E.   Current State of the usTLD Domain Space

NeuStar's thorough understanding of the current state of the usTLD strengthens our ability to effectively manage and enhance the space.

It is often said that hindsight is 20/20. This means that with time and experience, we come to understand, in context, the implications of previous decisions. Had anyone been able to predict the developmental course of the Internet and the effect it would have on people's lives, many issues that currently complicate its use would have been addressed and clarified. The same holds true for the dot-us top-level domain (usTLD). When the original structure and administrative mechanisms for the usTLD were established, there was nothing to compare it with and no way to predict its evolution. With the advantage of time, however, it is clear that the complexities of the current structure, combined with the lack of coordination and marketing of the namespace, have resulted in a space that has not attracted a high level of domain name registration activity and that remains underpopulated and underutilized in comparison with other ccTLDs.

HIGHLIGHTS

NeuStar's understanding of the current usTLD space provides the foundation for solution development that ensures:

- **Significant improvement of the integrity of the usTLD**

- **Innovative, yet responsible improvements are developed and properly executed**

- **The needs of all current and future stakeholders are addressed**

Without an in-depth comprehension of the current usTLD space—its successes and its shortcomings—no administrator could successfully meet the challenge of improving the integrity of the usTLD. This comprehension must include a thorough understanding of the naming structure, current administration, technical and operational conditions, and other factors relating to the usTLD, as well as a general understanding of what makes a ccTLD successful. Policy issues in the usTLD run throughout these issues and are discussed throughout this section and this proposal.

The usTLD was established in 1985 as the country code top-level domain (ccTLD) for the United States. ccTLDs are based on the two-letter country codes from the list of countries in ISO-3166. A number of these ccTLDs have been repurposed—used not to serve the individuals, governments, and businesses of the country that they represent but instead as a globally available alternative to the generic top-level domains. For example, the registry for the dot-cc domain, which began as the ccTLD for Cocos Island, now advertises dot-cc as the newest alternative to the gTLDs. This type of rebranding may create user confusion and can cause a situation where the ccTLD is not managed in the best interest of the country that it should represent, thereby significantly diminishing the integrity.

This kind of repurposing has not occurred in the usTLD. Today there are approximately 8,000 subdomain delegations under the usTLD to entities providing services for commercial, educational, and governmental purposes to registrants physically located in the United States. Individuals, federal government agencies, schools, libraries, museums, and state and local governments are all registered in the usTLD locality-based hierarchy.

Naming Structure of the usTLD

The original hierarchical structure of the usTLD was defined by Dr. Jon Postel in IETF RFC 1480, "The US Domain." This structure is based upon the geography of the United States. Second-level domain space is designated for states and U.S. territories and consists of two-letter state abbreviations. For example, the state of Pennsylvania is designated by pa.us. Within the state name space, there is a further subdivision for locality names—counties, cities, or local names. Further structure is available for each of the various registering entities listed above, and

additional structures not based in national geography (e.g., .fed.us, .isa.us, and .nsn.us), which represent special organizations not contained within a specific locality, have also been established. Some of the designated structures in the usTLD include, but are not limited to:

usTLD Designated Structures

Structure	Description
<state>.us	No direct registrations currently allowed.
state.<state>.us	Used for state governments (e.g., state.va.us). State agencies may register under this structure.
<locality>.<state>.us	Used for city and county names (e.g., arlington.va.us). Businesses, individuals, and private schools may register under this structure.
ci.<locality>.<state>.us	Used for city governments. Agencies that make up those governments may register under this structure.
co.<locality>.<state>.us	Same as above, for county governments.
k12.<state>.us	Used for public schools. Public school districts may register under this structure.
<district>.k12.<state>.us	Used for public school districts. Public schools may register under this structure.
cc.<state>.us	Used to designate community colleges.
tec.<state>.us	Used to designate technical schools.
lib.<state>.us	Used to designate libraries.
fed.us	Used for federal agencies. Only federal agencies may register under this structure.
isa.us	Used to designate inter-state authorities (ISAs), for joint governmental authorities that are inter-state.
nsn.us	Used to designate Native Sovereign Nations, for example Indian tribes, villages, colonies, and other communities that may span state, regional, and national boundaries.

Additional nongeographical domains are also included as part of this structure, as defined either in RFC 1480 or by previous administrators.

The locality-based hierarchy provides structure, name uniqueness, and a geographic reference point for registrants and, although it is regarded by some as unwieldy, there are enterprises that do value the specificity of the system. Exhibit E-1 demonstrates the basic structure of this hierarchy and shows the number of levels possible in the locality structure. The second-level domain names shown are a subset of all possible second-level domains, and additional "special" domains, as noted above, exist in this space. Registrations must be made within the hierarchical structure, and no registrations are allowed in the second level.
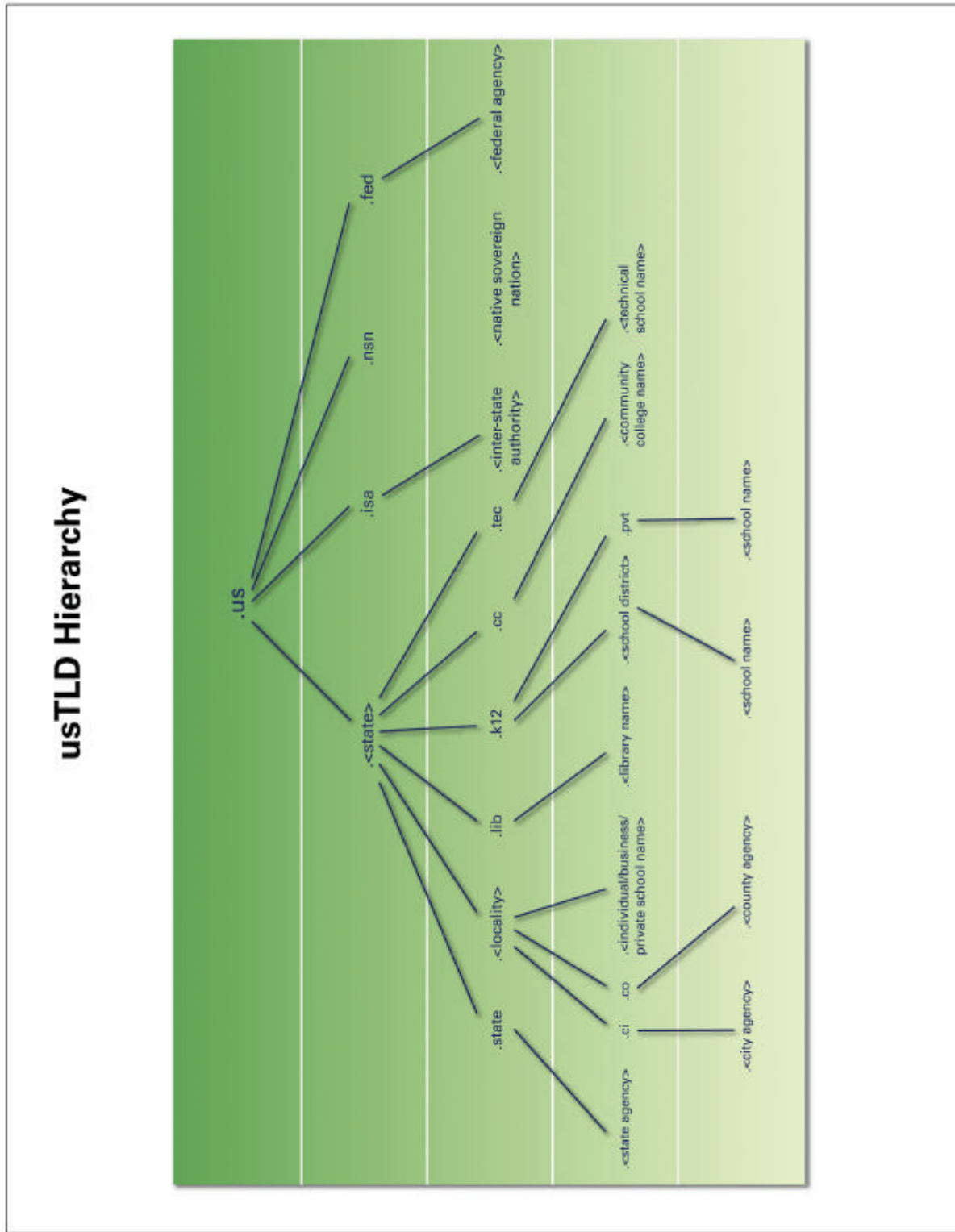
Exhibit E-1. The usTLD hierarchy provides structure, name uniqueness, and geographic reference points but is often considered to be unwieldy.

Designations for schools provide a good example of this hierarchy. Because many schools share the same name, it is important to distinguish by locality the specific school being referenced. There might be several Washington High Schools in the United States, but there is likely only one Washington High School in any given school district in the United States. The locality structure for schools was designed in RFC 1480 to permit distinction between such schools. The k12 designation was created to allow registrations of public and private elementary schools, and the basic structure for these is k12.<state>.us. Beyond the k12 designation is a designation for a school district, and beyond that, schools may register individual names so that the final structure becomes <school name>.<district>.k12.<state>.us. Private schools register as <school name>.pvt.k12.<state>.us, but they may also register under a locality as <school name>.<locality>.<state>.us

To add further complexity, although RFC 1480 defines this structure for registration of schools, the current usTLD administrator has allowed registrations outside of this hierarchy, so that a school might register directly under the k12 branch (for example, <school name>.k12.<state>.us). Additionally, entities designated as "special service units," which are discussed but not definitively structured in RFC 1480, may register directly under k12. Similar discrepancies exist under other areas of the hierarchy. For example, a city government would generally be designated as ci.<city name>.<state>.<us>, and a county government would be co.<city name>.<state>.<us>. In general, these guidelines have been followed, but not consistently. As a real example, the following table lists some city and county government domains within the Commonwealth of Virginia.

Hierarchical Structure of Government Domains Under .va.us

City or County Name	Fully Qualified Domain Name	Follows Hierarchical Structure
Arlington County	co.arlington.va.us	Yes
City of Alexandria	ci.alexandria.va.us	Yes
City of Chesapeake	chesapeake.va.us	No
City of Covington	covington.va.us	No
City of Falls Church	ci.falls-church.va.us	Yes
City of Norfolk	norfolk.va.us	No
Richmond County	co.richmond.va.us	Yes

Although the existing structures for Chesapeake, Covington, and Norfolk would have existed had these cities used the "ci" structure, it creates public confusion when cities and counties in the same state follow different naming conventions for their domains.

Administration of the usTLD

Most branches of the usTLD are delegated to a delegated manager, also known as a delegee, or locality delegee. RFC 1480, written in 1993, maintained that a single registry operator would not be able to assign all of the DNS names under dot-us and, under the administrative guidelines established for the usTLD, included guidelines for selection of delegated managers. Although some of these guidelines have changed since 1993, the current administrator has continued the practice of delegating subdomains, and the basic requirements have been maintained.

Delegation Guidelines

Delegated managers are typically commercial or public institutions with a presence or interest in the location designated. Individuals and organizations may request an exclusive delegation from the usTLD administrator to provide a registry and registrar services for a particular subdomain under dot-us. For example, one individual with an interest in Virginia libraries might request delegation of lib.va.us, and become responsible as the delegated manager for all Virginia library names. Delegees are responsible for providing physical DNS services and maintaining technical support for registrants. A delegee may also assign further subdelegations to a subdelegee, and that subdelegee is then responsible for providing DNS services and technical support for registrants under that subdelegation. For example, a delegee who is responsible for k12.va.us might subdelegate the Wilson district to a subdelegee. That subdelegee would then be responsible for all registrations under wilson.k12.va.us.

Where registration for a locality has not been delegated, the usTLD administrator itself provides necessary registry and registrar services. Additionally, no delegations are made in the second level, so that all cases of <state>.us remain under the control of the main registry operator.

"Locality Squatting"

From the beginning, the concern in selecting a delegee for a subdomain has been assessing their ability to carry out the necessary technical and operational responsibilities in a neutral manner, that is, applying the same set of rules to all requests for a domain name. Although RFC 2916 maintained that delegees have a duty to serve the community, no requirements were established regarding the physical location of the delegee, and no limits were made on the number of delegations that could be held by a single subdomain registry operator.

Because there is no such restriction, a small number of delegees became responsible for a very large portion of the delegated namespace. In fact, according to the current contact list of locality delegees, approximately 40% of the delegations are held by 5 delegees, and 54% of the delegations are held by 10 delegees. Additionally, registry operators who have no interest in the localities themselves, except for a commercial interest, run many of the delegations. The act of running a registry in which the delegee has no legitimate interest, or of refusing to provide services to legitimate registrants, has come to be known as "locality squatting."

In response, additional guidelines were established in 1997 to ensure that delegations were made to entities with a legitimate interest in the delegated locality. Beginning in July 1997, it is assumed that for any new delegations or redelegations, the delegee has the written authorization of the legitimate government for that locality to manage the domain name for that locality. Although this written authorization does not have to be presented at the time of delegation, the delegee might be asked to produce it if the delegation is later contested. Additionally, the administrative contact on the delegation application must be a government representative. Finally, guidelines have also been added stating that no delegee may be responsible for more than 50 localities in one state or 500 localities in total.

Although these guidelines are meant to promote diversity and ensure that legitimate governments are able to choose their own delegated registry operator, analysis of the zone file suggests that problems with "locality squatting" persist in the dot-us subdomains.

Pricing of Registrations

Another important administrative issue in the usTLD is that of cost. The current administrator does not charge customers for registration of a domain name, but they do state that delegees may charge a fee for their services, as long as the fee is small, fair, and applied equally to all customers. The definition of "small" is determined by the delegee. In many cases, the "small" fee determined by the delegee is larger than fees most registrars charge for a domain name under dot-com, dot-net, or dot-org. Whereas many registrars now charge under $15 per year to register a domain name under a gTLD, some dot-us delegees charge $25–$30 per year, with

additional one-time registration fees. Paired with the long string that constitutes a dot-us domain name, this additional cost is even more likely to deter individuals and businesses from registering under dot-us.

Technical Aspects of the usTLD

Both RFC 1480 and information available through the current usTLD administrator specify the technical requirements for delegees who are responsible for a delegated subdomain. Delegees must provide at least two independent, robust, and reliable nameservers in physically separate locations on the Internet, and any changes to these nameservers must be reported to the domain registry so that they can be reflected in the usTLD zone files. Delegee host computers must also be set up to accept zone transfers from the usTLD registry. All of these technical requirements are essential for the usTLD to remain a viable registry, and any delegee not following these requirements risks having the delegation revoked.

Registration Process

Another important technical issue is that of ease of registration. That is, the registration process is currently a manual one, with no consistent, automatic registration process for registrants. Although registrants can fill out and submit an application online, there is no automatic verification of registration. Registrants have no guarantee that their requested domain name is available and whether that name has been entered into the zone file. Moreover, registration applications can often take several weeks to be processed, and some customers have stated that their applications have not been processed at all. As compared to registration in a gTLD, this process is unreliable and cumbersome.

Whois Service

Today, another essential component of a successful TLD registry is a central, accurate Whois service. RFC 1480 provided for a Whois database only through the third level, intending that delegees and subdelegees would eventually run their own Whois databases for their individual branches. Under current administrative practices, the usTLD not only has no central database that can in turn create a central Whois, there is also no mechanism in place for delegees to provision database information to the central registry. Even if delegees wished to provide new Whois information to the usTLD administrator, that capability is currently nonexistent.

In order to remedy the lack of Whois information under the usTLD, the current registry operator installed a client/server Rwhois, (referral Whois) protocol and requested that delegees also operate an Rwhois server for their delegated subdomains. The Rwhois protocol, presented in RFC 1714 in 1994, defines a method for maintaining Whois information on multiple servers while having the ability to answer queries from any of those servers. If a query were made to the usTLD registry's Rwhois server, that server would either respond with its own data or refer to the delegated subdomain's server to return the Whois information.

Although the Rwhois solution appears to be a logical one, three problems prevent it from being successful. First, a central Whois is currently the industry standard for Whois services; Rwhois is generally not considered to be a robust and secure technical solution. Second, the current registry operator has merely requested that delegees install an Rwhois server. Without mandating installation of Rwhois servers, there is no way to build a complete Whois database. Third, there is no easy-to-use, Web-based method for Rwhois lookups in the namespace, so any Whois information that is available is difficult to find.

Other Factors

The use of the usTLD has only one restriction—it is intended for entities that have a physical presence in the United States. Yet many Internet users in the United States have little or no knowledge about this namespace. Aside from the individual advertising done by locality

delegees, the space is generally not promoted and not advertised. That an individual or company can register in the usTLD space is not widely known; in fact, there are no widely held perceptions regarding the types of entities registered under the usTLD.

For those individuals who do have knowledge of and wish to register in the dot-us space, inconsistent policies among delegees, the lack of a central Whois, and even the need to locate a delegee for individual subdomains creates a degree of difficulty that many registrants would rather not encounter.

Because of the comparative complexity of the namespace and the lack of coordination and marketing, the usTLD has not attracted a high level of domain name registration activity and remains underpopulated in comparison with gTLDs and even other ccTLDs. However, many schools, libraries, state and local governments, and even individuals do retain a domain name within the dot-us namespace. Those current users of the usTLD find the space to be valuable; in fact, many of them depend on it.

The ccTLD Environment

Many countries have already been successful in building awareness and increasing the use of registrations for their country code, while others have had less success. The following page displays data collected on relative successes across three other ccTLDs—dot-de (Germany), dot-uk (United Kingdom), and dot-ca (Canada). These three countries represent differing levels of development in the evolution of their ccTLD space. Based on ccTLD domain name registrations, both Germany and the United Kingdom are characteristic of countries that have created environments that encourage growth. Both countries have experienced thriving markets and have developed mature organizations with extensive distribution networks. Canada has recently converted from a hierarchical structure that was loosely managed, to a flatter, less complex hierarchy with a newly formed administrative organization.

Success Factors in Administration of other Country Code TLDs

Factors	Germany (.de)	United Kingdom (.uk)	Canada (.ca)
Administrative Organization	DENIC eG Cooperative	Nominet	CIRA (Canadian Internet Registration Authority)
Policies	Either the domain name owner or the designated administrator of the site must reside in Germany Self identification Can purchase registrations from member organizations only	No residency restrictions Second-level domain (SLD) structure requires self identification Can purchase registrations from member organizations only	Must meet Canadian presence requirements Citizen Residency Various entities Documentation required Can purchase registrations from member organizations only
Structure	Direct registration Can register any name except another TLD name (.arpa, .com, .edu, .gov, .int, .net, .nato, .mil, .org and all country-related TLDs) Cannot register German automobile identification numbers as domain names	SLD hierarchical structure Commercial – .co.uk Non .commercial – .org.uk Registered .companies only – .plc.uk & .ltd.uk Network Providers –.net.uk Schools – .sch.uk	Direct Registration Can still register under a geographic hierarchy that was the ccTLD structure until December 1, 2000
Price–Wholesale	US$5–US$10	US$5 – US$10	US$5 – US$10
Price–Retail	Generally ccTLDs are considered to be more expensive than gTLDs	Generally ccTLDs are considered to be more expensive than gTLDs	US$25–US$40 for one year
Awareness levels and cultural aspects	Very well known Available and promoted since 1997 Previous campaigns include organizations giving away .de domain names with additional purchase Nationalistic	.uk stands for United Kingdom – Abbreviation has meaningful brand acceptance General awareness is high	CIRA recently became the administrative organization 12.01.00
Country Code Domain Name Growth	4M names as of 2/2001 Growing at 167,000/month	Growing at 28,000/month	Growing at 20,000/month
Totalpopulation Online population Population % online	83M 20.1M 24%	60M 20M 33%	31M 13.3M 43%

When analyzing the ccTLD administration for these three countries in comparison to the current administration of the usTLD, it becomes apparent that five factors have played an important role in the expansion of the ccTLD space:

- An administrative organization with maturity and experience;

- Established policies that facilitate registration and serve to administer, maintain, and enforce the ccTLD space;

- A low degree of complexity in utilizing the structure or hierarchy for the ccTLD;

- Appropriate pricing to the end user; and

- Recognition of cultural differences and levels of awareness within the country.

In each case, an administrative organization has been assigned to maintain the registry database, and the registry manages a centralized database of information on registered domain names for that country code, assists with administration of the Internet, and provides information about domain name registrations. Neither Germany, the United Kingdom, nor Canada act as registrars. Based on the high number of domain name registrations, clearly DENIC, the German administrative organization, has created one of the most successful environments for TLD expansion. DENIC has managed the deTLD since September of 1997 and has established a wide distribution network that provides extensive opportunities for users to register names with ease.

The policies created to register, administer, and maintain each ccTLD are another contributing factor to the speed of ccTLD growth. Policies that are easily understood and require minimal enforcement establish an environment that simplifies transactions. Both DENIC and Nominet have established registration policies requiring self-selection or self-identification and no documentation for registration; in contrast, the Canadian Internet Registration Authority, CIRA, requires documentation of compliance before domain names can be registered.

The cost of registration plays a significant role in the growth of domain name registrations. gTLDs became competitive in late 1999, and until then, there was no wholesale market opportunity for gTLDs. This has not been true for many ccTLDs. Wholesale prices for ccTLDs in Germany, the United Kingdom, and Canada are relatively consistent in the US$5–US$10 range. With gTLDs fixed at $35 per year, this created a margin opportunity for the members or registrars promoting ccTLDs. With a US$20–US$30 margin opportunity, it was in the best interests of the registrars to heavily promote ccTLDs. With heavy promotion by the registrars, ccTLDs gained a significant increase in awareness and registrations.

Finally, awareness of the ccTLD, coupled with certain cultural aspects impact user acceptance. The United Kingdom has the helpful advantage of having a meaningful TLD. "uk" resonates with the user base of customers within the United Kingdom. This contributes to the overall awareness and general acceptance of the country code. "us" has a similar advantage, with clear recognition of "us" being synonymous with United States. Coupled with strong nationalistic pride, the usTLD should resonate favorably with the citizens of the United States.

Conclusion

The usTLD namespace is underutilized and under-recognized, but it remains a valuable public space. There is room for improvement in any large undertaking, and the usTLD is no exception. We have presented this extensive analysis of the current state of the usTLD and an analysis of ccTLDs in general, because we believe that the only way to make improvements—to expand and enhance the space—is to understand its current successes as well as its shortcomings. Throughout every section of this RFQ response, we have addressed our understanding of the current space along with our plans for its improvement.

The United States is the world's technological leader, and the current state of the usTLD namespace does not positively represent that. By thoroughly studying the current space, and through our careful plan for improvements, we believe that we can make the usTLD space the model for a widely used, visible, and successful country code top-level domain.