in other sections of this proposal.

B.2.3.4   Zone File Generation Architecture

Zone file information is stored in the registry database (along with all other registry data) and replicated to a zone distribution server. The database stored on the zone distribution server is in turn replicated out to a database at the nameserver data centers.

B.2.3.4.1 Zone File Replication

Each time the zone distribution database is modified and before the zone file update is replicated out to the nameserver data centers, the system performs a series of quality assurance checks. If any quality assurance checks raise an alert, operations staff must approve the deployment before the update is sent to the nameservers. The quality assurance checks include:

- Greater than a preestablished maximum number of modifications since the last update, and

- Greater than a preestablished maximum number of modifications since the last update for a special set of domain names used by key e-commerce sites. The alert threshold will be much lower for these domain names than for the previous check.

B.2.3.4.2 Standards Compliance

Each nameserver will run software that correctly implements the IETF standards for the DNS (RFC1035, RFC2181).

NeuStar will implement all applicable best-practice recommendations contained in RFC2870 (Root Nameserver Operational Requirements).

B.2.3.5   Zone File Distribution and Publication

NeuStar is proposing a significant improvement over traditional zone file generation and distribution by providing near-real-time updates of the zone file data.

The process of updating zone file information at the various nameserver data centers uses information from the zone distribution servers at the two co-active data centers, which are updated as described in Sections O.4 and O.5.

The databases on the zone distribution servers will be constantly replicated over a Virtual Private Network (VPN) to the zone update database at each nameserver data center. Each nameserver data center will, in turn, use its zone update database to update its zone file databases.

To ensure availability and provide scalability and redundancy, each nameserver data center will have a cluster of two or more nameservers behind a load balancer. This configuration enables NeuStar to rapidly accommodate increases in query load by simply adding servers to the cluster at the affected nameserver data centers.

The current zone file creation process has caused many problems—long delays before registered domain names go live or are redelegated—which can also confuse registrants, disable access to Web sites, and provide inconsistent responses to queries. Currently, zone file update (and propagation) is not real-time (the delay may exceed 12 hours), and zone file information may not match Whois information (updates often take place at different times).

These problems have consequences. Registrants are clearly affected when their domain names are not live. Registrars face additional costs for operations and customer support. Even the stability of the Internet is adversely affected when delayed zone file updates result in information mismatches and cause unnecessary additional loading.

NeuStar's improvement to zone file generation and propagation—updating the zone files in real time within defined service levels—is designed to eliminate synchronization problems that occur when information is modified, facilitate the deployment of innovative new technologies such as dynamic update, and enable definition and monitoring of service levels for zone file updates.

B.2.3.6   Locations and Architecture

The usTLD nameservers that NeuStar will deploy are located in Virginia, Illinois, and California. At the nameserver data centers, a zone update database constantly receives replication update packages from the zone distribution database server at the registry data centers. This zone update database is not 'hit' when the nameservers process requests; the nameservers use it only to update their zone file databases. NeuStar will deploy, for DNS software, a modified version of BIND. BIND has been modified to delete functions that are unnecessary for TLD root server operation and enhance functions that are critical to root server operations. The DNS software will comply with the latest IETF standards [RFC1035, RFC2181].

Near-real-time update of the zone file data (a significant improvement over traditional zone file generation and propagation) takes the zone file information stored in the registry master database and replicates it to a zone distribution server database.

The following two Exhibits B.2-4 and B.2-5, illustrate the zone file distribution and nameserver update processes.

The database on the zone distribution server at the registry data center is constantly replicated over our VPN to the zone update database at each nameserver data center. The update packages are compressed, encrypted, and sent with an appended checksum.

Every update package includes a checksum key, which is a generated checksum of the entire database up to and including modifications in that package. Each time a package updates a nameserver, the checksum is compared to the final state of the zone file data to ensure that the nameserver zone file corresponds to the zone file in the data center's database. If the checksums indicate an error, the nameserver asks the data center to replicate a full zone file to the nameserver. The update package replication process means that the full zone file should never need to be redeployed; however, NeuStar will provide this capability to recover from an unforeseen event. Should this capability be needed, propagating zone file updates may result in a 60-minute delay. We will include this as an exception in the Service Level Agreements (SLAs).

In the nameserver update process, each nameserver updates its zone file databases from its zone update database within defined service levels.

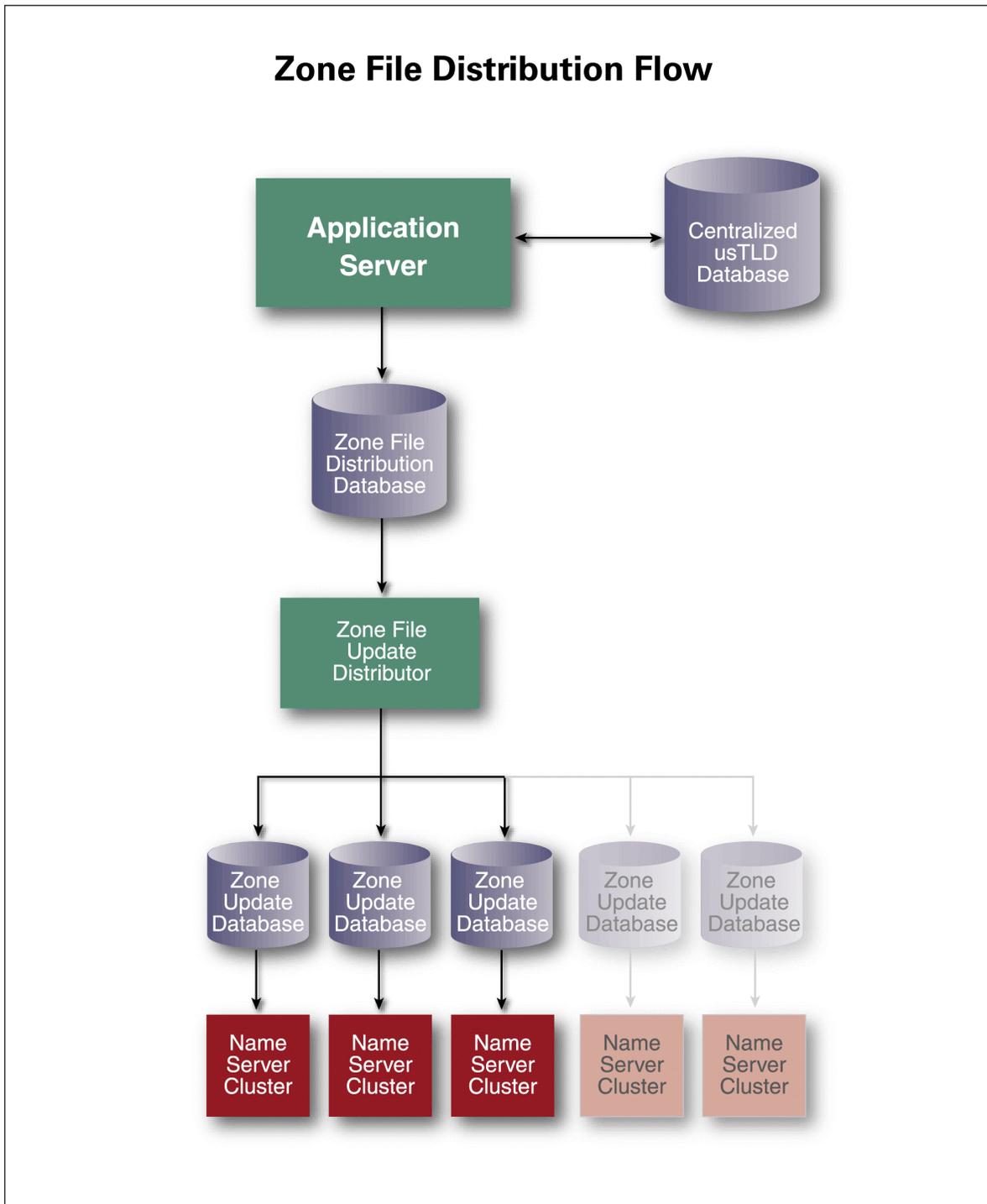## B.2.3.7 Frequency of Zone File Publication/Update

Any technical solution that includes real-time DNS updates must recognize that the most important function of the nameservers is responding to DNS queries. This requirement outweighs real-time updating of the zone file. NeuStar's solution is based on this reality. Although our real-time update process includes establishing and monitoring key parameters that measure compliance with agreed service levels, this process is subordinate to resolving DNS requests. Within this limitation, we are confident in recommending that no more than 15 minutes elapse before processing an update package. We will be willing to negotiate these or other SLAs to meet performance requirements in a way that safeguards the integrity of the Internet under heavy DNS load.

B.2.3.7.1 Monitoring and Logging

Our central network management system will log all modifications to the registry database, all zone file update actions, and all attempts at intrusion or other security-related events.
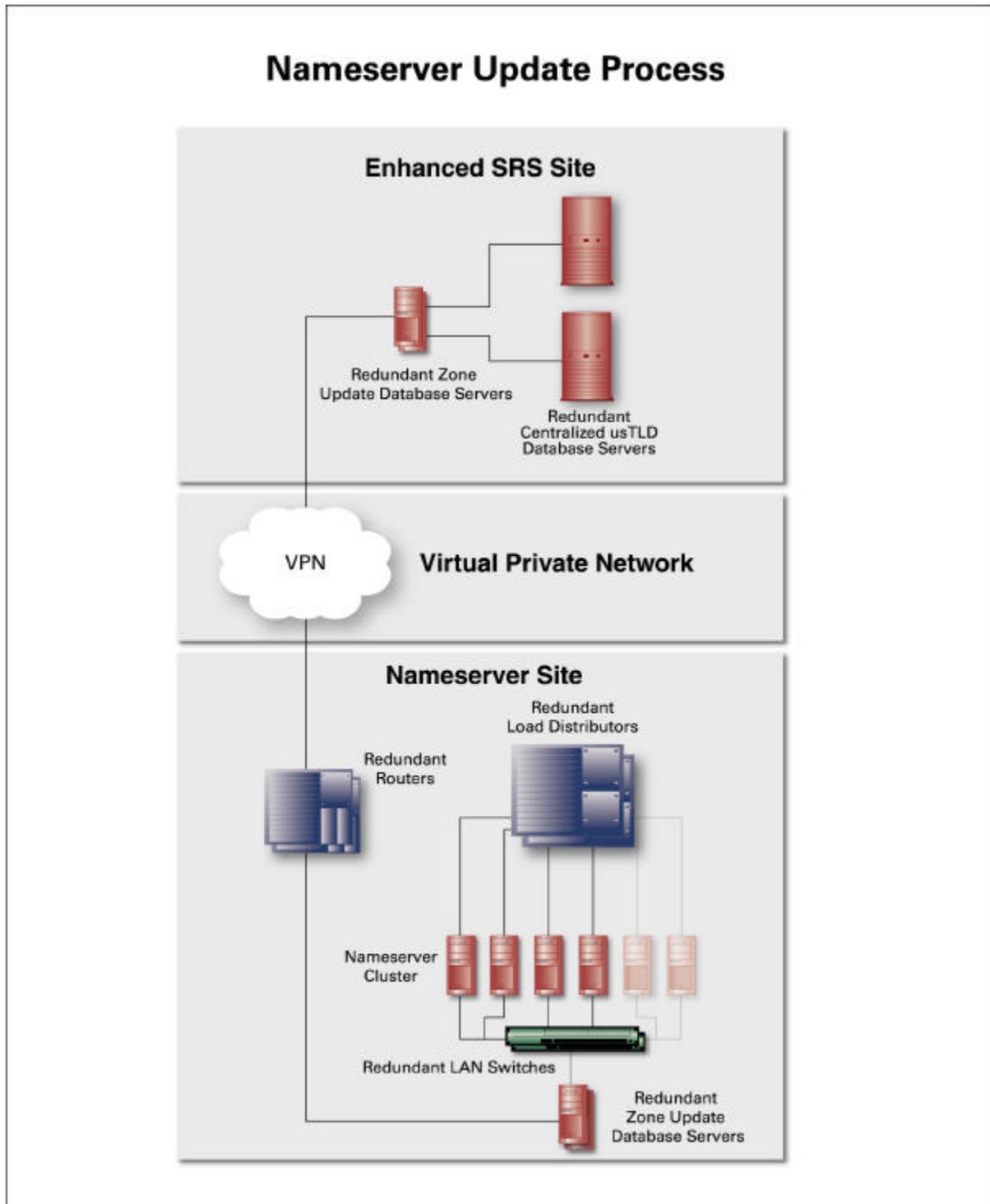
B.2.3.7.2 Standards Compliance

Each nameserver will run software that correctly implements the IETF standards for the DNS (RFC1035, RFC2181).

Zone File Distribution Flow

035a.usTLD

Exhibit B.2-4. *NeuStar's process for near real-time updating of the nameserver zone file databases ensures that consistent and timely data are always available.*

Nameserver Update Process

Enhanced SRS Site

Redundant Zone
Update Database Servers

Redundant
Centralized usTLD
Database Servers

VPN

Virtual Private Network

Nameserver Site

Redundant
Load Distributors

Redundant
Routers

Nameserver
Cluster

Redundant LAN Switches

Redundant
Zone Update
Database Servers

036a.usTLD

Exhibit B.2-5. *Maintaining a zone file database at each nameserver data center allows zone file servers to respond to DNS inquiries by accessing their own local zone file database. This maximizes efficiency and increases redundancy.*

B.2.4   Whois Database

NeuStar's centralized Whois database will ensure quality, consistent implementation and data, with all information available through publicly accessible means.

As part of our efforts to centralize all of the usTLD registration information and to make it available for Web-based queries, NeuStar will create and maintain an accurate and up-to-date centralized Whois database. In fact, NeuStar will actually administer two logical databases—one for registrants (in both the locality-based space and the expanded space) and registrars and one for delegated managers, that is, delegees and subdelegees. It is important to manage these entities separately because delegated managers are held to a higher level of accountability for the management of their namespace. NeuStar will maintain a Web site that will provide access to the Whois databases, and we will also provide a standard port 43 interface to the Whois data. In accordance with the RFQ, access to the Whois data via the Web site and to port 43 will be free of charge and available to the public, and the databases will allow for multiple field and string searches. Responses to Whois queries will indicate whether the record is in the registrant Whois or a delegated manager's Whois. NeuStar will reach out to the existing delegees and subdelegees to populate their information and their registrant's information in the databases.

Populating the Whois information in the expanded space will be done through the registrar at the time of registration. Registrations will not be considered complete without all of the appropriate information being provided. We will populate the data pertaining to the existing assignments by reaching out to the delegated managers, as well as by retrieving contact information contained in existing zone files of the usTLD administrator and of the delegated managers.

NeuStar will collect and update, at a minimum, the information listed below for each type of Whois record.

Whois Information Under the usTLD

Registrants in Locality Space	Delegated Managers in Locality Space
1. Name of the domain registered	1. Name of the delegated manager
2. Internet Protocol (IP) address of the primary nameserver and secondary nameserver(s) for the registered domain name	2. Delegated Manager ID
	3. IP address of the primary nameserver and secondary nameserver(s) for the delegation
3. Corresponding names of those nameservers	4. Corresponding names of those nameservers
4. Identity of the delegated manager under which the name is registered	5. Date of delegation
5. Creation date of the registration	6. Name and postal address of the delegated manager
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 delegated manager
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 delegated manager
8. Name, postal address, e-mail address, voice telephone number, and (where available) fax number of the administrative contact for the domain name holder	9. Web site or other contact information through which registrations can be accepted under the delegation

Registrants in Expanded Space	Registrars in Expanded Space
1. Name of the domain registered	1. Name of the registrar
2. IP address of the primary nameserver and secondary nameserver(s) for the registered domain name	2. Registrar ID
	3. Registrar status (e.g., active, pending)

Whois Information Under the usTLD

3. Corresponding names of those nameservers	4. Name and postal address of the registrar
4. Creation date of the registration	5. Name, postal address, e-mail address, voice telephone number, and (where available) fax number of the technical contact for the registrar
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	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 administrative contact for the domain name holder	7. Name, postal address, e-mail address, voice telephone number, and (where available) fax number of the billing contact for the registrar

Further, to ensure the integrity and highest levels of service for Whois administration, redundant databases will be located at the geographically diverse, redundant Enhanced SRS Data Centers located in Illinois and Virginia. In accordance with the U.S. Nexus requirement, no registry databases will be located outside of the United States. Both databases will be updated in near real time (intervals no greater than 15 minutes) and will be synchronized to ensure consistency of the response.

Detailed descriptions of how the databases will be populated, how they are kept up to date and accurate, and the structure of the Whois responses are provided in Section F, Central usTLD Database and Enhanced Shared Registration System. A detailed description of our Whois policy is provided in Section B.3.5.

A detailed description of the database infrastructure and design is provided in Sections O.3 and O.8 of this proposal.

B.2.5   usTLD Delegated Manager Database Administration

NeuStar's centralized database of delegated managers will enable us to contact those managers quickly and resolve issues effectively.

In order to manage a critical public resource like the usTLD, its administrator needs to maintain an accurate database for all entities that have a role in administering the space. The usTLD's delegated managers—the locality delegees and subdelegees—play an important role in the communities they serve. The usTLD Administrator may need to contact a delegated manager because of an outage or a question from one of their registrants. Out-of-date information prevents the administrator from resolving issues in a timely manner. To avoid this problem and to ensure that all delegated managers can be contacted, an integral element of the Centralized usTLD Database that NeuStar will deploy as the usTLD Administrator will be an accurate and up-to-date database of delegated managers.

The most critical function with regard to creating the database is obtaining information from the existing delegated managers. NeuStar has, in the past, provided just this service to the telecommunications industry. As the North American Numbering Plan Administrator, NeuStar was required to create a central database of telephone number assignments. This required us to work with multiple telecommunications companies across the country, most of which had many telephone number administrators. Not only were databases across companies inconsistent, but databases within companies were often inconsistent as well. NeuStar was nonetheless able to collect and standardize all of the data, and completed the transition ahead of schedule.

As the usTLD Administrator, NeuStar will reach out to all of the delegated managers. We will provide them with a list of the data elements required in our database, and we will provide them with multiple methods of provisioning that data with us. Our usTLD Transition Team will be tasked with the responsibility of contacting the delegated managers to collect this information. On an ongoing basis, we will provide delegated managers with an easy-to-use web interface to provision new registrations into the Centralized usTLD Database. Alternatively, should they have high volumes of registrations and would prefer a mechanized interface, delegated managers will have the option of using NeuStar's extensible Registry Protocol (XRP) to interface with the registry.

Information in the Delegated Manager Database will include at least the following:

1. The name of the delegated manager;

2. The Delegated Manager ID;

3. The IP address of the primary nameserver and secondary nameserver(s) for the delegation;

4. The corresponding names of those nameservers;

5. The date of delegation;

6. The name and postal address of the delegated manager;

7. The name, postal address, e-mail address, voice telephone number, and (where available) fax number of the technical contact for the delegated manager;

8. The name, postal address, e-mail address, voice telephone number, and (where available) fax number of the administrative contact for the delegated manager; and

9. The website or other contact information through which registrations can be accepted under the delegation.

Detailed descriptions of how the databases will be populated and how they will be kept up to date and accurate are provided in Section F, Centralized usTLD Database and Enhanced Shared Registration System.

Redundant Delegated Manager databases will be located at the geographically diverse, redundant Enhanced SRS Data Centers located in Illinois and Virginia. In accordance with the U.S. Nexus requirement, no usTLD databases will be located outside of the United States. Each database site will be updated in near real time (intervals of no more than 15 minutes) and will be synchronized. This will ensure the requisite level of availability and stability for the usTLD.

A detailed description of the operations of the databases is provided in Sections O.3 and O.9 of this proposal.

B.2.6   Data Escrow

In addition to arranging for frequent escrowing of the data contained in the usTLD registry, the very design of NeuStar's registry protects it from catastrophic failure.

The overall security and integrity of the usTLD requires that there be multiple mechanisms in place to ensure the continued operation of the usTLD in the event of a disaster, technical or business failure, or any other unforeseen event affecting usTLD operations. Therefore, NeuStar will establish an agreement with an outside escrow agent to develop a process and schedule for frequent escrowing of the usTLD zone file, Whois database, delegated manager Whois

database, and delegated manager database, as well as necessary domain name registration data, including chain of registration data.

Although a usTLD administrator could choose simply to rely upon an escrow service to ensure data integrity and recovery capabilities, NeuStar believes that additional steps must be taken to protect such an important public resource. NeuStar's heritage as an operator of mission critical, zero-downtime infrastructure makes it uniquely qualified to address such concerns. Therefore, the design of NeuStar's registry systems virtually ensures that no single event likely will result in a catastrophic loss of data. Specifically, the NeuStar architecture will utilize redundant, coactive data centers in Illinois and Virginia, combined with a robust, and redundant nameserver architecture.

These measures by NeuStar will ensure that all data necessary for operation of the usTLD registry will be available in the unlikely event of a catastrophic failure of the registry or following the selection of an alternate usTLD Administrator by the COTR. Such information will ensure that NeuStar, or any subsequent usTLD administrator, could recover operations quickly and easily, or in the case of a transition of administrators, such transmission would occur with minimal, if any, interruptions in service.

B.2.7   Industry Representation/Compliance

NeuStar's continued participation with Internet standards and policy organizations will contribute to its operation of the usTLD as the model for a country code top-level domain.

As is discussed throughout this proposal, one of NeuStar's primary goals is to make the usTLD an important part of the global Internet infrastructure. In order to successfully assume such a role, however, the usTLD Administrator must be prepared to coordinate with the various members of the Internet community. In particular, the Administrator must be prepared to comply with applicable policies and standards of the IETF and ICANN. Such policies form the basis for effective functioning of the global Internet and are followed by all reasonable Internet operators. NeuStar will comply with all such applicable policies and standards in its operation of the usTLD. NeuStar's efforts will not stop, however, at simple compliance.

NeuStar will continue to work with the NTIA, ICANN, IETF, and the Internet community to further develop and enhance not only the usTLD, but also the Internet and the DNS. Such efforts include participation in development of privacy, security, encryption, multilingual domains, and other important policies and technologies for DNS operations. NeuStar will maintain staff dedicated to such efforts. Indeed, NeuStar employees currently chair important IETF working groups such as the Whois Working Group. NeuStar intends, therefore, to operate as the model ccTLD in the international ccTLD community and, through its technical and policy efforts, NeuStar will work to establish the usTLD as the leading example of, and staging platform for, the most advanced DNS registry services on the Internet.

An important example of NeuStar's efforts in this area will be the revision of RFC 1480 upon completion of the six-month compliance report. NeuStar believes that the learning from this analysis of the locality-based usTLD will provide an important opportunity for significant improvement of the basic structure and underlying policy of the usTLD.

B.2.8   usTLD Public Awareness Initiatives

NeuStar's primary research indicates that a strong demand for dot-us domain names exists within the U.S. public. NeuStar evaluated this market analysis and performed further

secondary research to produce a marketing plan that will maximize brand awareness and drive market adoption.

In its commitment to the promotion and marketing of the usTLD, NeuStar has crafted the following Marketing Plan to create public awareness, expand brand identity, and drive registrations. A key component of the Marketing Plan is the maintenance of a Web site with current policy and registration information. Additional information regarding the usTLD Web site follows in Section B.2.11. The following section outlines the target markets, potential positioning, and phased awareness initiatives for the usTLD. This approach is one potential strategy to market the usTLD.

B.2.8.1 Executive Summary

NeuStar will actively market the usTLD making it the most widely available, diverse, competitive option for both consumers and small businesses in the United States. Sixty percent of the world's domain names originate in the United States. The usTLD, however, has not attracted registrations and remains underutilized compared to other country code domains. This underutilization reflects poorly on the United States as a technological leader. The problem is due, in part, to lack of promotion and awareness. To address this lack of awareness and ensure the success of public awareness initiatives, NeuStar conducted primary research uncovering the following empirical evidence to understand customers' needs, motivations, and attitudes:

- Strong interest in purchasing a domain name exists, with more than one-quarter (27%) of consumers indicating that they plan to purchase one in the next 12 months. An additional 15% report that they plan to purchase a domain name in the next three years.

- The usTLD tested very favorably versus other options presented, particularly when the sought-after name in dot-com was unavailable.

- Businesses would rather have a dot-us extension for their corporate Web site over dot-biz, even though they acknowledge that dot-biz is more descriptive of a business Web site.

- Consumers would rather have a dot-us for their personal Web site over dot-name, even though they acknowledge that dot-name is more descriptive of a personal Web site.

- A key differentiator for dod-us is that they can receive the name they want.

These findings present opportunities for the usTLD. These opportunities, when combined with appropriate public awareness initiatives supported by a dynamic channel strategy, create an environment for success. NeuStar will execute a phased marketing program to create a "snowball effect."

- Phase 1: Our goal in this Phase is to capture as many early adopters/early majority consumers and small business owners as possible.

- Phase 2: Our objectives in this phase focus on both channel and marketing programs. The channel strategy is designed to accredit registrars to extend the reach and distribution and simplify usTLD acquisition. The marketing programs in Phase 2 build on this strategy and begin branding in targeted cities to capture a larger audience.

- Phase 3: Our aim at this stage is to reach critical mass through a broader awareness campaign. Programs and promotions will be expanded across the country to build on the contagion already established.

NeuStar is confident that this phased approach will succeed for the following reasons:

1. There is a strong commitment to make significant investment in marketing, advertising, and public relations to increase the awareness of the usTLD.

2. The channel strategy is a two-pronged approach. First, it targets current registrars and provides them with tools, programs, and marketing collateral to be successful. In addition, it expands the size and reach of the distribution network by creating numerous new registrars with built-in membership networks of end users.

3. It capitalizes on the convergence of the expanded registrar network, the interactions of the early adopters coupled with a broad brand awareness campaign, and new applications to meet end-user needs.

NeuStar is committed to the success of the usTLD and submits the following documentation providing additional background, market environment analysis, complete research findings, and a more comprehensive outline of the marketing programs as supporting credentials.

B.2.8.2   Background

NeuStar is uniquely qualified to seize this challenge. As the leading provider of mission critical clearinghouse services, NeuStar has been entrusted to manage competitively sensitive public resources. It brings distinctive strengths to these efforts:

- **Neutrality Status**—The "Neu" in NeuStar, Inc., refers to the trusted, neutral third-party role it maintains in all interactions with other entities. As an organization that can be trusted for its objectivity, NeuStar is in a strong position to attract registrars and other membership organizations, thus guaranteeing high participation levels and a strong distribution network.

- **Simplified Integration Services**—NeuStar has repeatedly demonstrated a capability to leverage database technologies and operating platforms to simplify the integration of additional services. This capability, when applied to the Registry for usTLD, will enable a variety of value-added services to be easily deployed, thereby increasing the utility of the space.

- **Relationship Building Capabilities**—NeuStar has demonstrated an ability to form coalitions of support among diverse groups, thus providing a secure foundation for success with current delegation owners, future customers, ICANN, registrars, and public sector interests.

- **Public Resource Management**—NeuStar has established itself as an organization that can deliver mission-critical services. NeuStar currently manages several public resources. For example, it serves as the administrator of the North American Numbering Plan, operating the telephone numbering registry as a public numbering resource. Recently, NeuStar was named as the Number Pooling Administrator. And NeuStar is the Local Number Portability Administrator for the U.S. and Canada, operating the enormous routing registry for North America. The integrity and accuracy of this service is essential for virtually every call placed within North America. NeuStar will leverage this capability of successfully managing mission-critical resources in managing the usTLD space.

Market Environment

The usTLD will be introduced to a market already served by the very popular dot-com, as well as others such as dot-net and dot-org. The usTLD will need to be positioned against these competitors, and heightened awareness levels will be required to attract consumers, businesses, and public sector entities. Creating marketing programs to address these entrenched users will be of primary importance, though recognizing the need to retain current usTLD holders is not forgotten. In a recent NeuStar survey, both consumers and businesses in the United States had a 99% awareness level of the domain extensions dot-com (22.7M registered) and dot-net (4.4M registered).[1] Unfortunately, current awareness levels of the usTLD are not nearly as high. Both consumers and businesses demonstrated a 3% unaided awareness level of the usTLD. (Unaided awareness tests ask respondents to answer a question without prompting or using precoded categories. For example, an unaided question might be "Which brands of soda do you drink?") Aided awareness figures are much higher (70% to 74%), indicating general acceptance of the usTLD. (Aided awareness tests ask respondents to answer a question while providing answer categories. For example, an aided question might be "Below is a list of sodas. Please mark on the answer sheet which brands you drink.") Americans have used the abbreviation "us" for 200 years, are comfortable with its use, and recognize it in this context.

B.2.8.3   Strategic Goal

The DOC "Statement of Purpose" seeks to achieve the following objectives:

- Promote increased use of the usTLD by the Internet community of the United States and
- Promote robust competition within the usTLD and, in particular, registration services that will lead to greater choice.

NeuStar is guided by these objectives and is committed to increasing the utility and overall value of the usTLD space to drive registrations. To achieve these objectives, it is important to understand the community of customers and what motivates them to purchase.

B.2.8.4   Customer Base

Delegees

There are currently 8,000 subdomain delegations to more than 800 individual and entities who maintain a registry and provide registration services for commercial, educational, and government entities. They span the United States and are primarily composed of businesses, individuals, federal government agencies, schools, libraries, museums, and state and local governments. All K12 schools, community colleges/technical schools, and state and local government agencies are encouraged to register under the US Domain.

Public Sector

The public sector represents a broad market that includes the sizeable government bodies as well as the many non-profit organizations, all of which function in a way that suggests prime marketing opportunities for acquisition and promotion of the usTLD. Government bodies alone make up a sizeable group. There are currently more than 500 federal government acronyms that identify agencies with Web sites.[2] While the opportunities represented by the federal government, the 50 states, and localities are extensive, the opportunity represented by

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[1] Matthew Zook, Berkeley, Domain Name Project

[2] Government Information Resources at http://www.ulib.iupui.edu/subjectareas/gov/doc_abbrev.html

organizations, charities, foundations, churches, and associations is vast. These organizations, by their nature, are invested in the betterment of the United States and its people. Their numbers are sizeable. *Time Almanac* lists 30 U.S. religious bodies with more than 500,000 members. *GuideStar's* current list of U.S. nonprofit organizations numbers more than 700,000. *Time Almanac 2001, Encyclopedia of Associations,* lists approximately 23,000 organizations. These organizations will benefit greatly by expanding their reach via the Internet as they attempt, in a competitive environment, to reach their members and donors.

Business

There are approximately 12 million businesses[3] in the United States with a labor force of 139.4 million employees.[4] They support an economy with a gross domestic product (GDP) of $9.3 trillion in purchasing power parity.[5] As the U.S. economy continues to expand and globalization occurs, commercial enterprises are recognizing the need to utilize the Internet in the growth of their business. In a report by Jupiter Research, the evolution of business and the Internet was explored:

- Businesses reluctantly adopted computing in the 1980's to achieve productivity gains

- In the 1990's, client/server computing brought new capabilities to business

- Today the Internet offers a clear set of incentives that have spurred the exponential growth that we will continue to see. Incentives include:

  – Availability of investment capital

  – Redefined business practices to leverage the Internet

  – The pace of adoptions means moving slower, which equals greater risk.

Today, virtually all companies that participate in business-to-business (B-to-B) commerce are being forced to develop new strategies to keep up with the reengineering of the economy as a whole.

Jupiter estimates that between 2000 and 2005, online B-to-B commerce will swell from 3% to 42% of total B-to-B trade in the United States. The five largest B-to-B online vertical segments today include:

  – Computers and telecommunications equipment,

  – Food and beverages,

  – Motor vehicle parts,

  – Industrial equipment, and

  – Construction and real estate.

Much of today's research predicts that Internet growth will continue in the business sector as businesses look to the Internet as a tool to improve traditional and expensive business processes.

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[3] Dun and Bradstreet
[4] CIA Fact Book
[5] Ibid.

Small Business

There are approximately 9.8 million small businesses[6] in the United States, and they continue to be the fastest growing business segment. Defined as having between 1 and 99 employees, small businesses employ roughly 40% of the private workforce in America.[7] Small businesses have recently created the vast majority of new jobs in the country. For example, in a study conducted by Cognetics for the U.S. Small Business Administration, companies with 1–99 employees created 85% of the 11.2 million new jobs generated in the country from 1992 to 1996. The top spots in the country for small business growth include Phoenix, Salt Lake City, Atlanta, Raleigh-Durham, Indianapolis, Washington DC, Orlando, Nashville, and Charlotte.[7]

Small businesses affect every sector of the economy: 37% are in the service sector, 21% in retail, 11% in financial and investment-related, and 9% in manufacturing.[8] Computer use among small businesses is quite high—estimated at 75% to 97%.[9] A recent study conducted by Dun and Bradstreet indicated online use was also substantial:

Small Business Use of the Internet

Use	1999
E-mail	71%
Business research	58%
Personal research	50%
Purchase goods/services (business use)	43%
Purchase goods/sServices (personal use)	31%
Sell/market products	26%

Medium and Large Business

Large businesses are defined as having more than 1,000 employees. There are approximately 7,000 firms[10] that fall into this category, and they represent .05% of U.S. businesses. Medium-size businesses are characterized as having between 100 and 999 employees. There are approximately 2 million medium-size enterprises.[11]

Consumers

When compared to other countries, the United States has the highest penetration of online consumers.[12] More and more consumers are utilizing the Internet to gather information, research products, communicate via e-mail and meet their lifestyle needs. About 164 million (59%) of consumers are online today.[13] The online population is predominantly located in large cities and the suburbs when compared with U.S. population density:

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[6] Dun and Bradstreet
[7] Cognetics
[8] Small Business and Financial Services
[9] Small Business and the Internet
[10] Ibid.
[11] Ibid.
[12] Nielsen NetRatings
[13] U.S. Census/Nielsen NetRatings 2001

Online Population

	U.S. Population	Online Population
Large city	20%	22%
Suburbs	23%	31%
Small city/town	36%	32%
Rural	21%	14%

Geographically, the online population is concentrated in the Pacific West, South Atlantic, and East North Central regions, but it continues to expand beyond the technology regions (U.S. Census). Low-cost computers and reduced Internet access costs have contributed to the rise in overall household penetration. San Francisco (66%), Seattle (64%), San Diego (62%), and Portland (60%) led the way with the highest household penetration rates as of September 2000.[14]

The consumer online population is characterized by several distinct factors that play a significant role in a marketing effort. They are almost evenly split by gender (51% female and 49% male), and 30% are between the ages of 35 and 49. They are overwhelmingly white and well educated when compared with the national average. The percentage of adult Internet users who have graduated from college is 41%, nearly double the national average of 22%. Given that the Internet is primarily an information source, the more educated people are, the more likely it is that they will be motivated to use the Internet. The typical online household has an annual income nearly 36% higher than that of the average American household; 30% of those online have incomes of $50,000–$75,000 although online use by those in lower and middle income groups is growing.[15] Although Internet users have higher income levels than the average American, a comparison with 1999 data reveals a widening trend that includes lower levels of affluence. This expansion of income levels is attributed to lower costs for PCs and Internet access, as well as greater acceptance of the Internet as a safe and convenient way to shop. Correlations can be drawn when examining occupation and online usage: 32.5% of the U.S. online population is in executive, managerial, or professional occupations. Most of these workers use a computer and/or access the Internet as part of their work. On average, more time is spent online at work than at home. June 2001 data show that the number of online sessions at work is twice the number of sessions at home.[16]

In a study conducted by The Media Audit (a syndicated survey of both online and traditional media in more than 80 markets over a three-year period—1998, 1999, and 2000), online usage is diversifying. African American online usage has increased 41% during the past three years to 44% online usage today. The U.S. Census estimates that Hispanics represent the fastest growing segment of the U.S. population with more than 30 million Spanish-speaking residents. Moreover, in a report published by *The Economist*, the buying power of Hispanics in the United States has increased by 65% since 1990 to $348 billion. Tapping into this buying power can be done online: 42% of Hispanics now have access to the Web, according to The Media Audit—an increase of 45%. Sixty-three percent of Asians were online in 1998. In 2000, that figure had risen

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[14] Ibid.

[15] Ibid.

[16] Ibid

7% to more than 70%. Seventy percent exceeds the comparable figure for white households, whose online usage is about 58%.

E-mail ranks as the most popular online activity for consumers. It is expected that there will be 140 million active e-mail users in the United States by 2003. While many consumers have between two and five accounts, 51% check only one e-mail account daily. It is estimated that online adults will spend between 9 and 10 months of a typical lifetime writing and responding to e-mails. Research shows that e-mail has created a greater connection among family members with 26 million Americans regularly sending e-mail to a family member with whom they had not previously had much contact.[17] Instant Messaging is another communications activity that is frequently used by online Americans. Instant Messaging continues to grow because it is free and easy to use. In addition, approximately 30 million Americans are members of families in which someone has created a family Web site.[18] It is evident that the internet has introduced a fundamental shift in the way people communicate. As this communication medium becomes widely accepted, more citizens will want to own domain names to increase their online interactions. According to NeuStar research, less than 10% of Americans currently own a domain name.

B.2.8.5 Marketing Objectives

The single marketing objective of this plan is to ensure that every consumer, business, and public sector entity of the United States is aware of the usTLD, understands its value, and knows how they can acquire a dot-us domain name.

B.2.8.6 Market Definition

Successful launch of the usTLD will rely on marketing initiatives aimed at the appropriate audience with the appropriate message. Clearly understanding the size of the target, their demographic makeup, and their motivations and attitudes toward the Internet and domain names in particular will provide the foundation to drive usTLD penetration quickly. A research study was conducted to obtain empirical data for both U.S. businesses and consumers.

Research

NeuStar commissioned primary research to ensure a solid foundation from which to create a marketing strategy for the usTLD. The resulting information serves as the basis for all aspects of the marketing plan and will enable NeuStar to establish a presence and firmly position the usTLD quickly.

Objectives

Research was conducted in the form of a survey to a general audience of consumers and businesses regarding their attitudes and perceptions of the usTLD. The survey objectives were to:

- Understand market awareness of the current usTLD;

- Assess general awareness of country code extensions;

- Determine the size, demographics, and psychographics of the target market for the usTLD;

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[17] Pew Internet Project
[18] CyberAtlas

- Assess branding potential for the usTLD;

- Determine what product benefits are the most meaningful;

- Understand the barriers to purchasing a usTLD for both businesses and consumers;

- Evaluate the receptivity of usTLDs vis-à-vis other TLDs;

- Evaluate receptivity to locality-based domain name structures;

- Determine acceptability and preference for the hierarchical structure for the usTLD;

- Test various product-positioning statements for marketing the usTLD;

- Determine motivations for purchase of a domain name and types of Web sites;

- Determine means of differentiating the product;

- Obtain feedback regarding price; and

- Evaluate the likelihood to purchase.

Methodology

- An 18-minute online survey consisting of both open-ended and close-ended questions,

- A sample size of 1,000 panelists,

- Invitation e-mailed to the respondent panels,

- Cash drawing included as an incentive to increase the participation rate, and

- Data weighted to be representative of the overall online consumer and business market.

Research Participants

- Sample composition of 1,231 consumer and 1,355 business panelists within the United States,

- Subsample of at least 300 consumer and 300 business panelists who have purchased a domain name in the past to continue with the survey,

- The margin of error for the consumer sample as a whole was 2.8% at the 95% confidence interval, and

- The margin of error for the business sample as a whole was 2.6% at the 95% confidence interval.

Target Audience

- Sample was drawn from an existing online panel.

- Split sample consisted of consumers and business people who have used the Internet with some frequency.

- All panelists reside in the United States.

- Initial panel members were selected to be reflective of the online population of businesses and consumers and were not screened for particular knowledge of domain names.

- To continue the survey, 300 consumer and 300 business panelists were oversampled for current ownership of a domain name.

- Screener identified, but did not terminate, decision-makers in the category with the intention of finding sufficient sample size.

- Small, medium, and large business were quantified. Their percentages and responses will be reflective of the online business community.

- Results will be cross-tabbed to reflect both overall U.S. population and online U.S. population.

Research Highlights

The major findings of the research can be found below. A complete report detailing the research findings is located at the end of this document.

General Highlights

- On a macro level, both businesses and consumers show a strong purchasing preference for gTLDs over specific TLDs.

- The usTLD tested very favorably versus the options presented, particularly when the sought-after name in dot-com was unavailable.

- Consumers and businesses overwhelmingly believe that public service second-level domains are a good idea.

Consumer Research Findings

- Domain name penetration (in percentage terms) is very low in the online consumer sector, with less than 1 in 10 people (6.6%) currently owning a domain name.

- In an aided test, approximately three-quarters reported that they know that dot-us exists. This aided figure is very close to that for TLDs other than dot-com and dot-net TLDs (such as dot-biz, dot-tv, and dot-pro). This suggests that even though the generic use of dot-us has been released after some others, it does not start at a brand equity or intent to purchase disadvantage vis-à-vis newer TLDs.

- Domain name extensions appear to be less important to consumers than choosing a descriptive name for a Web site. For example, by a 3-to-1 margin, consumers would rather select a first choice name with a dot-us extension than a less desirable name with a dot-com extension.

- Consumers would rather have a dot-us extension for their own Web site over dot-name, even though they acknowledge that dot-name is more descriptive of a personal Web site.

- Consumers clearly prefer TLDs that:

  – Are flat rather than hierarchical,

  – Are generic (like .us) rather than specific (like dot-name), and

  – Encourage shorter rather than longer names.

Business Research Findings

- We do not anticipate a great deal of business activity in the next year, since only 7% of businesses say they plan to purchase a domain name within the next year. An additional 4% report that they plan to purchase a domain name in the next three years.
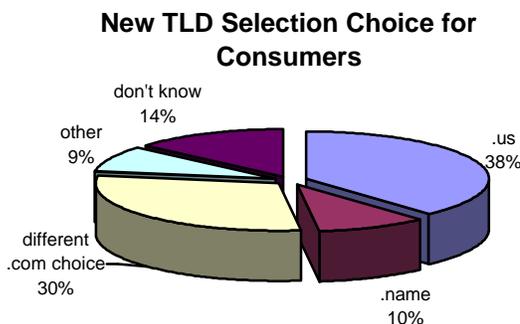
- In an aided test, approximately 7 in 10 report that they know that .us exists. This aided figure is very close to that for TLDs other than dot-com and dot-net (such as dot-tv and dot-pro). This suggests that even though the generic use of dot-us has been released after some others, it does not start at a brand equity or intent to purchase disadvantage vis-à-vis newer TLDs.

- Our initial estimates are that approximately 1 in 5 state some interest in eventually purchasing a usTLD name. This is an elastic figure, however, as many more are willing to consider a usTLD if

  - Their dot-com option is taken

  - dot-us can competitively compete with dot-com on price

  - They realize the necessity in purchasing dot-us in order to prevent cybersquatting.

- While small and large businesses demonstrate strong interest in purchasing domain names going forward, midsize businesses appear less interested.

- Businesses (just like consumers) clearly prefer TLDs that

  - Are flat rather than hierarchical

  - Are generic (like dot-us) rather than specific (like dot-name)

  - Encourage shorter rather than longer names.

Research Conclusions

The results from this survey show that Americans strongly feel that creating additional domain name extensions is a good idea. Clearly the market recognizes the need for additional open space on the Internet. Whether we will see a rush to acquire additional domain names remains an open question. What is known, however, is that the usTLD is well-positioned vis-à-vis other major TLDs. The primary reason is that both business and consumer purchasers appear to prefer multipurpose TLDs over single-use TLDs. The likely cause is the widespread use of dot-com in the U.S.—the ultimate generic multipurpose TLD. Over the years, research has shown that people tend to gravitate toward the familiar, hence the preference for other generic multipurpose TLDs. We believe that, with an intelligent brand awareness and advertising campaign, the usTLD can gain significant market share in the coming years.
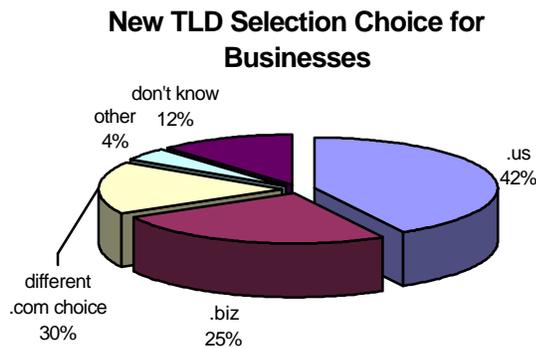
Many natural uses for the usTLD already exist. In particular, Americans feel that dot-us is particularly well suited for e-government initiatives. For example, Americans overwhelmingly think the use of the usTLD would work for programs such as creating a Web site called voting.us which lists local polling places and information about political candidates or a Web site called parks.us which lists local, state, and national parks.

While e-government initiatives could help drive the growth of the usTLD, it would be a mistake to limit its utilization to that market, since both consumers and businesses show interest in using the usTLD. In fact, overemphasis of e-government initiatives could persuade consumers and businesses that the usTLD is solely for government and public sector Web sites—a scenario that is clearly avoidable. There appears to be

New TLD Selection Choice for Consumers

don't know 14%

other 9%

different .com choice 30%

.us 38%

.name 10%

strong demand on the consumer side of the equation. Our survey found that 27% of American consumers plan to register a domain name in the next year. Additionally, survey respondents acknowledge that their first choice domain name with the dot-com suffix might be taken. As a result, they are looking at secondary options. When we asked likely domain name <u>consumer</u> purchasers "If you had to select a new domain name and dot-com was already taken but dot-us and dot-name were available, which would you choose?" a plurality (38%) selected the usTLD, 30% chose another name with the dot-com extension, and only 10% selected nameTLD. This speaks both to the power of the usTLD and the interest in multipurpose generic use TLDs.

On the business side of the equation, we also see a preference for the usTLD. When we asked likely domain name <u>business</u> purchasers "If you had to select a new domain name and dot-com

New TLD Selection Choice for Businesses

was already taken but dot-us and dot-biz were available, which would you choose?" a plurality (42%) selected the usTLD, 17% chose another name with the dot-com extension, and only 25% selected bizTLD.

To reiterate: We believe that latent demand exists for the usTLD and that a strong marketing campaign will create the requisite interest in and eventual use of the usTLD.

Key Survey Tables and Projections

Plan To Purchase Domain Within Next 12 Months / 3 Years

	Percentage	Pop. Projection
Business – 12 months	8%	0.7 M
Business – 3 years	5%	0.4 M
Consumer – 12 months	27%	35.8 M
Consumer – 3 years	11%	15.2 M
Total	**–**	**52.1** M

Likely To Purchase usTLD One Day

	Percentage	Pop. Projection
Business	4%	1.6 M
Consumer	23%	31.5 M
Total	**–**	**33.1** M

Likely To Consider Purchasing .usTLD After Being Informed of New System

	Percentage	Pop. Projection
Business	39%	3.0 M
Consumer	40%	24.0 M
Total	**–**	**27.0** M

B.2.8.7 Market Opportunity

The research indicates that there are several opportunities to market and position the usTLD to address the needs of American consumers, businesses, and public sector entities with regard to domain names:

- With usTLD "I can get the name I want."
- The usTLD is generic, which provides greater use possibilities for both businesses and consumers.
- Americans reacted favorably to new TLDs in general.
- Less than 10%of American online consumers have domains today.
- Small and large businesses indicate interest in purchasing domain names going forward.

- About 114 million Americans are not online today. NeuStar is committed to ensuring that new online citizens have a usTLD as the online household penetration continues to grow.

B.2.8.8 Value Proposition

Establishing a value proposition for a product provides the foundation around which a marketing campaign can be built. Value propositions define the most important benefits or facts the target group of customers should know and readily understand about the product being marketed. They clearly establish why the product is important, defining each product feature specifically and translating those features into customer benefits. Marketing programs are designed around communicating those benefits to target groups. The research indicates that customers are interested in receiving the following benefits from the features of a domain name product:

Domain Name Features and Benefits Identified Through NeuStar's Research

Feature	Benefit
U.S.-centric	Identifies owner as a U.S. citizen, organization, nonprofit organization, government, charity, or church
New	Name they want is available
Competitive price proposition	Affordable, good value
Generic TLDs with flatter hierarchical structure	Wider use/wider popularity
Direct registration	Simplicity, ease of acquisition
Available through a wide distribution network	Simplicity, ease of acquisition

Positioning

Product positioning is helpful in identifying the specific position or definition that is desired when promoting the product. It defines how a product should be known, described, or characterized in the customer's mind. Based on the research outlined above, the following are examples of how the usTLD could be positioned:

usTLD Positioning

Market	Responding to what emotion or attribute	Product Feature Targeted	Positioning Statement
Consumers and businesses	Trust and security	U.S.-centric	usTLDs are trusted Web sites managed by individuals and businesses located in the United States
Consumers and businesses	Ease	Generic TLDs with flatter hierarchical structure	A new, easy-to-remember Web site that is owned and operated in America
Consumers and businesses	Uniqueness and urgency	New	A newly introduced domain name extension that allows me to get the name I want
Consumer singles, students, young families, self-employed	Cool factor, few people have this new cool thing	Personalization	usTLDs give you a piece of the Web that is as individual as you are by letting you name your own Web site.
5) Self-employed, SOHO	Multipurpose	Generic	usTLDs allow my Web site to be used for multiple purposes

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B.2.8.9   Channel

Surprisingly, many consumers and businesses do not know how to purchase a domain name today. NeuStar's survey revealed that 3 in 5 consumers and 1 in 5 businesses do not know how or where to purchase domain names. This indicates a need for both education and a widely distributed network of sales channels to provide ease of acquisition for U.S. citizens. NeuStar's channel strategy is to create the widest distribution network possible to enable every citizen a speedy and simplified registration process. Educating citizens on where and how to acquire a usTLD will be covered within the Marketing Plan below. NeuStar would accomplish the channel objective in two phases:

Phase 1

Objectives	• Achieve 100% participation from ICANN-accredited registrars • Create a sense of urgency and excitement around the usTLD to encourage the registrars to assist in public awareness and promotional campaigns
Market	Accredited registrars
Programs	• Seminars • Letters of usTLD introduction to all appropriate registrars • Creation of sales materials • Sample graphics for use on resellers' Web sites • Fact sheet outlining the usTLD opportunity and benefits of the structure and application platform • Tool kit • Online Web site • Work with search engines to ensure dot-us is recognized
Timing	1–4 months prior to launch

Phase 2

Objectives	• Expand the network beyond current registrars to ensure that every American citizen, business, and public sector can easily acquire a usTLD • Simplify the accreditation process to encourage wide participation of commercial organizations, nonprofit organizations, foundations, government, charities, churches, and associations
Market	• Entities that offer channels beyond the online environment • Benefits to these organizations as they expand service offerings and end-user benefits
Programs	• Creation of accreditation process (Registrar in a box) • Letters of introduction to wide selection of entities • Direct sales to targeted businesses and public service groups • Creation of sales materials • Educational seminars—benefits of the proposition and ease of implementation • Fact Sheet outlining features and benefits, sales potential, or member reach for use in collateral • Tool kit • Sample graphics for use in information material/collateral • Online Web site
Timing	Launch + 1 year

B.2.8.10   Marketing Plan

In order to promote the increased use of the space, expanding awareness levels is essential to a successful strategy. To be successful, branding requires a consistent message, delivered frequently to the target group. A phased approach is recommended, based on the levels of immediate interest and the purchase intent of target groups. The programs are designed to increase brand awareness and penetration across the United States to businesses, consumers, and the public sector.

Phase 1 objectives are to reach two specific target groups prior to launch.

- Current owners of the usTLD will be notified of the changes taking place. The marketing material will pay particular attention to the benefits of a new Administrator and the expansion of utility. Registrants will be encouraged to take advantage of these new features.

- Consumers and small business owners will be targeted to create buzz and suspense. The overall objective is to generate a level of interest prior to launch that would encourage a high number of registrations at launch.

These initiatives are critical and will be successful because they reach both current owners and those targeted consumers and business owners who have already expressed interest and purchase intent. Capturing this group first is essential, as they become the foundation for the public awareness and word of mouth advertising on the Web.

Phase 2 builds on the awareness objectives as marketing and promotional efforts are launched to reach a wider audience. The major objectives of this phase are to:

- Touch consumer early adopters and early majority to lead the way in numbers of usTLD registrations. As a sizeable mass of consumers begins to adopt the usTLD, more will be interested and will follow suit.

- Increase awareness of those in the business community likely to purchase in the near term. Advertising and branding efforts will include education on product benefits and the registration process to address lack of knowledge on how to acquire a domain name.

- Enable e-Government initiatives (see Section D for further information) outlining the public's interest in response to the NeuStar research. This interest will be leveraged as sites come online to further the program.

- Drive registrations within the ethnic community by increasing awareness levels. Online populations within this community are growing.

Phase 2 efforts are designed to address both the timing related to purchase intent as well as the educational challenges that were uncovered within the research. Ensuring that the population is knowledgeable of the product benefits and is aware of how and where to purchase is critical to driving registrations. This effort will be supported by the channel strategy. As more and more businesses, groups, and organizations recognize the value of providing and promoting usTLDs to their customers, associates, and members, registrations will increase. In addition, both businesses and consumers were overwhelmingly positive toward e-Government initiatives. These initiatives should be launched in Phase 2 as an increased benefit and in response to customer needs.

Phase 3 reaches across the country to all citizens to ensure they have the knowledge and the opportunity to acquire a usTLD. The major initiatives are planned to:

- Drive toward critical mass using vehicles and messages that reach a wider audience of U.S. consumers and businesses. The marketing vehicles will place specific emphasis on promoting product benefits—"with dot-us, you can get the name you want"—and educating Americans on where to acquire the premier ccTLD.

- Partnership marketing, affinity opportunities, and relationships will be leveraged to maximize awareness opportunities and drive registrations.

- New applications will be launched to derive additional product benefits and increase end-user utilization.

Phase 3 leverages the momentum established in the early stages. The usTLD message is spread to a greater audience with increased frequency. As the third phase progresses, Americans will know that a new generic TLD is available, the value of owning one, how applications can improve their utility, and how and where to acquire one. Phase 3 continues to build and rely upon partnership and affinity marketing strategies that take advantage of the greatly expanded distribution network. NeuStar is confident in this strategy because it:

- Implements a build-out strategy to create the brand and increase awareness levels.

- Provides the greatest distribution network possible by leveraging end-user relationships and providing customers more opportunities to acquire a usTLD.

- Executes a staged plan to capture those users who are ready to purchase today, creates awareness for the group who indicated a desire to purchase tomorrow, and educates the balance on why they need a usTLD next week.

- Addresses educational challenges uncovered in the research.

- Communicates new applications to increase the utility of the product.

- Responds to citizens' needs for public interest and e-Government services.

What follows is an outline of the types of campaigns and the coverage that would be launched within each of the program phases. Each phase builds upon the one prior to capture the widest possible audience with as many impressions as possible.

Conclusion

This plan conclusively demonstrates NeuStar's ability to successfully achieve expansion of the space and drive registrations of the usTLD to every corner of the country. NeuStar has reviewed and addressed the key factors for success. It has conducted research to understand what American consumers and businesses think about domain names and the usTLD in particular. With this understanding of the market, NeuStar has developed a plan to reach the U.S. audience. NeuStar recommends getting started on this plan immediately to ensure that usTLDs will be available to more American consumers, businesses, and public sector entities without delay.

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B.2.9   Integration Assistance

NeuStar's Registrar Tool Kit software and operational test-and-evaluation facility will ensure that registries rapidly become familiar with our thick registry system, allowing them to begin operations efficiently, as soon as possible after accreditation.

NeuStar will operate a thick registry for the usTLD; although this thick registry allows us to enable new and enhanced services, it will also require registrars to follow new procedures when working with the usTLD registry. NeuStar will make every effort to give our registrars the support they need for a smooth transition to integrating with the usTLD registry.

Once a registrar is accredited, NeuStar will provide the XRP Registrar Tool Kit (RTK) software, along with documentation and training materials, to enable that registrar to learn the procedures and to obtain the technical knowledge necessary to interface with the usTLD registry.

NeuStar will establish an operational test-and-evaluation facility that will be available 24 x 7 x 365 for registrars to test their client systems. Our technical support team, which consists of functional experts in the processes and technologies for domain-name registration, will support this testing.

Once each new registrar is satisfied that its system is compatible with the registry system, it will schedule a formal acceptance test that will be monitored by our system engineers. After a registrar has passed the acceptance test, we will issue a user ID, passwords, and digital certificates, so that the registrar can begin operations.

B.2.10   Compliance Monitoring

Monitoring of delegees for technical compliance to the most current usTLD policies will ensure that NeuStar's database remains up to date, that delegees remain compliant with usTLD technical requirements, and that the usTLD retains a U.S. Nexus.

As discussed in Section B.4.5, NeuStar will conduct an initial compliance investigation in the first six months after contract award. This investigation is a requirement of the RFQ, and is intended to allow NeuStar to suggest policy changes, as well as to identify non-responsive delegees (including subdelegees), delegees who do not meet policy and technical compliance requirements, and "locality squatters." As part of this investigation, we will work collaboratively with delegees to help them achieve both policy and technical compliance, if they are found lacking in any way.

Information garnered from this investigation should also serve to confirm information received from the current administrator regarding server names and physical locations of the delegee servers. This will allow NeuStar to ensure that all delegee nameservers are physically located in the United States.

It is also important, however, that delegees continue to remain compliant with usTLD technical requirements for the lifetime of their delegations, and a level of oversight by NeuStar will help to guarantee this. Since NeuStar will not necessarily be hosting the resource records associated with names registered to delegated managers, it is possible for the delegee to register a name and forget to update NeuStar. NeuStar will "walk the tree" (see Section F for a description) on a continuous basis and compare the results with information in the Centralized usTLD Database. If there is a difference, we will contact the delegated manager to correct the discrepancy.

Additionally, NeuStar will perform yearly monitoring for technical compliance of locality delegees.

During this yearly audit, NeuStar will check that delegees continue to meet the technical and other requirements set out in RFC 1480 and other documents, and will include the following:

- There must be a knowledgable and competent technical contact, familiar with the Internet Domain Name System.

- The actual management of the assigning of domain names, delegating subdomains, and operating nameservers must be done with technical competence. This includes keeping the usTLD administrator or other higher-level domain managers advised of the status of the domain; responding to requests in a timely manner; and operating the database with accuracy, robustness, and resilience.

- There must be a primary and a secondary nameserver that have IP connectivity to the Internet and can be easily checked for operational status and database accuracy by the usTLD administrator.

- Nameservers should be in distinctly separate physical locations. It is appropriate to have more than two nameservers, but there must be at least two.

In order to perform this monitoring function, NeuStar will compare delegee information in the Centralized usTLD Database with information in the zone files. NeuStar will also prepare a technical survey to send to delegees, requesting information to confirm the names and physical locations of delegee nameservers, as well as delegee contact information.

In continuing with our cooperative approach to our initial compliance investigation, NeuStar will be monitoring compliance to ensure that all delegees meet the technical and U.S. Nexus requirements necessary to run a usTLD delegation and protect the integrity of the usTLD and of the Internet. As with the original report, we will work with any deficient delegees to help them achieve technical compliance.

B.2.11   Web Site

NeuStar's usTLD Web site will provide comprehensive information and communications methods to registrars and delegees while also displaying, informative essential pages to the general public.

NeuStar recognizes how critical information flow is for a registry to interact with its registrars. We also understand that, as the administrator responsible for the integrity of the usTLD, we must provide information that can be easily accessed by the Internet community. Although these are two very distinct requirements, they can easily be incorporated into a single, easy-to-navigate, content-based Web site. NeuStar will implement such a Web site divided into a public section for potential new registrars and the Internet community and a private section for existing registrars and locality delegees (including subdelegees).

The public section of this Web site will provide information to potential new registrars as well as to the Internet community. It is vital that this section of the Web site be easy to use and easy to navigate; we will make every effort to prevent confusion, especially among the newest visitors to the Web site.

This public portion of the Web site will allow users to do the following:

- Obtain information about the locality–based and expanded usTLD spaces;

- Identify a locality-based delegee for registration in a delegated space or subdelegation of a space;

- Register a domain name in an undelegated locality space;

- Locate a registrar for registration in the usTLD expanded space;

- Access the usTLD Help Desk via e-mail and messaging services;

- Obtain Whois information, by string or field search, in the usTLD;

- Look up the availability of domain names; and

- Apply for accreditation as a registrar in the expanded space.

Our efforts to maintain the best possible communications with usTLD registrars will be reflected in the private members section of the usTLD Web site. This section will allow registrars to access information about all areas of the registry's operation. Some of the key components of the site will be:

- A password-protected area where registrars will be able to access reports,

- A password-protected area where delegees and registrants will be able to communicate with the registry,

- A central repository of all public documentation,

- Detailed information and documentation regarding integration assistance,

- A comprehensive list of Frequently Asked Questions (FAQs),

- Access to the usTLD Help Desk via e-mail and instant messaging services,

- All relevant contact information and escalation procedures,

- Access to customer account information,

- A collection of marketing material and information that may be freely used by registrars to help them promote the domain space, and

- Free downloads of RTK software.

NeuStar's Web development team is experienced in providing Web sites that allow both public and private access. We will leverage our Web development experience and design an easy-to-navigate, content-based Web site that will provide fast and easy access to services, help, and information to all of our customers.

B.2.12   Documentation and Training

Readily available, clear and concise procedures and documentation ensure a stable system, informed customers, and knowledgeable Help Desk account representatives. These are fundamental to NeuStar's customer service philosophy.

Accurate, detailed documentation is vital to the implementation of any successful TLD registry, particularly when transitioning the administration of and enhancing the registry. System documentation in particular will contribute to the stability of the registry and improve service enhancements.

Two distinct types of documentation are required in order to provide a complete understanding of the usTLD and the services being provided—internal and external. Internal documentation includes both system documents and methods and procedures (M&P) documents. External documentation includes all user documents, such as online help and user's manuals and training materials for new registrars. Training of the usTLD staff ensures the highest quality of customer service that NeuStar can offer, and training materials provided to registrars allow those registrars to quickly become familiar with usTLD registry operations.

System documentation allows developers to relay the details of the usTLD registry specifications, design, and interfaces. These documents assist not only in the initial implementation of the system but also in repairing the system and scaling the system, should the need arise. M&P documentation will provide the usTLD support staff with policies and procedures for support of the usTLD. These documents will provide clear instructions for responding to requests for help, procedures for handling service interruptions, and workflow processes for all functional areas. M&P documentation, while invisible to our customers, is a vital step in providing the best possible services to them. User documentation provides registrars with detailed instructions for using the Registrar Tool Kit and interfacing with the usTLD registry. These documents are vital to successful implementation of the usTLD expanded space.

Internal Documentation

As part of our internal documentation initiative, NeuStar will develop both system documents and M&P documents. In addition, a Quality Assurance (QA) Plan will be prepared and used throughout the development, test, implementation, and maintenance life cycles to ensure the quality and success of the usTLD registry. The QA Plan will specify all system and user documents to be produced for the usTLD registry.

The full suite of internal documentation will be prepared and maintained by NeuStar through the project life cycle and will be made available to the DOC or to a designated third party for audit purposes. Compliance matrices will be prepared to map system requirements to system design and to individual test scenarios. At a minimum, system documentation will include the following:

- **Functional Requirements Specification**—Describes all external interfaces and specifies the functional, data, performance, and security requirements of the usTLD registry.

- **System Design Document**—Presents a high-level overview of the usTLD registry that will facilitate analysis, planning, and implementation.

- **Detailed Design Document**—Presents a more detailed overview of the usTLD registry to further facilitate analysis, planning, and implementation.

- **Testing Documentation**—Includes detailed test plans, test scenarios, and test scripts to ensure that the usTLD meets the requirements outlined in the Functional Requirements Specification.

- **Security Policy Document**—Outlines all aspects of NeuStar's security policies, including access, Internet and physical security, and procedures for handling security breaches.

- **Disaster Recovery Plan**—Details the requisite procedures for full recovery of the usTLD registry.

M&P documents will be developed and maintained to guide NeuStar personnel in the day-to-day operation of the usTLD. These documents will contain all of the usTLD business rules and workflow processes for all functional areas, as well as internal and external reporting requirements. At a minimum, M&P Documentation will include the following:

- **Help Desk (Tier 1) Methods and Procedures**—Provides all methods and procedures for Help Desk staff in NeuStar's IP Customer Service Center, including phone and e-mail help procedures, trouble-ticketing procedures, and escalation procedures.

- **Applications Support (Tier 2) Methods and Procedures**—Provides methods and procedures for the applications support staff, including procedures for resolving trouble tickets as well as expected times for resolution of service-affecting and non-service-affecting problems.

- **Billing and Collections Methods and Procedures**—Provides all methods and procedures for the usTLD billing staff, including procedures for handling registrar calls and resolving billing issues.

- **Quality Assurance Methods and Procedures**—Provides all methods and procedures for QA staff, to ensure that all QA requirements are followed by NeuStar's usTLD staff.

All M&P documentation will also include contact information for escalation of issues.

External Documentation

As part of our external documentation initiative, NeuStar will develop guides for use by registrars in the usTLD expanded space, as well as guidelines for locality-space delegees. These documents will be available on the usTLD Web site.

At a minimum, user documentation will include the following:

- **RTK Programmer's Guide**—Contains detailed information to registrars about using the Registrar Tool Kit, which will be provided to all usTLD accredited registrars via the private area of the usTLD Web site.

- **Connecting to the usTLD**—Provides information and detailed guidelines for delegees and registrars for interfacing with the usTLD registry.

- **Guidelines for Locality Delegees**—Provides detailed guidelines for delegees and subdelegees in the locality-based usTLD space, including technical and operational requirements of a locality delegee, as well as procedures for transferring a locality space to a new delegee.

- **Frequently Asked Questions**—Provides answers to Frequently Asked Questions for both registrars and locality delegees and subdelegees. An additional FAQ will be available on the public section of the Web site for registrants and the general public.

- **Marketing the usTLD**—Provides ideas and information to registrars for successfully marketing the usTLD in their own advertising.

Training

In order to provide the best value in service to registrars, delegees, and registrants, the IP Customer Support Team will develop and distribute extensive training materials to ensure that all staff have a well-rounded knowledge and understanding of registry and registrar operations and procedures. Although staff will be chosen on the basis of domain name management experience, it is vital that all members of the usTLD team are trained on usTLD-specific methods and procedures. In this way, NeuStar will ensure extremely high levels of quality, consistent support services.

At NeuStar, we want our customers to feel comfortable working within our systems; a registrar that does not fully comprehend our procedures and functions may feel uncomfortable working with us. To avoid these problems and ensure fuller participation in the usTLD registry, training materials will be provided to registrars via the usTLD Web site. These materials will include presentations and walk-throughs that instruct registrars on use of the RTK software and inform them on how to interface with the usTLD registry. Any questions from registrars not covered in these training materials and in the user documentation and FAQs will be answered, either by our Integration Assistance team or the Help Desk staff.

B.2.13 Customer Relationship Management

NeuStar will leverage an enterprise-wide CRM program to assist in channel management and outreach for the usTLD.

NeuStar recognizes that the most important element in any service is the customer—whether that customer is the Department of Commerce, a registrar, or an individual registrant. To this end, NeuStar has codified and implemented throughout its lines of business a thoughtful, thorough, and down-to-earth approach to Customer Relationship Management (CRM). NeuStar's goal is to ensure customer satisfaction and provide superb service levels to all of the customers with whom we have a relationship.

Our CRM vision is to exceed customer satisfaction levels by managing all communications channels, regardless of how customer interactions are initiated, and by observing the needs and wants of our customers to better understand them. CRM allows us to seamlessly blend multiple technologies and applications with processes and resources while managing all areas and types of customer interactions, including sales, marketing, customer service, billing, and technical support. Our CRM program will optimize the value of every customer interaction and experience with usTLD points of contact and service. NeuStar's commitment to provide this down-to-earth customer support is at the heart of our CRM business practices and procedures. We understand the high expectations of our customer base for providing usTLD services to the Internet community in the United States—and NeuStar will deliver.

Our CRM program comprises scalable infrastructure, solid processes, and a technological foundation. We will use CRM in combination with our extensive market and customer knowledge to ensure that we meet our commitment to timely, responsive, and high-quality customer service.

B.2.14   Reporting

NeuStar's Web-based usTLD reporting system will be rich in functionality and have built-in flexibility to provide reporting information to registrars in numerous ways.

NeuStar's usTLD registry will include an automated reporting service that will provide a regular, high-level description of information about the registrar's interaction with the registry. This report will be e-mailed to designated registry contacts and will be available via the private section of the usTLD Web site. It is important to note that a registrar will have access only to its own data; a registrar will not have access to any other registrar's private information. The specific information included in these reports will be developed in consultation with registrars to ensure that they have access to information they deem critical for their business, and different sets of information will be available for different time periods. The reports will include data such as:

- Total number of domains registered since initiating service as a usTLD registrar;
- Total number of domains registered or cancelled in the previous 7 days, 24 days, or 1 month, as requested by the registrar;
- Total number of domains transferred from other registrars;
- Total number of domains transferred to other registrars;
- Remaining account balance; and
- A list of domain names that are coming due for re-registration.

It is anticipated that registrars may require additional, specific information from time to time. To make this information available to registrars, NeuStar will develop a Web-based report query function. This function will allow registrars to obtain information on registration and maintenance activity such as:

- Numbers and names of domains registered within any specified period;
- Domain names transferred to or away from the registrar within a specified period;
- Change of ownership activity, including exact time and date requests were processed; and
- Re-delegation activity for domains assigned to a given registrar.

These reports will be developed on an ongoing basis in consultation with registrars and the DOC.

B.2.15   Progress and Quarterly Reporting

In order to provide assurances to the COTR of the level of work and progress toward goals of the usTLD, NeuStar will submit progress reports and quarterly reports, as required by the RFQ.

Routine communications with our customer is the best way to ensure that we are making progress toward our goals for the usTLD. In accordance with RFQ Section C.2, NeuStar will submit monthly progress reports to the COTR and post them on our web site for the first two years of the purchase order, as well as quarterly reports thereafter. These reports will indicate the status of all major events as well as major work performed during the reporting period, including technical status, accomplishments, and complications experienced in fulfilling SOW requirements. These reports will also provide performance data related to the operation of the usTLD registry. This data will include, for each reporting period:

- The total number of registry transactions;

- The number of new, transferred, or deleted registrations in the usTLD, including cumulative registrations over time;

- The number of locality delegees (including subdelegees) and changes in locality delegees;

- The number of registrars accredited to register names in the expanded usTLD space, including the operational status of those registrars; and

- Any updates or modifications to the system made by NeuStar.

B.2.16   Help Desk

Our unparalleled experience in providing data administration solutions and services makes NeuStar the only entity truly capable of providing the technical support and administration services necessary for the successful operation of the usTLD registry.

Because of the complex nature of the usTLD space, a high level of Help Desk services will be necessary to support our customers—registrars, delegees (which includes subdelegees), and locality-based registrants. NeuStar will ensure that these communities have access to the right support from the right people.

During implementation, the usTLD staff will work to establish policies, processes, and procedures that facilitate efficient usTLD operations, including verifying and understanding registrar interfaces, problem resolution and escalation procedures, service and administration guidelines, and customer record security. Registrars who call the Help Desk will be identified by caller ID and by a pre-established pass phrase that is different for each registrar.

NeuStar's usTLD Help Desk within the Internet Protocol (IP) Customer Service Center will be the first point of contact for registrars, delegees, and direct registrants for Tier 1 technical and account questions as well as for billing questions. Tier 2 technical support will be available on a 24 x 7 x 365 basis. We will leverage NeuStar employees trained in Internet Help Desk operations; these employees will be familiar will all usTLD policies, standards, and practices. In order to accommodate multiple U.S. time zones, the Help Desk will be available from 8:00 a.m. to 8:00 p.m. (EST), Monday through Friday.

Help Desk personnel and other assistance will be available to our customers through a variety of means, including:

- A toll-free Help Desk number that provides customer support from 8:00 a.m. to 8:00 p.m. (EST) and technical support on a 24 x 7 x 365 basis;

- E-mail access for Tier 1 and Tier 2 assistance;

- Extensive self-help provided via the usTLD registry Web site, including detailed documentation and answers to Frequently Asked Questions;

- Online instant messaging support;

- Easy-to-use training materials;

- Discussion and news lists; and

- Password access to reports via a secured section of the registry Web site.

The IP Customer Service Center's phone system will use an Interactive Voice Response (IVR) system and Automatic Call Distributor (ACD) to route registrar and direct registrant calls to the

appropriate Help Desk personnel. Customers who call the toll-free number after 8:00 p.m. will have their calls routed to the on-call Second Tier technical support specialist. NeuStar's highly skilled, customer-oriented Help Desk staff will be responsive to customer needs and will provide the following support services:

- Assistance with domain name registration and administration operations,

- Troubleshooting assistance and problem resolution for first-level technical and integration issues,

- Answers to questions regarding policies and procedures,

- Assistance with address charging and payment issues, and

- Explanations of general guidelines over the phone.

Customer support queries received by phone, by e-mail, or from the usTLD Web site will be logged and tracked through assignment of a trouble ticket. It is the goal of NeuStar's IP Customer Support Center to close as many trouble tickets as possible on the first call. In the event that an issue cannot be resolved during the initial call, it will be escalated to the appropriate Second Tier support service.

NeuStar's Second Tier Customer Support staff will act as a second level of escalation in resolving registrars' technical issues. This team will be responsible for providing complex problem identification and resolution, in-depth system integration assistance, and system troubleshooting. Some of the key functions supported by this team include:

- Addition of new registrars into the system;

- Maintenance of registrar security mechanisms, such as public and private keys and passwords;

- System service reporting;

- Change management;

- Mass database modifications and updates;

- Non-standard database modifications; and

- Production and updates of system documentation and integration guides.

The Billing and Collections team will provide support for account statements, reconciliation, and other billing issues. Although the primary point of contact for registrars on these issues will be the account manager, the Billing and Collections team will be responsible for understanding and meeting the day-to-day billing needs of registrars. The core responsibilities of the Billing and Collections team will be to:

- Accept and process initial registration payments from registrars,

- Assist registrars in adding funds to their account,

- Audit and produce monthly statements for registrars,

- Monitor available funds in registrar accounts, and

- Audit and reconcile system registration records with accounting system records.

Help Desk Escalation

Help Desk escalation procedures are intended to resolve issues as quickly as possible. An escalated Help Desk call will use the following procedure:

1. A customer will contact the usTLD Help Desk via the toll-free number. The Help Desk account representative receiving the call will open a trouble ticket by obtaining the following information from the customer:

   - Name of customer contact;

   - Company name;

   - Point of Contact, if other than the person opening the trouble ticket;

   - Call-back telephone number;

   - E-mail address; and

   - Detailed description of the problem, including how the problem manifested itself, the time the problem occurred or began, whether or not the symptoms of the problem are still occurring, and whether or not a root cause analysis and/or resolution/fix are required. The problem description should be in bullet format.

2. The Help Desk account representative will attempt to resolve the issue and close the trouble ticket. The account representative will use a check sheet developed by second-level support in diagnosing the problem and attempted problem resolution.

3. If the account representative cannot immediately resolve the issue, the account representative will escalate the issue to a Tier-2 support specialist. Our escalation policy defines procedures and time lines for elevating problems either to functional experts or to management for resolution if they are not resolved within the escalation policy time limits. The following table is an overview of our escalation policy.

NeuStar usTLD Help Desk Escalation Policy

Level	Description	Escalation Policy	Notification
I	Catastrophic outage affecting overall registry operations	Service center manager escalates to usTLD management and Disaster Recovery Team if not resolved in 15 minutes	Web portal and e-mail notifications to all registrars and locality delegees within 15 minutes; updates every 30 minutes
II	Systems outage affecting one or two registrar sessions but not the entire system	Systems engineer escalates to service center manager if not resolved in one hour.	Web-portal notification to all registrars and locality delegees, including subdelegees; hourly updates
III	Technical questions	Help Desk account representative escalates to the systems engineer if not resolved in two hours	Hourly updates to registrar, locality delegee, or registrant via e-mail
IV	Basic questions	Help Desk account representative escalates to the systems engineer if not resolved within four hours	Hourly updates to registrar, locality delegee, or registrant via e-mail

The NeuStar Difference

Throughout our operations, in both telephony and IP services, NeuStar has demonstrated its ability to deliver and manage complex database services such as those needed to run a successful top-level domain. More than that, NeuStar has first-hand experience in learning what difficulties can arise from registry services like the usTLD registry and has proven its capability not only to handle problems efficiently when they arise but also to prevent them from occurring.