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THE CASE FOR GTLD AUCTIONS: A FRAMEWORK FOR EVALUATING DOMAIN NAME POLICY*

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I. INTRODUCTION: DOMAIN NAME POLICY

In this policy paper we first present a framework for evaluating domain name policy in general and TLD policy in particular. We demonstrate that the domain name system is what economists call a “private good” and not a “public good.” We then show that, because of what economists call “networking effects,” root service, the part of the domain name system that handles the gTLDs is a natural monopoly. At the first level of analysis, we establish that gTLD policy ought to take into account these two fundamental economic facts: (1) domain name service is a private good, and (2) root service is a natural monopoly created by networking effects.

We next argue for a specific set of conclusions about gTLD policy. In particular, we demonstrate that there is a compelling case for allowing the market to operate in the creation of new gTLDs. This could be accomplished through a variety of mechanisms, including a rule of first occupation or through an auction. Although the creation of gTLDs should allow for the operation of market forces, it does not follow that ICANN itself should act as a profit-maximizer. Instead, we reason that, because ICANN is a non-profit corporation and because it is the trustee for a natural monopoly, ICANN ought to act in the public interest. We conclude that ICANN should structure the expansion of the root in a way that insures the stability and efficiency of root service. We offer a specific proposal for an auction of new gTLDs, and show that this approach offers substantial advantages over current domain name policy.

Our conclusions are reinforced by a set of comparisons between the policy questions faced by ICANN as both a participant in and regulator of the DNS and with analogous policy questions faced by market participants and regulators in other sectors of the telecommunications system. In particular, we argue that there are important insights to be gleaned and lessons to be learned by comparing domain name service with broadcasting and telephone service.

We assume that readers of this paper are familiar with ICANN, its operation and historical development, and the Domain Name System (DNS). For description and discussion of these, please see our full-length article at http://techlaw.ills.edu/papers/gTLD.pdf. The full-length version also contains citations and supporting references for the arguments made here.

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II. AN ECONOMIC ANALYSIS OF DOMAIN NAME POLICY

We begin our analysis of domain name policy with a brief excursion into economics. Economics cannot answer all of questions raised by domain name policy. First, domain name policy must answer to the discipline of network engineering. A useful domain name system must work, and the functionality, scalability, reliability, and stability of the system are determined by the soundness of its engineering. Second, domain name policy must answer to public policy. The Internet is a global network of networks, and Internet policy is answerable to a variety of constituencies, including national governments, the operators of the ccTLDs, Internet Service Providers, information providers, end users of the Internet, and many others. ICANN is a nonprofit corporation required by law to serve the public interest. An economic analysis of root service can answer some, but not all, of the fundamental questions that are raised by domain name policy.

Nonetheless, an economic analysis of domain name policy has an important, indeed a crucial role to play. The Internet has been mythologized, and the image of the Internet as a separate realm, somehow exempt from legal regulation and the operation of market forces is still a powerful and compelling ideal in the minds of many. Although this romantic picture may have an element of truth, there is much to be learned by stepping back and looking at root service as an ordinary service, provided by an ordinary organization, subject to the familiar laws of supply and demand. How can the provision of that service be organized so as to provide the greatest benefit of the public? How can the root be put to its highest and best use?

A. Domain Name Service Is Not a Public Good

From the standpoint of neoclassical economics, a good place to begin an analysis of the root and the creation of TLDs is the question, “Should root service be provided by the market?” One reason for answering such a question in the negative is that the good or service in question is a “public good,” e.g., a good that ought to be provided by government or public entity. National defense and clean air are usually considered public goods. Conversely, if root service is a “private good,” then well-established and uncontroversial economic theory suggests that it can best be provided by markets.

The phrase “public good” is ambiguous. In one sense, the public good is simply whatever is in the interest of the public as a whole; in this sense, “public good” is a synonym for “common weal.” Economists use the phrase “public good” in a more restricted and technical sense. A given good or service is a “pure public good” if and only if it meets the following two criteria: (1) nonrival consumption, and (2) nonexcludability. By “nonrival consumption,” economists mean that consumption of the good by one individual does not limit the availability of the good to any other individual. By “nonexcludability” economists mean that the provider of the good or service cannot exclude individuals from access to the good.

Consider the example of national defense. National defense meets the criterion of nonrival consumption, at least for a broad range of cases. If the United States has a strong national defense, then everyone who lives in the United States benefits equally.
The security that I receive from the maintenance of the Army, Navy, Air Force, and Marines of the United States Armed Forces does not diminish the security that other residents of the United States receive from them. National defense also meets the criteria of nonexcludability. It would be difficult or impossible to exclude specific individuals from that benefit. Because national defense meets the two criteria, it cannot be provided by markets. Suppose a private firm tried to provide national defense for a monthly charge. Would it be rational to pay the charge? Because the private firm could not exclude me if I did not pay the charge, it would be economically rationale for me to refuse to pay the charge. That is, it would be economically rational for me to be a free rider. If everyone were economically rational, no one would pay the charge, and the market, therefore, would fail to provide national defense. Government can eliminate the free rider problem by paying for national defense with compulsory taxes.

With this outline of the economic notion of a public good in place, we turn to our main question: “Is root service a public good?” In the domain name policy literature, statements are sometimes made that suggest that the answer to this question is yes. For example, the gTLD-MOU, an effort to establish an informal transnational agreement on domain name policy states “the Internet Top Level Domain (TLD) name space is a public resource and is subject to the public trust.”1 A similar statement can be found in the Final Report of the International Ad Hoc Committee: Recommendations for Administration and Management of gTLDs,2 and in the operating principles of the Government Advisory Committee to ICANN. Typically, these statements are not supported by analysis or reasoning of any kind; for this reason, it is difficult to discern what these statements mean. Indeed, as part of the process that eventually lead to the creation of ICANN, the Department of Commerce of the United States Government received comments on both sides of the question whether the name space should be viewed as a public resource. Moreover, those who participate in domain name policy discussions are frequently woefully ignorant of even the most basic economic concepts. We believe that this issue can be clarified by adopting the following conceptual distinction. We shall serve the use of the term “public good” for those goods or services that meet the technical economic definition of a public good. We shall use the term “public resource” for a good or service that is owned or controlled by government—whether or not the resource is a public good.

Given this distinction, root service is clearly not a public good in the economic sense. This conclusion can be established by examining two different perspectives—those of end users and TLD proprietors. First, we look at root service from the point of view of end users of the Internet who want to locate a given computer or server by entering a domain name in an application; from this first perspective domain name

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1 “Establishment of a Memorandum of Understanding on the Generic Top Level Domain Name Space of The Internet Domain Name System (gTLD-MoU),” http://www.gtdl-mou.org/gTLD-MoU.html ((last visited February 8, 2003).

2 See http://www.gtld-mou.org/draft-iahc-recommend-00.html (last visited February 8, 2003) (“The Internet top level domain space is a public resource and is subject to the public trust.”).
service does look like a public good. Second, we look at root service from the point of view of proprietors of TLD registries, who want users to be able to locate the name server for their TLD by entering its domain name in an application.

Suppose that you are using the World Wide Web and that you wish to browse to Amazon.com website by using the domain name, “www.amazon.com.” Does your consumption of root service rival that of other users? In theory the answer to this question might be “yes,” because root servers have a limited physical capacity. My query might be bounced, because all of the root servers might be utilized to capacity. In practice, this is unlikely to occur, because of the distributed nature of the DNS. Given that the root file is cached at numerous locations, users rarely need to access the root server to resolve a TLD. Indeed, the overwhelming majority of queries that reach the root servers are misspellings of TLDs, e.g. .c0m or .cpm is entered for .com.\(^3\) For all practical purposes, my consumption of root service does not rival yours.

Likewise, the architecture of the Internet does not facilitate excludability. Although the root servers could be password protected and a fee could be charged for access, users could easily locate the IP Address for a given TLD name server without paying the fee—precisely because that information is cached and made publicly available at innumerable locations on the Internet. Of course, further alterations could be made to exclude free riders from access to the database of domain names, but because that database is not subject to intellectual property protection, excludability will be difficult to maintain. In other words, from the user’s perspective, domain name service appears to be a public good. However, appearances, in this case, are deceiving.

From the proprietor’s perspective, it becomes clear that root service is not a public good. First, root service to the proprietors of TLD registries is rivalrous. If the root points to a name server (or system of parallel name servers) operated by Verisign to provide name service for the .com TLD, then it cannot also point to a name server (or system) operated by a different registry for the .com TLD. For name service to work, each domain name must resolve to a unique IP Address. This in turn requires that each second level domain must be identified by a unique (or coordinated set of) first level domain name server(s). If Verisign operates the name server for .com, then no one else can operate that same name server for a given root. Hence, root service, as well as other names services, is rivalrous in the economic sense.

Second, root service to the proprietors of TLD registries is excludable. Any given TLD can either be included or excluded from the root. Thus, the operator of the root can sell root service to TLD registries. If the proprietor of a given TLD registry refuses to pay, then the operator of the root can simply eliminate the TLD from the root or point to a name server operated by a rival registry proprietor. Hence, root service is excludable in the economic sense. By extension, all levels of name service are similarly excludable.

What are the implications of the conclusion that root service is a private and not a public good? At this stage, we will set aside the question whether there can be

\(^3\) “Establishment of a Memorandum of Understanding on the Generic Top Level Domain Name Space of The Internet Domain Name System (gTLD-MoU),” http://www.gtdl-mou.org/gTLD-MoU.html ((last visited February 8, 2003).
competition for root service. Given that root service is a private good, it could be provided efficiently by firms (that is, profit seeking entities, such as for-profit corporations).

Private firms could sell root service. This could be accomplished through a variety of pricing mechanisms. As we have already discussed, it would be difficult to sell root service directly to users and therefore root service providers would be more likely to sell root service to the proprietors of TLDs. Root service would be one of the factors (costs) of operating a TLD, and hence would be incorporated into the price the TLD operators charge to registrants of SLDs, assuming the TLD proprietor was in the SLD business. What price would be charged? If there were competition in the market for root service, the price would equal the costs of root service (including, of course, the cost of capital in the form of interest to lenders and dividends or share price appreciation for equity holders). Given that the cost of providing root service is relatively low, the price would be low.

Another question concerns what economists call “metering.” Would root service providers charge every gTLD operator a flat fee or would such providers attempt to meter the usage of root service associated with each TLD proprietor and charge based on metered usage? Of course, the price could be a combination of a flat fee (a connection charge) and a metered fee. Direct metering is possible, because each query to the root can be logged. Indirect metering is another option; for example, TLD proprietors could be charged on the basis of the number of registrations—assuming that registrations correlate strongly with the demand for root service.

Why should private goods be provided by markets? At a fundamental level, the answer to this question lies in the Pareto Principle: given the possibility of improving the welfare of one individual without harming anyone, the Pareto Principle requires that we take the action that results in the improvement. A market transaction, where individual X and individual Y voluntarily exchange some good or service G for payment M, is required by the Pareto Principle, unless the transaction results in an externality—that is, a cost or harm to some third party, Z. Markets both allow Pareto-efficient transactions, and give incentives for all such transactions to take place. In a market, the purchaser who derives the greatest benefit from a good or service will be willing to pay the highest price. For this reason, markets put resources to their highest and best use.

B. Networking Effects and the Root Service Monopoly

The story we have told so far has made an important assumption—that there could be more than one firm that provides root service. From the technological point of view, there is no barrier to the creation of alternative roots. ICANN could operate one root system, and one or more other entities could operate competing roots. In fact, there are alternative root services.

However, the alternative roots provide service to only a tiny fraction of Internet users. Why? In the paragraphs that follow, we will demonstrate that the economics of root service strongly favor a single root. The arguments that we make do not depend on technical considerations. Even assuming that multiple roots were technically feasible, the marketplace would result in a single root (or perhaps a dominant root, with a tiny fraction
of purchased domain names residing in alternative roots). Our demonstration is based on two ideas: (1) the economists’ notion of networking effects, and (2) the cost structure of root service providers. As we show, these two factors would inevitably lead a system that began with competing alternative roots to evolve into a system with a single root. The same factors prevent a system with a single root from evolving into a system with multiple roots.

First, consider “networking effects,” a term we are using in a technical economic sense. The value of root service increases with the number of users of the service. A single root with many users is more valuable than a single root with few users. Given any arbitrary number of users, root service is more valuable if all of the users patronize the same root, and as a consequence, root service is less valuable if the same users divide their patronage among two or more competing roots. Second, consider the cost structure of root service providers. Much of the cost of operating a root is fixed. Although a root with more customers in theory requires more server capacity, given the distributed nature of the DNS, the marginal costs of serving additional customers are relatively small as a share of total costs. Given these two factors (networking effects and a high ratio of fixed to marginal costs), rational TLD proprietors will choose to purchase root service from the market leader. This is because the market leader provides a more valuable service at a lower cost. ISP’s will point toward the market leader’s root server, because the market leader’s root service is more valuable to the ISP’s customers than is the root service provided by other root service providers. Both the networking and cost effects become more and more pronounced as the market share of the market leader becomes larger and larger. For this reason we would expect the market to lead to a single firm providing root service, i.e. root service will be provided by a monopolist.

The way that networking effects operate with respect to root service can be illustrated by performing a thought experiment. Imagine that the root became fragmented. If there were many competing roots, and many competing sets of TLDs, then different users would reach different destinations by entering the same domain name. ICANN’s root presumably would result in www.amazon.com being resolved to the IP Address of the ecommerce retailer in Seattle, Washington. An alternate root might result in the same domain name being resolved to a tour operator in Brazil. Different Internet Service Providers (ISPs) would point requests for root service to different root servers. As a result, individuals would get different results for the same domain name when they moved from one ISP (at home) to another (at work or at an Internet café). As fragmentation increases, the value of domain names decreases. If I am an Internet user, I am less likely to invest in memorizing or memorializing “www.amazon.com” if it doesn’t reliably get me to the website I am seeking. If I am a website proprietor, I am less likely to invest in publicizing a domain name, if users will frequently be directed to another proprietor’s website when they enter the string of characters that I am advertising.

Networking effects can be observed in many contexts other than the domain name system. The World Wide Web itself is more valuable because it has many users. Likewise, a single integrated world wide telephone system is more valuable than would be a series of competing systems, each of which has users who could not make connections to users of the competitor’s systems. Microsoft Office dominates the market for word processing and spreadsheets in part because there is an advantage to using the
same word processing and spreadsheet program as do many other users. Users have a
greater incentive to invest in learning program specific skills if it is likely that those skills
will be transportable to other locations, workplaces, and so forth. Collaboration is less
costly if the collaborators use the same program.

So far, we have been discussing economic theory. The actual story of the
emergence of ICANN’s root service monopoly is somewhat different. Because the
Internet emerged from a government research project, only one entity provided root
service early in the history of the Internet. That entity (IANA, i.e. Jon Postel) received a
government subsidy for the provision of root service. That is, one entity provided root
service for free. It is hardly surprising that no effective competitor to ICANN has
emerged. By the time the government subsidy for root service ended and ICANN began
charging TLD proprietors, ICANN was already an effective monopolist. Given
networking effects and the cost structure of root service, there were very substantial
barriers to the entry of competitors.

What is surprising is that any alternative root service providers exist at all. What
explains the emergence of these failed attempts to compete with ICANN? The most
obvious explanation is ICANN’s restriction on the TLD space. In particular, ICANN has
taken a very cautious approach to the creation of new gTLDs. Firms that desired to enter
the market as registries (operators of top level domains) were required by ICANN to pay
a $50,000 fee to submit an application, with no realistic basis for estimating the
probability of success and no clear criteria on the basis of which their application would
be accepted or rejected. Even so, ICANN received 47 applications, of which 7 were
ultimately accepted. Establishing an alternative root is an alternative route to the
establishment of a new gTLD. Because an alternative root can be a superset of the root
administered by ICANN, firms establishing an alternative root had some hope of
overcoming the networking effects and cost structure that tend to reinforce ICANN’s
monopoly.

Profit-maximizing firms with monopolies will (in the absence of price regulation)
extract monopoly rents. That is, they will charge rents that exceed their costs. Unless the
monopolist can successfully engage in price discrimination, monopoly rents will be
inefficient. The monopoly rent raises the price of the monopoly good, and as a result,
some consumers of the good who would have paid the market price will not consume the
good. In the case of domain names, however, price discrimination is a real possibility.
For example, the monopoly proprietor of the root could auction TLDs. If a firm wished
to become the proprietor of the .biz TLD, the monopolist could auction .biz. In cases
where no bidder possesses monopsony power, the auction price should provide a
monopoly rent to the holder of the root-service monopolist and also insure that the TLD
goes to its highest and best economic use.

There are, however, limits on the rent that a monopoly proprietor of the root
could charge. Most obviously, the monopolist could not charge a rent in excess of the
value of the TLD to potential purchasers. There are, however, additional limits. At
bottom, the Internet is a communications system, and as such, it competes with other
systems. If the proprietor of a root charged too much for root service, end users and
information providers would use alternative communications systems, e.g. telephone,
broadcast, direct mail, and so forth.
So far, we have assumed that the proprietor of the root is a profit-maximizing firm and will charge monopoly rents. Does ICANN profit-maximize? An adequate account of the institutional economics of nonprofit corporations is far beyond the scope of this essay. Rather, we suggest the following tentative hypotheses about ICANN. First, ICANN does not maximize profits in the way that for-profit firms do. That is, ICANN does not seek to maximize its revenues from root service. Indeed, ICANN continues to provide root service to ccTLD operators who refuse to pay ICANN any fee at all. In theory, ICANN, as a nonprofit corporation operates the root in the public interest; as a nonprofit corporation organized under the laws of the State of California, ICANN, and therefore must have a “public or charitable purpose.”

The obligation to act in the public interest is, however, abstract and vague. This is true both as a matter of political philosophy and as a matter of law. As a matter of political philosophy, the nature of the public interest is, at the very least, contested. That is, whatever the ultimate resolution of philosophical debates about what counts as the public interest, as a practical matter this is a question of which we are unlikely to see a strong social consensus in a modern pluralist democracy. As a matter of law, the obligation to act in the public interest underdetermines ICANN’s actions. Undoubtedly, ICANN could make DNS policy in a variety of ways without endangering its status under California law, but there is one thing that ICANN cannot do given its legal status. ICANN cannot operate the DNS so as to maximize its own profits or so as to confer a private benefit on the various stakeholders that participate in the ICANN process.

C. Economic Significance of the Difference between Top and Second Level Domains

Are gTLDs scarce in the economic sense? It might be argued that gTLDs are not economically scarce on the theory that every string of characters that can serve as a TLD can also serve as a SLD. As a matter of economic theory, this argument is a failure. There is only one authoritative root. Only one party can act as the proprietor for any given domain name within the root. Give this fact, the top level name space is scarce in the economist’s sense. That leaves open, however, the question whether that scarcity is of practical economic significance.

We believe this is an interesting question. It might turn out that for most purposes, the SLD space under .com, .net, .biz, and .org are sufficiently large so that new gTLDs would only have minimal economic value. The intense interest in the last round of gTLD expansion suggests that there is, in fact, a real and substantial economic difference between SLDs and TLDs.

For our purposes, however, we believe that the best way to answer the question whether there is a real economic difference between SLDs and TLDs is to conduct an auction. The bids will themselves signal what the market thinks that real value of new TLDs might be. It is almost inconceivable that an auction would not bring in sufficient revenues to cover its own costs. If the auction revenue were sufficiently low, this would tell ICANN that expansion of the root should be a low priority. If auction revenues were very high, then additional auctions would likely be warranted.
D. Options for ICANN’s management of the TLD Space

So far, we have provided an outline of the economics of ICANN’s root service monopoly. Although some aspects of our account are tentative and other elements may be controversial, we believe several points should be beyond controversy. Among these points are: (1) root service is not a public good in the economic sense, (2) root service is a natural monopoly because of networking effects and cost structure, (3) top level domains are economically scarce. Given these three conclusions, what options are available to ICANN for administration of the TLD space?

In the sections that follow, we will discuss these options in greater depth. At this stage we will simply list some of the alternatives, providing a brief description for each.

1. Rule of First Occupation—the first alternative is a rule of first occupation, with or without a fee. New gTLDs could be registered on a first-come, first-serve basis. Each registrant could be charged an annual or one-time fee that would cover the cost of adding the new gTLD to the root and providing root service for the new gTLD.

2. Auctions—a second alternative is to conduct gTLD auctions, with or without a fee that covers the cost of root service. We discuss the various auction possibilities in detail below.

3. Taxonomy—a third possibility is for ICANN to taxonomize the root. ICANN could extend the linguistically meaningful division of the name space begun with .com, .org,.net,.gov, and so forth.

4. Case-by-Case Public Interest Assessment—Yet a fourth option is the so-called “beauty contest” approach. ICANN could allow applicants to come forward with applications for new gTLDs, either in batches, on an annual-basis, or even on an always-open basis. The ICANN board or some subunit of ICANN could then evaluate each proposal, either on its own merits or in comparison with competing proposals.

Finally, any of the above options could be combined with technical certification of registry operators. Operation of a registry is not identical with management of a TLD. Registry operation (at least for the purposes of this paper) is simply performance of the technical functions that enable stable and reliable operation of the name server containing the zone file for the TLD. This function can be contracted to a certified registry operator by the firm or organization that sets the registration policies for the TLD. Thus, we could auction gTLDs and then provide technical certification for registry operators.

Having completed our sketch of the economics of DNS policy at the level of theory, we now move to the realm of practical experience. Fortunately, DNS policy does not need to be made in a vacuum. There is a rich history of telecommunications regulation in the United States. That history is the topic of the next Part of this Article.

III. COMPARISONS WITH TELECOMMUNICATIONS POLICY

In Part II, we provided an abstract analysis of domain name policy from an economic perspective. Here, in Part III, we extend and deepen that analysis by drawing upon lessons learned in the context of telecommunications policy.
A. Introduction to Telecommunications Regulation

In the United States, an independent federal agency, under the direction of Congress, is charged with developing and implementing policies governing the major telecommunications industries. These include broadcast radio and television, wireline and wireless telephony, and video distribution via cable, wireless, and satellite. One might wonder why the Federal Communications Commission (“FCC”) does not likewise have jurisdiction, at least in the US, over perhaps the most significant telecommunications industry - the Internet. The FCC’s authority does extend over those elements that comprise the Internet “backbone” and connectivity, i.e., the wireline infrastructure and the wires, cables, or wireless frequencies Internet users employ to connect to the backbone. But the agency does not regulate those elements of the Internet which comprise its functions or value. Thus, the fundamental components of the Internet’s functionality—the computers, servers, content, architecture, protocols, users, and Internet service providers are not regulated by the FCC or any other governmental body.

This is not an oversight. Deliberate federal policies during the Clinton administration were intended to leave the Internet mostly in private hands and unregulated. As explained by Ira Magaziner, President Clinton’s senior policy advisor, “almost two-thirds of the real growth of the U.S. economy [during the mid- and late 1990s] [came] from the Internet economy.” Privatization, in the view of the White House, was essential to foster this growth and its transformative effect on the global economy. Thus, while the Internet was developed under the auspices and support of the US military, the Department of Commerce, and several funding agencies, post-natal government involvement is mostly noted by its absence.

Regulating the Internet would be a daunting task, and not obviously feasible for national agencies. National regulation would likely retard the growth of the Internet, and create more controversy than consensus. Indeed, the few ad hoc regulations that do apply uniquely to the Internet, usually relating to content such as child pornography, spam, or trademarks, have either been unconstitutional, ineffective, or supplemented by private regulation.

While we generally oppose any regime of national government regulation of the Internet, we believe that it both illuminating and instructive to examine regulatory policies in other telecommunications industries as a basis for the formulation and evaluation of Internet policy. There are two principle reasons for doing so. First, the interminable struggle over telecommunication policies elsewhere reinforces the wisdom of leaving the Internet mostly unregulated. Second, those analogous policies have undergone rigorous examination, both for their theoretical soundness and practical efficacy. There is a lot to be learned from what scholars, regulators, courts and the industries themselves have to say about various policies and principles in telecommunications law.

Aside from the Internet, the two most dominant telecommunications industries, both in the US and worldwide, are broadcast and telephony. Examining these industries allows for comparative analysis of Internet policies, especially those involved in access to the name space. In many ways, the DNS system resembles the radio spectrum because
scarcity limits access, thereby requiring a licensing scheme. Scarcity also creates value and markets, which may in turn influence policy formation.

The DNS and IP Address systems also bear similarity, respectively, to the telephone name and number spaces. Regulation of the latter is accomplished by such familiar conventions as country codes (1 for North America), area codes, three-digit prefixes and four-digit suffixes. But resulting value in telephone numbers has lead to ancillary regulation such as information and public safety protocols (411 and 911 respectively) and number portability requirements.

It is to these industries and regulatory policies we now turn, after which we will return to a discussion of the Internet name space and regulation of gTLDs.

B. Two Fundamental Comparisons: Radio and Telephone

The Internet is both similar to and different from other communications technologies. In this section, we compare Internet regulation to regulation of the broadcast spectrum (using radio licensing as an example) and to regulation of the telephone system (using telephone number assignment as an example).

1. Radio Licensing

Use of the radio spectrum has been subject to a regulatory licensing scheme since shortly after the first commercial applications of radio emerged. Licensing is premised on the theory that the spectrum is “a valuable and limited public resource.” Whether it is also a public good, as we have used that term, depends on which good and whose consumption is analyzed. Several different interactions and groups of users are involved in the commercial broadcast industry: broadcasters (station owners), listeners and viewers, program content suppliers, and advertisers. The first two groups are most instructive for present purposes. As we next show, the frequencies used for transmission (analogous to domain names) are private goods, while the information contained within the transmissions (analogous to web content) are public goods.

The spectrum is an intangible construct. It is a convenient way to describe the physical transport of energy using electromagnetic waves. It is a means of information delivery, not a commodity or resource that can be “used up” in any physical sense. Yet, in economic terms, the spectrum can support only so many channels of information at any one time. The number of channels is dependent on the state of technology and on social preferences such as clarity of reception and privacy concerns. Since this article is about economic and welfare policies, not about engineering, we will assume there is a limited supply of useful spectrum which can be “consumed” by use. If there were no limit on supply, there would be no need to develop allocation policies. In the case of radio frequencies there is a limit, albeit more of an artificial than technological nature. In either case, limited supply creates scarcity; scarcity creates a need for allocation. The question at hand is whether scarce communication resources should be allocated by government regulation or by the market.

Broadcasters "consume" spectrum in order to deliver information and services to others. In economic terms, spectrum resembles a private good because it is rivalrous; i.e.,
use by one consumer (broadcaster) diminishes the supply for others. If broadcaster A
transmits on a frequency of 101 MHz, that frequency is no longer available for others (in
the same geographic region and at the same time), at least not without rendering both
signals worthless. That is because multiple signals on the same frequency will interfere
with one another; receiving devices will be unable to distinguish the signals and produce
meaningful video or audio. Indeed, it was the unregulated cacophony of voices
transmitting on same or nearby frequencies in the 1920s that lead to the well-known
“tragedy of the commons,” rendering the radio spectrum mostly unusable.

Of course, the rivalrous nature of the spectrum arises only if there is a limited
supply. If there were no upper or lower limit on frequencies usable for transmitting
information, an infinite number of broadcasters could operate simultaneously, so long as
there was compatibility between transmission and reception devices. We know there is a
lower limit on frequencies - zero cycles per second - but there may not be an upper limit.
Consumer electronics devices operating in the gigahertz range (billions of cycles per
second) are now commonplace; the terahertz range (trillions of cycles per second) is not
far behind. Using current technologies, we could allocate at least a million broadcast
channels of 10 KHz each (the bandwidth of AM broadcast licenses) in every metropolitan
area. That's more than enough to fully eliminate "spectrum scarcity." Indeed, the FCC
could give every person in the United States his or her own broadcast license.

Of course this would never happen. First, there are competing uses for the
frequencies, such as other broadcast needs, public safety, and wireless telephony.
Second, and perhaps more important, "spectrum scarcity" is not altogether a bad thing.
Scarcity created by regulation gives rise to excludability, which creates value; it turns
what might otherwise be a public good into a private good. To the extent it promotes
innovation and investment, the public might benefit from having fewer frequencies
available for broadcast use. Herein lies one lesson that broadcast can offer for regulating
the domain name space: not all scarcity follows the model of a scarce physical resource,
such as land or water. Scarcity can be a function of architectural decisions and
engineering. Because excludability can be created by a system of legal regulation, a legal
regime can create economic scarcity. Whether to enforce scarcity, and its extent, depends
on the social benefit of having fewer rather than greater numbers of users. This in turn
depends on an economic and social welfare analysis of the commodity. We will return to
this analysis below. But one thing is certain: scarcity in frequencies, as in domain names,
is intentional and cannot be justified on technical grounds.

The rivalrous nature of the radio spectrum arises from the interaction of physics
and regulation. Two signals at the same frequency can interfere—that is physics. The
FCC historically allocated spectrum by grant licenses to broadcast within a band or range
of frequencies—that is regulation. Excludability also arises from a combination of
physics and regulation. The law can grant an exclusive license to broadcast at a
particular frequency in a specified geographic region. Physics makes it possible to detect
violators, and limits the geographic range of particular broadcasters—at least in certain
parts of the spectrum. Regulation is required, because broadcaster A’s transmission on
101 MHz does not by itself prevent broadcaster B from using the same frequency.
Indeed, it is nearly impossible to exclude access to the spectrum for transmission through
technological means. So exclusion requires some legal regime, and the current regime is
licensing. It is a regime that is sometimes difficult to enforce, as evidenced by the proliferation of “pirate” radio stations” at various times, often off-shore locations transmitting to coastal and border areas. However, because of the large investments typically necessary to erect studio and transmission facilities, illegal unlicensed broadcast is rare.

As shown above, without exclusion, the spectrum is potentially worthless—interference might prevent anyone from making use of the resource. Accordingly, spectrum policy in the United States turns a public good (nonrivalrous use of technologically unlimited frequencies, and not easily excludable) into a private good. Both spectrum scarcity and exclusion are artifacts of regulatory policy.

Licensing policy requires an elaborate bureaucracy (and compliant courts) to implement and enforce. The Media Bureau (formerly Mass Media Bureau) processes roughly 5,000 license applications a year. The bureau receives a good portion of the FCC’s annual appropriations, which totaled 278 million dollars for fiscal year 2003. These are considerable public resources devoted to the regulation of a private good.

Unlike the frequencies used for transmission, the content of broadcasts is a classic public good. Over-the-air radio and television signals are both nonrivalrous and nonexcludable—or at least were before the advent of encryption technologies. They are nonrivalrous because consumption (reception) by any number of listeners or viewers does not degrade the signal or deplete its content. Broadcast signals are ordinarily nonexcludable because it is difficult to keep non-paying listeners and viewers from enjoying the broadcast. Of course, both analog and digital signals can be encrypted as a means to charge for access, but the FCC generally discourages such practice. This is what keeps over-the-air broadcasts "free." Indeed, the provision of free radio and television content is a basic tenet of FCC policy and drives many of its decisions, such as the requirement that television tuners be capable of receiving digital over-the-air signals by 2007.

In analyzing licensing and domain name policies from an economic or public policy perspective, it is important to focus on the right commodity and corresponding facet of the industry. It is not consumption of broadcast content that is relevant here. Thus, the fact that from their perspectives, listeners and viewers are consuming a public good is immaterial. Rather, it is the consumption of frequencies by broadcasters that are the relevant transactions and frame the debate. Correspondingly, consumption of web content by Internet users (a public good) is not what drives gTLD policy-making. Rather it is the consumption of gTLDs within the domain name space (a private good) that matters. Thus, we focus on allocation of spectrum and gTLDs, not on user access to transmitted information.

Although the distinction between use of spectrum and name space by providers (broadcasters and domain registrants) and use by listeners, viewers, and Internet end users is an important one for economic and policy analysis, it is a distinction often overlooked. Indeed, the Supreme Court has gotten it wrong. In *Reno v. ACLU*, the Court invalidated the Communications Decency Act of 1996 as infringing on Internet users’ free speech rights. It distinguished the broadcast industry, where speech restrictions had been upheld partly on a theory of spectrum scarcity. “[U]nlike the conditions that prevailed when Congress first authorized regulation of the broadcast spectrum, the
Internet can hardly be considered a `scarce’ expressive commodity … as many as 40 million people use the Internet today.” This statement mixes apples and oranges. Spectrum scarcity in broadcast refers to the limited number of providers that can operate simultaneously, not the number of persons who can receive transmissions. Comparing broadcast providers with Internet end users misses the scarcity point entirely. It also confuses private and public goods.

As suppliers of a good or service, broadcasters are analogous to registrants and web site owners. The former consume spectrum, while the latter consume domain names, and IP addresses. In the case of spectrum, the specific form of scarcity results from regulatory policy. In the case of domain names, scarcity results from the design of the root plus the networking effects that create a natural monopoly in a single authoritative root. In the case of IP addresses, scarcity is dictated by the communications protocol, TCP/IP, that limits the number of possible IP addresses. In none of these cases, is scarcity the inevitable result of physical limitations.

Whether spectrum scarcity is a bane or benefit, some mechanism must be devised for allocating access. As it turns out, this has been the most complex and contentious element of telecommunications policy for nearly a century. At the international level frequency use has required treaties because radio signals do not respect national borders. At the domestic level, allocation policies have involved each of the three branches of the federal government. And within the economy of telecommunications, scarcity has played an important role in innovation, investment decisions, and prosperity. Indeed, rapid flux in bandwidth capacity (a corollary of spectrum scarcity) has both created and broken industries.

Our concern here, however, is how the FCC has managed spectrum scarcity. The history of spectrum management, as well as current licensing policies, can be instructive to the analogous managerial role of ICANN when it comes to gTLD policies. We will return to this after a brief discussion of another telecommunications industry – telephony.

2. Wireline Telephony

As with broadcast use of the spectrum, whether the telephone system comprises a private or a public good depends on whose use and what aspect is being analyzed. In this section we conclude, as we did above for broadcast rights, that telephone number assignments are private goods. At one level this is easy to see. Consumption of telephone numbers is rivalrous; if consumer A has a particular number, it cannot also be assigned to consumer B. Consumers are also excluded from telephone services or the network entirely, unless they pay for required goods and services. However, there are differences between the spectrum and modern telephone networks that require further analysis before we conclude that both provide points of comparison for the domain name system.

The physical infrastructure that comprises the Public Switched Telephone Network (PSTN), and forms the backbone of wireline telephone services, differs from the radio spectrum (the backbone for radio transmissions) in at least two relevant respects. First, even with limited technology, there need be no interference from simultaneous wireline uses. An unlimited amount of wire can be laid and an unlimited number of
conversations can occur. The commercial history of the telephone industry shows that whenever demand threatens to exceed supply, telephone companies simply lay more cable. Still, wireline is scarce in the economic sense. Expansion of the wireline infrastructure consumes physical resources (such as copper and silicon) and requires human labor. Thus, wireline (the medium for old-fashion telephone communication) is scarce in a different sense than spectrum (the medium for broadcast communication), but they are both scarce.

Second, the PSTN is entirely privately owned. Whereas the radio spectrum was early conceived as “public property,” thereby imposing public trust obligations on its users, telephone lines are created and maintained by private for-profit entities. Telephone companies (“telcos”) do provide an economic benefit to the public, because of the social and economic intercourse that depends on them. In this sense, telcos are “public utilities” similar to energy and transportation companies, and they are commonly regulated for the same ends (and often by the same agencies — state public utilities commissions). The common goals are fair, non-discriminatory and universal service to all who seek access.

In this sense, the Internet more closely resembles the telephone system than broadcast because the most basic communications layer is privately owned. Indeed, there is substantial overlap since the Internet backbone is mostly owned by the large telcos. However, for the purpose of evaluating domain name policies, the relevant analogy is not to the physical transmission layer of the telephone system; instead, we focus on the analogy between IP Addresses and domain names, on one hand, and the telephone numbering system, on the other hand.

In contrast to the privately owned wireline backbone, the telephone numbering system is often said to be a "public resource." As with the spectrum, the telephone number system is, in a sense, a mathematical construct. Because it might seem that no one can “own” a number or a wavelength, they are perceived as “belonging” to the public at large. However, even if this view is valid in the abstract, it does not mean that telephone numbers are public goods. The public resource that is the telephone numbering system is, in economic terms, a private good when it comes to telephone number services; i.e., assigning individual numbers. Because these points are important when comparing them to the domain name system and domain names, let us explore them further.

As with the domain name system and the broadcast spectrum, the telephone numbering system looks like a public good from the point of view of the end user making a phone call. Although multiple users may not be able to simultaneously connect to the same phone number without receiving a busy signal, Ben’s use of a particular string of numbers to reach Alice’s phone does not preclude Cathy from using the same string for the same purpose. Consumption of the numbering system is nonrivalrous. Although one might attempt to charge a separate fee for use of phone numbers, there would be no economic point in doing so. Indeed, the whole point of having a phone number is that everyone with access to the system can reach your phone if you pay the listing fee. The numbering system could be viewed as nonexcludable. Moreover, once Ben has a phone number, he can give the number away and (like other information) it can be copied or distributed. When we dial a phone number, the numbering system might appear to be a public good.
From the point of view of subscribers, however, telephone numbers are private goods. If Ben’s telephone number is +1.800.555.1212, then that cannot also be Alice’s number. Ben’s consumption of the number precludes Alice’s use. Therefore, telephone numbering service is rivalrous. Numbering service is also excludable. If Ben doesn’t pay to get a phone number, then his telco can exclude him from the system. Because numbering service meets the economic criteria of rival consumption and excludability, numbering service is a private good.

Given an interconnected wireline network, there can only be one numbering system for that network. Like IP Address numbers, telephone numbers perform a routing function. There must be a unique number for each phone on the system for routing to take place. There could, of course, be multiple wireline networks, but if those networks are to interconnect, then each phone on the interconnected network must have a unique identifier. Somehow, there must be a system for allocating unique identifying numbers to each phone on the network. Given the way telephony works, there simply cannot be competing numbering services. Accordingly, there must be a single authority that creates the equivalent of numbering domains and authorities within each domain that allocate numbers to firms operating within the domain. The authority must then allocate telephone numbers; the allocation method could be first occupation, geographic classification, a lottery, an auction, or some other method.

Like the Internet, the telephone numbering system is international. At the top level of the system are the country codes (analogous to the ccTLDs). These are assigned by the International Direct Distance Dialing (IDDD) system. The United States, Canada and some Caribbean nations are part of the North American Numbering Plan (NANP). The IDDD code for NANP countries is 1. Within the NANP, telephone numbers consist of a region or access code (3-digit area code), a central office or exchange prefix (3-digits), followed by a 4-digit station number. Thus, a unique 11-digit string is assigned to each end-user device on the PSTN.

Since the country code "1" is the same for all telephones within the NANP, the addition of this digit does not increase the supply of available unique numbers within the domain. The number of available numbers within the NANP is $10^{10}$, or 10 billion, assuming each digit 0-9 is usable at each location on the 10-digit string. The assumption is false - for instance there are no area codes or exchange prefixes beginning with 0 or 1 - but there are still several billion possible telephone numbers. Approximately 500 million numbers are currently in use in the US so there should be ample supply, but there isn’t.

Instead, scarcity in telephone numbers is a perennial problem. This is most apparent within individual area codes, where the arithmetic supply of phone numbers is $10^7$, or 10 million, per area. The actual supply is less, both because some numbers are reserved and because telcos acquire numbers in large blocks which limits their availability to customers. Even a full ten million numbers are inadequate in major metropolitan areas such as Los Angeles and New York, especially given the explosion of multiple lines for fax machines, modems, pagers and cellular telephones. Given that reality, the division and proliferation of area codes is now a common phenomenon. The number of area codes nationwide doubled between 1991 and 1999. It took only two years, however, for the number of area codes to double in California, from 13 in 1997 to 25 in 1999. Indeed, when Los Angeles’ 213 area code was split to form the 323 area
code, the latter was immediately found in “jeopardy” of exhausting its supply of numbers. An “exhaust study” by the North American Numbering Plan Administration (NANPA) in 1999 estimated that the supply of available telephone numbers will be exhausted as early as 2006 and no later than 2012.

The FCC has responded to these projections. In 1999 it issued a Notice of Proposed Rulemaking (NPRM) to address “the Matter of Number Resource Optimization.” Among the proposed solutions for which it sought comments were: expansion of the number supply (by increasing the number of digits), more efficient allocation of the existing supply (such as number pooling and portability), and implementing a pricing mechanism for number allocation and use. Although the FCC has yet to adopt a market-based allocation system, it appears it will do so shortly and has sought additional comments on implementation. “The impetus for establishing a market-based numbering resource allocation system was our belief that the lack of efficiency in carrier utilization of numbers may be in part due to the failure of existing allocation rules to recognize the economic value of numbers.”

What is the “economic value of [telephone] numbers” and why is that relevant to domain name policy? At first blush, the analogy should be between NANP numbers and IP numbers, not between telephone numbers and domain names. We agree that exhaustion of the NANP number space, and FCC responses, are highly relevant to IP number policies (an issue beyond the scope of this paper). But telephone numbering policy, especially the “economic value of numbers,” provides a relevant point of comparison for evaluating ICANN’s domain name regime.

The economic value of telephone numbers has three dimensions. The first is in having a number at all. The economic and social value of being connected to the PSTN is so well recognized that an elaborate subsidy scheme (“Universal Service”) has been created to make telephone service affordable to all Americans. The parallel here is in having an IP address.

The second dimension of value in telephone numbers is in preferred area codes and prefixes. In many communities with split or overlay area codes, certain codes are more desired than others (e.g., 212 in New York, 310 on Los Angeles’ Westside). The same is true of some SIC codes, such as 800 (compared to 866 or 877). Thus, long before the North American Numbering Plan Administrator (NANPA) runs out of 10-digit numbers, it will run out of preferred ones.

But the greatest value in telephone numbers is found in their linguistic association. In this respect, the telephone number space is also its name space. At one level, the telephone name space comprises the various telephone directories and databases in use by local telcos around the globe. There are surely economic values in that space, as companies vie for descriptive listings or early placement (e.g., “Saab Independent Repair,” “AAA Pest Control”). But with telephone addressing, there is a ready translation between certain names and numbers – so-called “vanity” numbers. Thus, 1-800-356-9377 resolves into 1-800-FLOWERS” and 1-800-937-8529 resolves into 1-800-WESTLAW. Both have considerable value (and the latter is trademarked). In the telephone system, resolution of numbers occurs in two places – in directories and on the telephone keypad. Because of their mnemonic association, telephone numbers have been commoditized and trade on a secondary market. Some exploit that market to extort
value from trademark holders and others. The practice of “number brokering” bears striking similarity to cybersquatting.

Market allocation of telephone numbers, as a policy shift at the FCC, is obviously relevant to Internet name space policies. Earlier we concluded that frequency allocation policies in the broadcast industry also provided a point of comparison. In the next section we take a closer look at the FCC’s newly constructed market approaches to frequency, number and name space allocation in broadcast and telephony. These are not ad hoc decisions; rather they are the culmination of decades of experience, litigation, and scholarly study. ICANN would be well advised to undertake a serious review of FCC experience with spectrum allocation and telephone numbering policy as ICANN moves forward to develop in its effort to formulate policy for the DNS.

C. Allocation and Regulation of Name and Number Spaces by the FCC

The broadcast and telephone industries are heavily regulated by the FCC; the former through licensing, the latter through public utility-type regulation. In each instance, the commodities under regulation (frequencies and telephone numbers) are scarce. The FCC’s various approaches, historically and currently, to allocating these goods is highly instructive for managing other scarce telecommunications goods such as TLDs and IP Addresses. It seems the FCC has tried, at one time or another, every conceivable allocation method. If some of those allocation methods turned out to be inefficient or inequitable, ICANN should be very cautious about employing the same methods for the DNS. In other words, ICANN ought not to “recapitulate the FCC.”

In this section we briefly trace the history of licensing and telephone number regulation, exploring along the way the assumptions and policy choices made by regulators. We will then discuss why “quasi-deregulation” has been adopted by the agency and what form that takes. As it turns out, market economics and other social welfare theories have played an important role in the development of FCC allocation policies. They should be examined in formulating gTLD allocation policies as well.

1. The Road to Market Allocation of Spectrum

The Radio Act of 1912 was our nation’s first effort at spectrum management. It declared it illegal to “use or operate any apparatus for radio communication as a means of commercial intercourse among the several States … except under and in accordance with a license, revocable for cause, in that behalf granted by the Secretary of Commerce and Labor.” The Act did not specify criteria for licensing nor, apparently, did it authorize the Secretary to promulgate his own. In an early case, the Court of Appeals ruled that Secretary Hoover had no power to deny licenses, but only empowered to assign frequencies. This was followed by a district court decision that a station's use of a frequency not assigned to it was not a violation of the Radio Act. This was reiterated by a 1926 Attorney General opinion. In response, Secretary Hoover abandoned all effort to regulate the spectrum, instead urging that stations “regulate themselves.” A “tower of Babel” ensued.
In the void created by federal incompetence, both the market and the courts responded to restore some semblance of order on the airwaves. Stations did agree amongst themselves on transmission times and frequencies and a healthy market developed in broadcast rights. More importantly, perhaps, a state court decision in 1926 upheld a tort claim by Chicago station WGN against a “wave jumper” that was broadcasting so close to WGN’s frequency as to cause interference. The decision was the first to recognize “a particular right or easement in and to the use of [a] wave length.”

Just as a common law of broadcast property rights (based on first occupation) began to develop, Congress passed the Radio Act of 1927 and created the Federal Radio Commission (FRC). Salient provisions of the Act confirmed public ownership of the airwaves and specified merit-based free licenses, in exchange for which broadcasters would provide public service. Congress rejected alternate allocation schemes such as first occupation, lottery and auction. Rather, applicants would be evaluated on the basis of “public interest, convenience and necessity.” In cases of competing applications, administrators would hold comparative hearings. The notion of government control through licensing flowed from the antecedent principle of public ownership of the spectrum, “an idée fixe in the debates of Congress.”

One of the FRC’s first decisions was to keep the broadcast band at its current size rather than to expand it to accommodate all existing broadcasters. Scarcity was codified. Licensing criteria and broadcasting standards quickly followed. The former favored wealthy applicants with superior technical capability and broadcast experience. The latter favored middle-of-the-road programming. Broadcasts by socialist stations, unconventional columnists, social critics, evolutionists, and fringe candidates were forced off the air. As the Commission stated, there was “not room in the broadcast band for every school of thought, religious, political, social and economic, each to have its separate ... mouth piece in the ether.” Despite the prohibition of censorship in the 1927 Act, both the FRC and the Court of Appeals effectively adopted policies and interpretations of the statute that had the effect of nullifying this prohibition. This regime was the product of a statutory mandate to promote “the public interest.” The underlying justification for the rationing of licenses was spectrum scarcity, but spectrum-scarcity was itself the product of the regulatory regime. Just as the advent of the printing press a half-millennium before prompted the Licensing Act, discovery of radio waves as a means of communication lead to licensing of spectrum use. In both cases, what was really being licensed was the right to speak.

In 1934, the Radio Act was supplanted by the Communications Act and the FRC was replaced by the FCC. This transition was accompanied by minimal changes in broadcast licensing policies and standards. In fact, the ownership and licensing precepts established in 1927 remained mostly intact for seventy years. Those precepts were: a) public ownership of the airwaves, b) short term licensing, c) free rent to broadcasters, and d) monopoly rents by broadcasters. In other words, a select few—the entrenched stakeholders—were given rights worth billions of dollars. The value of broadcast licenses typically derived from two sources: advertising revenue (income) and sale of licenses (the capitalized value of the expected future income stream). Prior to the grandfathering of digital licenses to television broadcasters in 1996, the estimated opportunity cost to taxpayers of free licensing had been conservatively estimated at $1
billion per year. The granting of free digital licenses to existing television broadcast license holders has resulted in a wealth transfer to entrenched stake holders valued upwards of $80 billion.

In addition, the broadcast licensing regime imposes direct costs of government. The FCC's annual budget is approximately one-quarter-billion dollars annually. This cost is high because ad-hoc license evaluation and even systematic spectrum decision making both require substantial expertise and staff resources. Moreover, given the economic rents that can be realized by those who are awarded licenses, it is not surprising that there is substantial competition. In the case of broadcast licenses, that means holding expensive “comparative hearings” (dubbed "beauty contests") and hearings on “petitions to deny” license renewal. It might all be worth it if licensees were truly fulfilling their public trust responsibilities and promoting the “public interest, convenience and necessity.” But the failure of the broadcast industry on this score is so well known that further argument on this point is unnecessary.

Suffice it to say that it was official government policy for most of the twentieth century to give away public property and convert public goods into private ones. Early stakeholders were the beneficiaries. Radio stations sell in the hundred million dollar range, and television stations are priced in the multi-hundred million dollar range. Networks cost more – roughly $20 billion. Shouldn’t the federal treasury be getting some of this windfall?

Most economists think so, and have repeatedly told the FCC. One of the earliest critics of spectrum allocation policy was Ronald Coase, the noted British economist (later at the University of Chicago). In testimony before the FCC in 1959, Coase argued for a system of competitive bidding (auctions) for licenses.

[U]se of the pricing mechanisms … would avoid the need for much of the costly and time-consuming procedures involved in the assignment of frequencies by the Commission. It would rule out inefficient use of frequencies by bringing any proposal for the use of such frequencies up against the test of the market, with its precise monetary measures of cost and benefit… And it would avoid that arbitrary enrichment of private operators of radio and television stations which inevitably follows from the present system. We sometimes hear denunciations of giveaways and their corrupting influence. You, gentlemen, are administering what must be one of the biggest giveaways of all.

Coase refined his reasoning in his now famous theory (“Coase theorem”) that, in the absence of transaction costs, efficiency of resource allocation is independent of how a property right is initially assigned. As applied to broadcast, it holds that initial license allocation would have little effect on who gets to use the spectrum. Licensees and aspirants would "agree themselves around" the FCC’s initial distribution of rights and effectuate a license transfer whenever it was to their mutual advantage. In most cases, the market would achieve Coasian optimality by reposing broadcast rights with whoever was willing to pay most for them. For this and other writings on the institutional structure of the economy Coase won the Nobel Prize in economics in 1991.

In short (assuming the constraint of forced scarcity), federal licensing policy had little influence on the actual use of the airwaves, only on who received windfalls. As Thomas Hazlett describes it, federal policy went through two epochs corresponding to
different theories of spectrum regulation. These were the “chaos theory” (self-regulation by the industry prior to 1927), and the “error theory” (licensing per “public interest” standard after 1927). Neither produced desirable effects.

A third era in licensing – lottery – began with experimental trials in the 1980s. After being inundated with thousands of applications for new cellular and Personal Communications Service (PCS) licenses, each requiring comparative hearing, the FCC lobbied Congress for lottery authority. It came in the Omnibus Budget Reconciliation Act of 1981. Lotteries were quickly extended to new classes of broadcast service – Low-Power Television (LPTV) and Low-Power FM radio (LPFM), in part. The hope was that random selection would speed up licensing and deployment of these new services. That hope faded quickly.

Although cheaper to administer, lotteries proved to be an inefficient means of awarding licenses. Lottery applications were easy to submit. Applicants did not need to provide detailed credentials, as they would in the case of comparative hearings. Nor would they need to conduct market studies and ascertain the need or value of service, as they would if they had to amortize the cost of a license obtained at market price. So applications came in by the thousands. Winners would often "flip" or resell their licenses to larger entities “without ever delivering service to a single customer.” Some licenses won at lottery were resold in short order for tens of millions of dollars. The windfalls continued, as per the Coase Theorem. By 1985, the FCC indicated its desire to eliminate the lottery system.

“The long policy march to FCC license auctions” reached its destination during the Clinton administration. The Omnibus Budget Reconciliation Act of 1993 authorized the FCC to use competitive bidding to assign radio licenses in non-broadcast bands (e.g., wireless telephony). A vigorous and successful auction regime took hold. A 1997 report by the Congressional Budget Office (CBO) found that “by most assessments, the FCC auctions have assigned licenses to use the spectrum in an economically efficient way.” CBO also estimated that spectrum auctions would “yield $27 billion in receipts to the federal Treasury” in the first five years of license sales. Beyond, 1998, however, auction revenue would tail off substantially, producing only an estimated $6.0 billion in the following five years. However, if the FCC’s auction authority were expanded, for instance to include broadcast frequencies, projected revenues would jump to more than $30 billion. That would sure help narrow the budget deficit.

Later that year, Congress passed the Balanced Budget Act of 1997. It expanded the FCC’s auction mandate to include new broadcast licenses. To be sure, very few “new” broadcast licenses are issued these days (the consequence of spectrum scarcity), and will not be until analog licenses are reclaimed as part of the transition to digital television. But auctions are now underway for broadcast as well as all other commercial uses of the spectrum. Competitive bidding is the fourth and latest era of license allocation policy.

One aspect of spectrum management that deserves mention are the “service rules” that determine permissible uses for each frequency. Before the FCC can assign licenses it must first devise a “band plan,” which involves allocating a set of frequencies for a particular radio service. Thus, the region between 535 and 1705 KHz is designated as the AM band, the region between 88.0 and 108.0 MHz is designated as the FM band,
and so on. Within each band only the specified use is allowed. Band plans are based on technical needs (matching frequencies to compatible uses) and predicted demand for bandwidth.

For example, usage of the 470-806 MHz band is limited to UHF-TV. Therein lies a problem. The UHF band is 336 MHz wide and can accommodate 28 stations in every TV market (four times as many as the VHF band). That may have been appropriate when the FCC established the band in the 1960s, anticipating rapid growth in broadcast TV. But an emerging technology – cable – interrupted that plan, and UHF has languished. Changing the band use means evicting incumbent UHF stations and paying them to relocate. Central planning of frequency use can be very inefficient.

Shortly after its embrace of market allocation of licenses, the FCC began to explore changes in spectrum policy that would let the market also decide the highest and best use of bands. In 1999, the Commission issued a major policy statement in a “Spectrum Plan for the New Millennium.” The new policies included spectrum flexibility – “relaxed service rules, which would allow licensees greater freedom in determining the specific services to be offered.” No longer would each frequency be tied to a pre-determined use, often confining it to outmoded technologies. If a PCS provider valued a vacant channel in the 700 MHz band more than did a broadcaster, and interference problems were worked out, why should that channel be limited to broadcast use? Band flexibility promotes technological and allocative efficiency. Under this approach, the market would not only determine license assignment (who gets what frequency), but also what service would provide the highest and best use of the frequency.

Perhaps auctions are too good to be true. They return billions of dollars to the US treasury, they increase allocative efficiency, promote innovation and new technologies, reduce bureaucratic overhead and political patronage. Surely, they must undermine some important goals of our nation’s telecommunications policy, such as serving the public interest. Indeed, if the quid pro quo for free broadcast licenses was public interest programming, then licenses bought at market price must not be so constrained. Except that is not the case. One doesn’t have to denigrate the quality of public interest programming over the past 75 years to appreciate that many industries are imbued with public interest obligations. Moreover, to the extent license requirements such as children’s and public affairs programming lessen profitability, that fact would simply be reflected in the prices paid at auction.

A more serious objection to auctioning off the spectrum is that it creates a property rights regime, turning the public airwaves into private property. Once licenses and the spectrum rights they represent are deemed property, the argument goes, government loses control over such things as ownership, transferability, use and content. Indeed, many of the early advocates of spectrum auctions, such as Herzel and Coase, also favored property rights in frequencies. Here the consequences are significant. If broadcasters owned their pieces of spectrum, content requirements such as “equal time” and the “fairness doctrine” might constitute forced speech, thus violating the First Amendment. Private property also connotes free alienability, quiet enjoyment and the right to use for productive purposes, and the right to exclude others. Each of these “sticks” in the “bundle of rights” that constitute property is currently regulated by the
FCC, although increasingly less so in an era of deregulation. Perhaps the most controversial of these sticks is exclusivity. In an era of “smart” radios, which can share spectrum without causing interference, a property rights approach might preclude compatible uses or foster rent-seeking by owners, neither of which leads to efficient use of the spectrum.

The debate over property rights in the spectrum is an exciting one for economists and legal philosophers, but resolution of these issues is not required for a pragmatic assessment of market allocation of the spectrum. First, legal rights associated with property ownership do not derive from natural law; they are defined by the state and can take whatever form Congress decides to give them. Purchasers at auction currently take their licenses with a well-defined statutory preclusion of ownership rights. Thus, licenses purchased from the FCC contain a whole host of restrictions that are inimical to a pure property rights regime.

Second, in terms of content regulation, the Supreme Court has moved away from any sharp distinction between public and private property. Thus, in FCC v. Pacifica Foundation, the Court upheld a prohibition on indecent broadcasts without once mentioning the Red Lion justification of scarcity or public spectrum. Nor did the Court give any greater scrutiny to cable must-carry rules in Turner Broadcasting v. FCC, because the cable system was privately owned. To the extent a public-private distinction is still important in telecommunications, it is based on who has access to the speech, rather than who owns the channel of communication. In sum, we believe the public interest can be promoted, and reasonable regulation of licensees will be upheld (and unreasonable ones struck down), whether or not licenses are bought at auction or are obtained at zero cost.

2. Market Allocation of Telephone Numbers

Telephone numbers are in short supply. One obvious solution to that problem is to create more. This is easily accomplished (conceptually) by adding one or more digits to the current 10-digit string in the North American Numbering Plan. Of course this would be very expensive; cost estimates range between $50 and $150 billion, and could take a decade or more to implement. Everything from switches to routers, customer equipment, telephone books and databases would have to be upgraded. Current assignments of numbers to businesses and individuals would be disrupted. Stakeholder entitlements to such things as vanity numbers would have to be mediated. The last time the FCC faced a similar problem, it opted not to change the familiar string. Expansion is likely inevitable, but the FCC is holding off as long as possible.

Another solution to short-term number scarcity is to more efficiently allocate and manage the existing supply. Accordingly, the FCC has made “numbering resource optimization” a high priority. In a series of orders over the past few years, the Commission has adopted several administrative and technical measures designed to increase allocation and utilization efficiencies. Among these are: eliminating number reserves, decreasing block allocations, number portability, number pooling among telcos, and “anti-hoarding” standards. Other measures are under active review.
The most controversial, and likely most effective, mechanism for conserving numbers is to raise the price. Currently, telephone numbers are free. They are distributed to telcos at zero cost on a demand basis. Zero pricing has lead to gross allocative inefficiencies, as there is no disincentive for warehousing, waste or underutilization. All the costs of consumption are externalized. For example, “unified messaging services,” such as voicemail and e-fax services, obtain vast pools of numbers for free and provide value-added services to customers, also often for free. Because of zero pricing at the wholesale and retail levels, these resources are used inefficiently, “potential[ly] stranding millions of numbers.” Responding to this and similar problems, the FCC has stated its belief that "a market-based approach is the most pro-competitive, least intrusive way of ensuring that numbering resources are efficiently allocated.”

Auctions provide a market-based approach aimed at optimizing the use of the scarce resource. If auctions were implemented, telephone companies would be required to pay for, rather than obtain for free, allocated number blocks. Although the FCC is still seeking comments on how best to implement competitive bidding, this is likely the next step in managing the scarce telephone number space. These auctions will be different from spectrum auctions in a significant respect. The FCC’s goal is to “increase the efficiency of numbering resource usage, and not to raise additional funds.” Thus, there may well be offsets to other telco fees and contributions, such as to the Universal Service Fund. Notwithstanding, the industry has reacted negatively to the FCC’s pricing proposal, forcing the agency to explain its reasoning in detail. It has yet to convince the industry, and yet to implement the proposals. But it will.

One problem facing the agency is how to treat the advantages of incumbency. The dominant theme of the 1996 Telecommunications Act is competition. Toward that end, Congress enacted a number of measures designed to ease entry into local exchange markets. Market pricing of telephone numbers could impede these efforts. Incumbent local exchange companies (ILECs) can exploit their natural monopolies to extract monopoly rents from customers (hence the drive to open those markets). In addition to being well-financed, ILECs often have large stockpiles of available numbers (which gives rise to the scarcity problem in the first place). If existing numbers are grandfathered, and competitor local exchange companies (CLECs) have to buy their numbers at auction, they may be doubly disadvantaged and unable to compete. The FCC is not insensitive to this problem and is working on “competitively neutral” pricing mechanisms. Among these is a proposal to reject grandfathering and apply market pricing to the embedded number base.

The purpose of this Part has been two-fold. First, we established substantial symmetry in economic terms between two traditional telecommunication industries and the Internet, focusing on scarcity and private good characteristics of the spectrum and the telephone name and number space on the one hand and the domain name space on the other. Second, we explored the various models that have been used by the FCC over the years for allocating scarce resources. Both with broadcast and telephony, the FCC came late to realize that allocative efficiency could best be accomplished through a market pricing mechanism – the auction.

The next step is to apply these lessons to the Internet. As we show in Part IV, adopting a competitive bidding model for allocation of generic top level domains both
promotes efficient use of the name space and enhances its economic value. Since domain names are private goods, even if one conceptualizes the name space itself as a public resource, market allocation is likely the most economically efficient and stable mechanism. No degree of social engineering by ICANN, under the banner of promoting the “public interest” in the DNS system, can come close. The only reason for retaining the present pace of free-form review of gTLD applications is to maintain the status quo. And the only reason to do that is to preserve monopoly privileges of incumbency.

IV. A PROPOSED MODEL FOR EXPANSION OF THE NAME SPACE

As its name implies, ICANN’s principle function is to regulate the name and number spaces of the Internet. Although the organization strives to govern by consensus, there has never been agreement on how these spaces should be regulated. Indeed, other than ICANN governance itself, no other issue has generated more controversy and proposals for reform. Whole organizations exist toward that end. Yet, “little progress has been made because of both an extremely complex political environment and the economic interests of the parties involved in the multi-billion dollar business of selling domain names.”

It will take considerable effort to reform name space regulation. The problem is not unique to the Internet. We have seen other telecommunications industries go through similar upheavals. Our hope is that it will not take decades or longer, as it did with broadcast and telephony, to arrive at efficient allocation and utilization mechanisms. In this section we propose a model that has proved effective elsewhere – competitive bidding for scarce private goods.

We think this could break the logjams that have characterized the addition of new gTLDs to the root. A paradigm shift is required to make this work. ICANN has to stop treating the name space as a public good – requiring strict regulation in the public interest. Once it recognizes that domain names are private goods, and allows market allocation, a more efficient system of name space management should emerge.

A. Treating Scarce Name space as a Public Good – An Example of Regulatory Failure

Root service – the computer system that allows translation of URLs into computer-identifying IP numbers – is a natural monopoly. The Internet would be fundamentally different, and likely a great deal less useful, if unifying control were absent. The monopoly characteristic of root service means, among other things, that entry into the root is tightly controlled. In Milton Mueller’s terms, ICANN “rules the root.” In doing so, it endows and regulates a private good – the name space. Yet, it treats it as if it were a classic public good.

The domain name space has been declared a public resource. And so it is, in the same way that the spectrum and the telephone numbering system are public resources. All three are mathematical constructs – addressing protocols – that require social buy-in to be practical. It is difficult to conceive of these constructs as reducible to private ownership, just as it would be to think of owning integers. Yet, the notion of public resource is not synonymous with “public good” as economists use that term. The
distinction between public and private goods helps in policy analysis of regulatory structures. Public goods are not efficiently allocated by markets; hence they require government or government-like regulation. Private goods, on the other hand, are susceptible to market regulation, which is much more likely to achieve optimality in resource allocation. We demonstrate these points by first recounting ICANN’s experiences with gTLD expansion, and second by looking at the contestable markets that exist in domain names.

1. ICANN and gTLD Expansion

At its annual meeting in November, 2000, the ICANN Board considered 44 applications for new gTLDs that had been submitted under working rules devised by the DNSO and Names Council. The Board accepted 7 of the proposals, one of which is yet to be implemented due to ongoing negotiations with ICANN. The application process was complex, expensive and somewhat mysterious. Aspirants had to complete lengthy forms involving their technical and business plans, their internal structure, eligibility standards, market projections and dispute resolution policies. They were advised to “secure now the professional assistance of technical experts, financial and management consultants, and lawyers to assist in the formulation of their proposals and preparation of the applications.” ICANN imposed a $50,000 processing fee, which also served to weed out the disfavored, weak, and undercapitalized applicants. Selection criteria were never fully articulated and the hearing at which applications were reviewed was, putting it mildly, unstructured. Applicants had only one day to review staff recommendations before the hearing, and only 3 minutes each to make their cases to the Board. Much of the Board’s discussion was based on speculation or trivial factors, such as whether a TLD string was “pronounceable.” ICANN has acknowledged the subjective nature of the process, but has proclaimed that one of its strengths.

This is no way to make law, sausage or domain name policy. Nonetheless, it is the only precedent for adding new gTLDs. Perhaps because of it, ICANN has taken a much slower and more deliberate approach to considering further applications. Many of the original 44, and some new ones, are still pending. At its December, 2002 annual meeting, the Board referred the applications to committee, the newly-formed Generic Name Support Organization (GNSO). It seems likely that pressure will build until the GNSO and the Board approve additional gTLDs. There is already an indication that 3 or more additions will be made in 2003. They are likely to be “sponsored” domains (e.g., .union) with restricted eligibility, rather than open and commercially oriented (“unsponsored”) domains such as .web. This will serve to maintain scarcity in the name space and the resulting monopoly value of existing domain names and gTLDs. Incumbent registry operators and registrants will again be the winners of this round of gTLD expansion; competitors and consumers will again be the losers. This is how public choice theory works; organized special interests work to defeat regulatory reform that would benefit the public.

ICANN’s behavior in connection with regulation of the name space is analogous to “agency capture,” that phenomenon where an agency becomes “uniquely susceptible to domination by the industry [it is] charged with regulating.”
In `captured' agencies, agency regulators do not act as `arms-length' representatives of some larger `public interest' in their interactions with regulated industries. Instead, government officials work to advance the agenda of current firms in the industry by formulating regulations that benefit or at least do not substantially burden the industry. In the most malignant capture account, the captured regulatory agency enables an industry to bar new entrants and [to] extract monopoly rents so that consumers are materially worse off with regulation than without it. Capture of this sort, theorists claim, is particularly likely when an agency is charged with regulating only a single industry.

In the case of ICANN, the influence of those who are affected by ICANN’s actions is facilitated by the newly adopted governance structure with built-in influence of “constituencies.” These, for the most part, are the incumbent stake-holders – the trademark holders, large telcos, ISPs, and registration service providers that would be most disrupted by unrestricted expansion of the name space. To be sure, ICANN is not a government agency, but it wields regulatory power nonetheless. Indeed, it superintends a monopoly as strong as any the FCC or most state public utilities commissions ever has.

The FCC was also “captured” by the industries it regulated. This is one reason Congress began deregulating the telecommunications industries in 1996 with the Telecommunications Act. The following year, Congress extended frequency auctions to broadcast licenses. As much of this article suggests, we believe ICANN should follow this course. It should do so not simply because it would ameliorate capture or produce sizable revenues, although it would accomplish both of those. Rather, it should do so because market allocation of private goods – in this case, the domain name space – is a more efficient way to manage them. Auctions would insure that specific gTLDs, and the name space in general, would be put to their highest and best economic use.

2. The Market for Scarce Name Space

The SLD name space is scarce. A huge number of domain names remain available—the theoretical dimensions of even the SLD space in the .com TLD alone are vast. But, the most desirable domains are those which are both easy to remember and which also have commercially exploitable symbolic, generic or trade meaning. Many, perhaps most, of the potential SLDs in this subgroup have already been registered. That scarcity creates value, which in turn creates a market where values can be realized. With most domain names, the market exists only at the secondary level; i.e., “used” names can be bought and sold among registrants, sometimes for millions of dollars. Domain name brokers, appraisal services and online auctions can facilitate the transactions. In a few cases, mostly in the ccTLD space (such as .md, .tv and .us), a primary market functions at the retail level. Profit-maximizing TLD operators extract monopoly rents by charging a premium for popular second level domains drawn from generic terms, common names and nouns. The economic value created by scarcity is thus monetized. In an unregulated environment, windfalls go to the registry operators rather than to first-in-line registrants during the inevitable land rush.
The TLD name space is also scarce, for the same reasons that scarcity exists in the SLD. Yet, there is no market for gTLDs despite their tremendous economic value, in one case (.com), denotating an entire industry. gTLD operators acquire their rights and resulting value either by being in the right place at the right time (e.g., Network Solutions, Inc., the first .com registry), or by the grace of ICANN. In neither case did the operators have to pay for their exclusive rights, other than perhaps administrative processing and lobbying fees. ICANN, as keeper of the root, has systematically failed to capture value at the wholesale level. Instead, registry operators have obtained windfalls worth hundreds of millions of dollars or more. The stock value of Network Solutions was estimated to be $21 billion when it was acquired by Verisign.

The current round of gTLD expansion is following the same model. ICANN will make bureaucratic and well-intentioned efforts to promote the Internet community’s interests by assuring smooth administration of the root and name space. It will not, however, realize any monetary benefit from the new value it creates. It will instead endow a lucky few successful applicants with monopolies they can monetize at the retail level. ICANN’s conduct today parallels that of the FCC during the era of comparative license hearings. It tries to evaluate applicants on the basis of “public interest” criteria, knowing full well that behind the scenes a game of “Who Wants to be a Millionaire” is being played out. If the root is a public resource, then ICANN shouldn’t be so generous. Instead, it should adopt a system of competitive bidding, drawing on recent FCC policies and experience for guidance.

B. Competitive Bidding for new gTLDs

When new radio frequencies become available for commercial use, federal law requires that licenses be auctioned off to the highest qualified bid. The FCC does a reasonably good job in designing and conducting spectrum auctions. They are often familiar in format, not much different than found for consumer goods on eBay. In other cases, such as with “simultaneous multiple-round” or “combinatorial bidding,” the auction design is fairly complex. Because of complexity in these cases, the FCC sponsors periodic conferences on auction theory and seminars on auction mechanics for potential bidders. We believe gTLD auctions will be relatively simple, both in concept and operation. Nonetheless, we think actual auction design should be worked out by ICANN to assure compatibility with technical standards. ICANN can draw on the FCC’s operational experience with auctions as well as a large body of literature on auction theory and design. Although we describe an auction model below, we do not propose that ICANN accept it based on our analysis alone. Rather, our purpose here is to lay out a framework, describing what should be auctioned and roughly how. The actual process of auction design should include input from economists who specialize in auction theory; indeed, ICANN should either hire a staff economist or develop a consulting relationship with an economist specializing in auction design.
1. What Should Be Auctioned?

Unlike allocating radio licenses or telephone numbers, where the relevant space is identified prior to issuance, the domain name space is constrained only by the allowable character set and string length. Thus, allocation of gTLDs involves selection both of domain names and sponsors or operators. The former is analogous to the radio frequency band or telephone number set; the latter are the licensees. FCC spectrum auctions, until now at least, have determined only licensees. Determination of the frequencies to be awarded (the “auction inventory”), or their permitted uses, is subject to pre-auction administrative processes. Adapting this practice to gTLDs means that, prior to auction, ICANN would first determine the domain name or names to be added. An auction would then select the operators of the newly approved gTLDs. For example, ICANN might decide to add .sex to the name space, and then hold an auction solely to determine the registry operator. While this mechanism might facilitate gTLD expansion, and would certainly produce revenue, it does not address the principal nature of inefficiency now encumbering the gTLD selection process.

It is unrealistic to expect ICANN to rationally determine which gTLDs should be added to the root. There are few if any objective selection criteria. Does a gTLD need to be pronounceable or have semantic meaning? Does it need to be descriptive? Can it contribute to the functionality and stability of the domain name system? These questions, while sensible in the abstract, are not germane to the question at hand any more than whether nouns and adjectives are eligible to become gTLDs. In one notorious case, the ICANN Board selected .aero over .air because it felt the latter was a public resource. The principle at play during the first expansion round in 2000 was “proof-of-concept” domains. As useful as that might sound for evaluating many aspects of expansion, including root operation, allocation methods, and even individual applicants, it is not a meaningful tool in distinguishing among possible gTLDs. In fact, there may be no rational policy choices. Regulatory decisions on which gTLDs to add are inevitably arbitrary, or simply favor particular interest groups. The highly engineered grid of gTLD assignments that marks the current domain name space does not necessarily measure or meet the needs of the Internet community.

Why not let the market decide? If .air has greater utility to the Internet community than .aero, why shouldn’t it be added? Why not add them both? To be sure, some users may enter .air when they are looking for .aero. And some domain holders might be induced to protect their trademarks or investments by buying domains in multiple gTLDs. But, those inefficiencies occur now, and are presumably reflected in the value of the gTLDs themselves. In short, the auction process should be structured so the question of which gTLDs to add is itself determined by the market. This is likely to yield a higher and better use of the name space than achievable by any bureaucracy. The experience of the FCC with spectrum allocation strongly supports economic theory on this point.

Closely related to the question of which gTLDs should be added is the issue of how many should be authorized at any time. Here ICANN must play an important role. Integrity of the root and domain name system is its raison d’être. Unlimited or too-rapid expansion could overwhelm both the infrastructure and the markets that have developed
based on existing practices. It could also undermine the goals to be achieved by competitive bidding in the first place. Instead, ICANN should make an informed judgment, based on technical and public policy factors, on how fast to expand the domain name space. But their decisions must be transparent, so as to avoid any suspicion that stakeholders are manipulating the auction process so as to maintain scarcity or protect incumbents. In expanding radio bands or telephone numbers, the FCC is faced with real-world technical constraints. ICANN needs to articulate similarly objective criteria for any decision reached on how many gTLDs to add.

In this respect, “proof-of-concept” is a prudent policy. We think ICANN can legitimately limit the first round of gTLD auctions to a technically and administratively manageable number. If for no other reason, the model and economics need to be tested. There were 47 serious applicants for new gTLDs in December, 2000, each anteing up the $50,000 application fee. Several more applicants have emerged since then. We believe this number – roughly 50 – provides a suitable lodestar figure for ICANN to consider. Presumably, the root server system can support this number of new gTLDs. And if ICANN’s cumbersome selection process were replaced by an auction, no significant administrative burdens would be encountered.

What should be the duration of the right, purchased at auction, to operate a gTLD? Should it be like a spectrum license which has a prescribed term (e.g., 8 years for broadcast licenses), and renewable thereafter? Or should the right be perpetual? One advantage licensing has over outright sale is the oversight it forces at renewal time. ICANN’s agreement with Verisign for operation of the .com, .org, and .net registries was for eight years, with no mention of renewal. We think this is a suitable term, but that a renewal expectancy will enhance the price paid and capital investment of new gTLDs. The right should also be revocable upon material breach of an agreement with ICANN for the stable operation of the gTLD. So long as the rules are transparent and term security is worked out in advance, the auction should function smoothly.

One objection to an auction for new gTLDs is that incumbent registry owners get a free ride. Should the existing gTLDs also be auctioned, either in the first round or when their agreements with ICANN expire? Otherwise, the argument goes, they would have an advantage over competitor gTLDs because their acquisition costs were much lower. The ten existing commercial gTLDs could be auctioned as part of the expansion, either by ICANN (perhaps with delayed transfer to reflect extant agreements) or by the private operators as part of a double-sided auction.

For a variety of economic and practical reasons, we think incumbent registry owners should be grandfathered in, at least in the current round. First, they are already likely to take a significant hit with large-scale expansion of the root through loss of monopoly power and rents. Second, their pricing structure for SLDs, often for long terms, was set in reliance on making annual payments to ICANN rather than paying a capitalized up-front purchase price. Finally, the incumbent gTLDs have enormous influence on ICANN’s decision-making process. That reality of “regulatory capture” cannot be ignored in restructuring gTLD expansion policies. If incumbent expectancies were suddenly unsettled, it is less likely that the necessary paradigm shift would be approved.
In sum, we propose that ICANN authorize an auction of 50 new gTLDs, for renewable terms where both the specific gTLDs and their operators would be selected by competitive bidding. We next show how the process might work.

2. Auction Framework

Although auctions were used by ancient societies, they have gained considerable attention in recent years among economists and mathematicians, striving to test game theory and theories of market pricing, formation and mechanics. Often there are asymmetries of information, or unknown quantities (such as future revenue streams), which make precise market pricing impossible. The auction is a good way to interact amidst uncertainty; hence their attraction for game-theoretic analysis.

Once the rationale of auctions has been accepted, the next issue is their design. There is a rich body of work on this, both theoretical and empirical. “What really matters in auction design are the same issues that any industry regulator would recognize as key concerns: discouraging collusive, entry-deterring and predatory behavior. In short, good auction design is mostly good elementary economics.”

The literature generally describes four basic types of auctions:
- the ascending bid auction (bids increase as participants drop out until only one is left);
- the descending bid auction (“Dutch auction”) (offering price starts high and is lowered in successive rounds until one bidder accepts the price);
- the first-price sealed-bid auction (each bidder submits a single bid without seeing any others; the highest bidder wins); and
- the second-price sealed-bid auction (“Vickrey auction”) (as above, but the highest bidder pays the price of the second highest bid).

Ascending bid auctions are the most common and are probably the easiest to implement, especially given the nature of the bidding we propose (highest bids determine not only winning bidders but winning gTLDs). However, they are also most prone to collusion, as Klemperer demonstrates. They can also discourage entry by risk-adverse bidders – those for whom perceived overbidding (called the “winner’s curse”) would be costly. In ascending bid auctions, participants with an advantage or greater perceived staying power, can not only win, they can win at a low price by discouraging participation by others. Developing an advantage through tactical measures (e.g., intimidating competitors) or predation, can be profitable. Sophisticated bidders prepare in advance to “game the auction.”

Many of these pitfalls can be mitigated by proper design and mechanics. Low entry barriers, high reserve prices, minimum increments, and enforced rules (e.g., collusion and cartel formation) can help secure the validity of the auction. Misbehaviors are minimized in our model by the variable identity of the good sold (artificially low bids for any particular gTLD will be surpassed by bidders for other names; neither the low bid nor its proffered gTLD will win). “Punishing” anticompetitive behavior is an important safeguard.

The benefits of an ascending price auction seem to be worth the risks. This format tends to “allocate the prizes to the bidders who value them the most,” thus
achieving the prime desideratum -- an efficient outcome. Especially in multi-unit
auctions, as we propose, ascending auctions allow for greater information exchange
among bidders, thus reducing risk aversion. Attractiveness to bidders is a key element of
successful auctions.

Finally, an ascending auction with a specified ending time can reap some of the
advantages provided by a sealed-bid auction without that format’s principal disadvantage
– disgruntled buyer or seller in the event of outlying (grossly high or low) bids. Toward
the end of bidding time in a fixed length auction, serious bidders tend to make a last best
offer. Perhaps it is no accident that eBay, the world’s largest auction house, uses an
ascending auction with the safeguards and features described here. Accordingly, that is
the structure we propose for ICANN’s first gTLD auction.

a) Eligibility and Standards

In most auctions, only qualified bidders are eligible to participate. The auction
house needs to satisfy itself that the bidder has means to pay or is credit-worthy, is
lawfully entitled to take possession and use the item, and hasn’t engaged in collusion or
anti-competitive behavior in the past. On eBay, for instance, bidders must pre-register
and their bidding history is available for all to see. At FCC auctions, bidders must pre-
qualify to show they meet license eligibility requirements. They must also make upfront
payments to assure financial ability. We think ICANN should similarly set eligibility
standards to pre-qualify bidders prior to auction. These standards would be mostly of a
technical and financial character. In fact they need not be significantly different than
those in effect now. gTLD operators should have a registry plan in place, be technically
competent to provide robust domain name services, and be adequately capitalized.

One could take the contrary position, that anybody should be able to participate
in the auctions; whether they ultimately are allowed to operate the gTLD is a separate
matter. For instance, a successful bidder at an auto auction is not guaranteed the right to
drive the car off the lot. She must also have a driver’s license. But that approach
overlooks ICANN’s role as superintendent of the root and domain name system. It has a
public trust responsibility to operators and users alike. That is best discharged by
insuring that gTLD bidders can actually provide the name services they claim to offer.

One eligibility requirement deserves special mention – the right to use a
trademark as a gTLD. An entire industry, consisting of a special purpose law – the
Anticybersquatting Consumer Protection Act (ACPA) – and an arbitration procedure –
Uniform Domain-Name Dispute-Resolution Policy (UDRP) – is built on trademark
usurpation in domain names. Up until now, this problem has arisen only with SLDs. But
trademarks such as .ibm have been proposed as gTLDs. To avoid involving the auction
process in trademark litigation, ICANN should assure that bidders for trademarked
gTLDs have the right to use them. It could do this by adopting a “sunrise policy;” i.e., a
gTLD reservation process limited to trademark owners. NTIA recently set a similar
requirement for SLDs within the .us country code TLD. But we see no reason trademark
owners should get a free ride in the allocation of gTLD space. Nor should trademarks
necessarily prevail over other gTLDs, at least in the limited first round of gTLD
expansion by competitive bidding. Accordingly, while a trademark owner may be the
only one lawfully entitled to operate a trademarked gTLD, it should compete in auction for the right to do so.

ICANN should also set a reserve price. This serves several purposes. Among them are: discourage collusion, cost recovery of administrative overhead, generate revenue, maintain minimum values in the name space, assure financial ability, and avoid speculation (super cybersquatting). We think the processing fee charged to applicants in 2000 -- $50,000 -- serves as a good baseline reserve price. The precise amount, as well as eligibility standards and auction mechanics, should be determined by ICANN through referral, notice and comment, as it does now with policy initiatives. The collective judgment of the Internet community can shed substantial light on specific auction parameters beyond the framework we have described. We next illustrate how the auction would work.

b) Sample Auction

Assume, for the sake of illustration, that 100 bidders meet eligibility standards and participate in the auction. When bidding starts, each participant can offer one or more gTLDs together with a bid amount. For instance, a Hollywood entrepreneur might bid $250,000 for the right to operate .movie. Some bidders may be content to bid on gTLDs already on the bid list, rather than proffer their own. Other bidders will have a unique claim to a gTLD. For instance, if IBM proposes .ibm, no other bidder would be qualified to operate it. One might expect IBM to offer the reserve price ($50,000) and not a cent more, confident that no one else can outbid it. But $50,000 for .ibm might not be one of the top 50 bids, in which case, that TLD does not get approved.

Bidding would take place in public over the Internet, much the same way that other on-line auctions are conducted. Between the open and close of bidding, all bids would be listed, showing rank, gTLD, amount, and bidder. It would hypothetically look something like this (only 6 shown):

<table>
<thead>
<tr>
<th>Rank</th>
<th>gTLD</th>
<th>Bid Amount</th>
<th>Bidder</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.movie</td>
<td>$250,000</td>
<td>Hollywood Domains, Inc.</td>
</tr>
<tr>
<td>2</td>
<td>.sex</td>
<td>$247,500</td>
<td>Hustler</td>
</tr>
<tr>
<td>3</td>
<td>.web</td>
<td>$244,200</td>
<td>Image Online Design, Inc.</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>50</td>
<td>.site</td>
<td>$95,000</td>
<td>Afilias, Inc.</td>
</tr>
<tr>
<td>51</td>
<td>.mobile</td>
<td>$94,500</td>
<td>Nokia, Inc.</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>100</td>
<td>.geo</td>
<td>$50,001</td>
<td>SRI International</td>
</tr>
</tbody>
</table>

Relative ranking in the top 50 is unimportant, as each will win the right to be added to the root. Accordingly, bids in this group are likely to be close to one another. The real battle will be waged at the boundary, between the 50th and 51st ranked bids. As the auction nears close, Nokia and Afilias will both raise their bids, trying to preemptively outflank the other, as well as bids higher up the ladder. Anyone who has
lost an eBay auction can appreciate how seasoned bidders have perfected winning strategies, such as last-second stealth maneuvers. Indeed, bidding software helps those who are serious about the enterprise.

This is an auction within an auction. For instance, if Hustler and Playboy both bid for .sex, only the higher of the two can succeed, even if they are both among the top 50 bids. Subjecting both gTLDs and operators to competitive bidding serves two salient purposes. First, it works as an anti-collusion mechanism. Competitors are unlikely to conspire to make low bids, since that could exclude both from the winning pool. Second, the auction identifies the 50 most valued gTLDs, not merely those who most want to operate registries. This not only maximizes revenue to ICANN, it puts the domain name space to the highest and best use, as measured by market players. To facilitate this assessment, the auction should remain open long enough (perhaps 30 days) so that participants can obtain feedback from potential customers and other constituents.

The most notable result of an auction along these lines is that the successful gTLDs are not likely to be ones that ICANN would select under existing policies and practices. Therein lies a principal purpose in preferring markets for the allocation of private goods.

C. gTLD Auctions Would Serve the Public Interest

In this section, we demonstrate that auctions of new gTLDs would serve the public interest. First, we establish that as a matter of law, ICANN has a mandate to serve the public interest. Second, we argue that auctions serve the public interest in three ways: by securing adequate funding for ICANN to perform its core missions, by allowing ICANN to subsidize uses of the root space that are in the public interest, but not supported by the market, and by putting the root to its highest and best commercial uses.

1. ICANN’s Mandate to Serve the Public Interest

ICANN is a California Nonprofit Public Benefit Corporation. To qualify as such, the corporation must have a “public or charitable purpose.” Public benefit corporations “are not operated for the mutual benefit of their members but for some broader good.” ICANN is also operated, “exclusively for charitable, educational, and scientific purposes within the meaning of § 501 (c) (3) of the Internal Revenue Code.” Principal among “the charitable and public purposes” of ICANN are “performing and overseeing functions related to the coordination of the [DNS], including the development of policies for determining the circumstances under which new top-level domains are added to the DNS root system.”

In short, ICANN’s TLD policies must promote a public purpose that inures to the “broader good,” not unlike the FCC’s mandate to promote the “public interest, convenience and necessity.” This is confirmed by ICANN’s MOU with the Department of Commerce, which stresses the Corporation’s “public trust” responsibility over the TLD name space. If auctions fail to serve the public interest, or transmute ICANN into a for-profit corporation, they ought not to be considered in any expansion of the gTLD name space. But the public purpose of market allocation policies is well demonstrated by
theory, analogous FCC practice, and by ICANN’s own statement of purpose. Thus, in “operat[ing] for the benefit of the Internet community as a whole,” the Corporation shall do so “to the extent appropriate … through open and transparent processes that enable competition and open entry in Internet-related markets.”

2. gTLD Auctions Serve the Public Interest

Is our auctions proposal consistent with ICANN’s obligation to serve the public interest? Opponents of auctions might argue that the auction scheme puts ICANN in the role of a profit-maximizing market participant, and hence that auctions are inconsistent with ICANN’s role as a trustee for the public interest. In this section, we demonstrate that this concern is misguided. In fact, gTLD auctions would facilitate ICANN’s ability to serve the public interest in a variety of ways. Indeed, we demonstrate the gTLD auctions better serve the interests of the public at large, including end users, than would the alternative options available for expansion of the TLD name space.

Because auctions promote allocative efficiency, per unit operational costs for name services will decrease. In a competitive world, some or all of these savings are passed along to consumers. In the case of name service in the gTLD space, it means that marginal costs by registry operators in the form of annual fees paid to ICANN may go down or rise at a slower pace. Lower costs are likely to result even though gTLD operators will bear acquisition costs not realized currently. These up front payments are offset by marginal cost reductions and reduced need for periodic payments from name service providers. SLDs will share in these reductions as well as from elimination in monopoly rents that gTLD operators charge due to their quasi-monopoly status in an environment of artificial scarcity.

If gTLD operators are paying ICANN at auction, should they continue to make annual contributions to ICANN’s budget? Broadcast and telephony analogies are imperfect since consumption of the respective name spaces in those industries had been at zero cost prior to the advent of competitive bidding. Still, the FCC charged license application fees (analogous to ICANN’s gTLD application fee) which partially funded ongoing agency operations.

Thus, ICANN should continue to charge an annual fee to registrars and registry operators, but the amounts should reflect the costs of specific oversight functions (e.g., IANA), rather than serve as a general purpose tax, as is the case now. Even with a lower fee structure, ICANN’s annual revenue stream might go up, rather than down, because of the increased number of gTLD operators and registrars. The ultimate level of non-auction fees requires further economic and fiscal analysis. We simply observe that auction payments by successful gTLD bidders would not necessarily increase consumer costs; it would very likely reduce them.

a) Auction Revenue Can Address ICANN’s Funding Problems

One obvious effect of conducting gTLD auctions would be to increase ICANN’s revenues. Is this necessary or desirable? In its July, 2000 report to the House and Senate Commerce Subcommittees, the General Accounting Office (GAO) noted that “funding
has been a source of concern for ICANN.” An original proposal to levy a $1 per year licensing fee on each domain name registration was rejected by the Department of Commerce. Instead, ICANN relies on payments, some voluntary, some contractual, from various registries and registrars for its annual budget of approximately $4 million. Because many country code registries refuse to pay their share (they call it an “arbitrary tax”), “ICANN has experienced continued difficulties in securing a stable funding mechanism.” Even more problematic, “ICANN's current fundraising is a recipe for undermining legitimacy. It is likely to (1) subject ICANN to undesirable influences; (2) subvert its objectives by increasing its staff; and (3) render its decisions unfair and arbitrary.”

From an economic standpoint, the controversy over ICANN’s attempt to charge ccTLD operators a fee for the provision of root service seems odd on the surface. ICANN is providing a valuable service that ccTLD operators utilize. Why would the ccTLD operators expect this service to be provided for free? Putting the point another way, why do ccTLD operators expect that they should be allowed to be free riders, consuming a service for which others pay? Part of the answer to these obvious questions lies in the history of the DNS and root service. Root service was historically provided free of any specific charge. Because the ccTLD operators were not required to pay for root service in the past, they may have come to see free root service as an entitlement. Moreover, each ccTLD is organized autonomously. Some ccTLD operators provide name service within their domain free of charge. For such operators, the imposition of a fee for root service may pose a substantial challenge. The subsidy to the ccTLD operator may be insufficient to cover the charge for root service, and it may not be politically feasible to cover this charge by either charging for name service within the ccTLD’s domain or by obtaining public or private subsidies. Hence, it is quite natural for ccTLD operators to strongly oppose the imposition of a fee for root service.

In a first-best world, ccTLD operators should bear the cost of root service and pass that cost on to registrants within the ccTLD. This solution is first best, because it prevents the inefficient use of root service. But the first best solution may well be unavailable—outside the feasible choice set in economic parlance. ICANN’s bottom-up, consensus driven process has so far proven resistant to the effective collection of a root service charge from the ccTLD operators. Hence, there is good reason to consider second-best solutions. One possibility is to utilize revenues from a gTLD auction to subsidize the provision of root service to the ccTLDs. In this essay, we do not address the legitimacy or desirability of ICANN’s charging a fee to the ccTLD operators for the provision of root service. Our point is a modest one: auction revenues do not have the practical problems associated with charging the ccTLDs for root service.

A stable and unified root is in the public interest. For historical reasons, ICANN provides the best currently-available institutional home for the maintenance and management of a stable root. It follows that it is in the public interest for ICANN to have an adequate source of funding, and gTLD auctions provide a very attractive, politically feasible means by which ICANN can obtain necessary funding.

We recognize that ICANN has critics. Some of these critics may oppose gTLD auctions on the ground that fiscal instability may be a likely route to ICANN’s economic demise. It is possible that populist rhetoric aimed at the “ICANN tax” is motivated by
opposition to ICANN itself. These topics are outside the scope of this paper. We believe that if ICANN is replaced, the replacement entity will be in a better position to make DNS policy if ICANN commits to (or carries out) an auction experiment. We also note that it is far from clear that a replacement entity would be better positioned to replace the “beauty contest” model with auctions.

b) Surplus Auction Proceeds Would Enable ICANN to Pursue Public Interest Projects Consistent with its Core Mission

What if gTLD auctions were to yield revenues that exceeded ICANN’s budgetary requirements? We take no position on the question whether this is likely to happen. On the one hand, it is difficult or impossible to estimate the revenues that would result from a gTLD auction. Presumably, those revenues would be invested in an endowment fund that would yield income for ICANN’s operational budget. On the other hand, ICANN’s current budget does not provide a clear picture of ICANN’s true financial need. For example, the root system is currently subsidized by various root server operators. If ICANN were adequately funded, it might be appropriate for ICANN to pay fair market value for root server operation. Moreover, ICANN’s current staffing plan is arguably inadequate. For example, ICANN does not have a professional economist on staff—a dangerous condition for an entity responsible for making economic decisions with potentially enormous consequences. Moreover, ICANN lacks funds to conduct substantial outreach programs that would enable end users to participate meaningfully in the ICANN policy formulation process.

Because both the revenues and the expenditures are difficult to estimate, the notion of an auction revenue surplus is hypothetical. However, were such a surplus to materialize, ICANN would have ample opportunities to utilize the surplus in ways that are consistent with ICANN’s core mission and that would serve the public interest. The obvious comparison here is to the telecommunications industry’s universal service and e-rate funds. These support a number of consumer subsidies, from “plain old telephone service” (POTS) to high speed broadband access by schools, libraries and rural health care providers. They are in partial fulfillment of Congress’ mandate to promote “deployment on a reasonable and timely basis of advanced telecommunications capability to all Americans.” Approximately $4 billion are made available annually through the e-rate fund alone for a variety of public interest programs. Although ICANN’s surplus revenues are likely to be far less, templates exist for use of such funds in the public interest.

Public interest organizations have already explored options for subsidizing public interest uses of the root. For example, KIDS, one of the pending applicants for a new gTLD has proposed auctioning off “glamour” SLDs and using the proceeds to fund charitable activities on and off the Internet. The Benton Foundation proposed to the Department of Commerce that the .us ccTLD be restructured with SLDs auctioned off with proceeds funding various public interest programs. Their goal was to narrow the “digital divide” by “promoting access by all Americans to communications services.”

We do not advocate these particular proposals. We urge ICANN to act cautiously, limiting its public-interest projects to those which have a strong connection
with ICANN’s core functions. For example, one serious problem with the DNS is that the system currently is limited to domain names that utilize the standard Roman alphabet and Arabic numerals. This obviously creates barriers of access to Internet users who are literate only in languages that use other alphabets or ideograms. ICANN has already initiated a project for the development of Internationalized Domain Names (IDN). Surplus auction funds could be used to accelerate this process, and extend IDN beyond the major international languages, such as Mandarin Chinese, Japanese, and modern Arabic, to smaller language groups that would benefit from native language domain name service. Perhaps, in addition to consulting economists on domain name policies, ICANN should also consult linguists, social anthropologists and others with relevant expertise, regarding the impact of the DNS on Internet usage by those whose written language does not employ the Roman alphabet, Arabic numeral character set.

c) Auctions Provide for Efficient Allocation of the Root Resource

There is yet another and more fundamental reason why gTLD auctions serve the public interest. Auctions put the root to its highest and best use. It is a fundamental assumption of current ICANN policy that the root space is a scarce resource. Why is the root “scarce” in the economic sense? There are two reasons. First, we assume that the Domain Name System cannot feasibly support an unlimited number of TLDs. We neither endorse nor oppose this assumption. It rests on historical experience with the root and technical judgments best made by experts. Second, and more fundamentally, the root is a scarce resource, because for any given unique string of characters that could function as a gTLD name, there can only be one authoritative system of name servers for that string. In other words, there can only be one .com, one .net, one .biz, and so forth. Either of the two reasons would independently establish that the root is scarce in the economists’ sense of that concept.

Given that the root is a scarce economic resource, the question becomes: how can the root be put to its highest and best use? At this point, we have already established the foundations for an answer to this question. We have established that, as a matter of economic theory, the DNS is a private good, although the DNS is also a public resource. The analogous cases of the broadcast spectrum and the telephone number space provide a wealth of experience for determining whether theory conforms to practice. In both arenas, a similar lesson has been learned. Well-designed auctions can put public resources to their highest and best use.

At this stage, we complete our argument. We shall demonstrate that gTLD auctions will lead to the most efficient use of the root resource. Our argument will proceed in two stages. In the discussion that immediately follows, we show how an auction combined with a secondary market in gTLDs leads to an efficient allocation of the root resource—in the abstract as a matter of economic theory. We then proceed in the section that follows to reinforce this demonstration by comparing gTLD auctions to four alternative policies: a static root, a taxonomy plan, case-by-case public interest evaluation, and a rule of first occupation. Although gTLD auctions have advantages of each of these four alternatives, the alternatives themselves are not equal. First occupation
is the best of the alternatives, case-by-case evaluation is next best, a taxonomy plan is the third best option, and a static root is the worst of all.

Why are gTLD auctions efficient? No doubt some readers will think this question answers itself. An auction creates a market for gTLDs. For any given gTLD name, the bidder that can put the string to the highest and best use make the highest bid for the string. If the number of new gTLDs is limited, then an auction provides a mechanism by which those gTLDs that produce the greatest value will be created; the most valuable gTLD strings will receive the highest bids. Since the Internet is an economic engine of unparallel strength, “highest and best use” gTLDs means further economic growth. “Billions of dollars of cumulative loss to the U.S. economy have been attributed to inefficient spectrum allocations under the [pre-auction] system.” It is impossible to know whether the current regime of gTLD deployment has been as damaging. Still, one cannot gainsay that more efficient allocation in the gTLD name space will have a positive effect on the economy and provide services of value to end users of the Internet.

However, many readers may raise an objection at this point. What about valuable gTLDs that are not associated with profit-making enterprises? For example, in a gTLD auction, it is likely that .museum would not have been created. Isn’t it possible that the .museum domain will create more good than some alternatives with greater market value, for example .sex, .ibm, or .biz? This is a complex issue, but it does not need to be resolved. If there are high social value, low market-value, gTLDs, an auction scheme will do a better job of creating and supporting them.

How can that be so? We have already seen the answer in our discussion above. If there is a need to subsidize public-interest gTLDs, then the best way to accomplish that goal is to provide ICANN with adequate resources. The proceeds of gTLD auctions can be utilized to subsidize public-interest gTLDs, and if necessary, to expand the capacity of the root to make the DNS capable of supporting the additional gTLDs. If ICANN should subsidize some uses of the root, then ICANN needs the resources that will enable it to do so.

Finally, the experience of the FCC in the United States and of regulators in a variety of other nations suggests that auction design is important. A badly designed auction can facilitate the cartelization of bidders—leading to lower auction prices. Auction structure might itself result in inefficient uses of the name space. For this reason, we urge ICANN to seek input from outside the ICANN community when designing the gTLD auction. Telcos are players in spectrum auctions for wireless phone bandwidth, and they also play an important role as both backbone operators and ISPs. But it goes without saying that the telcos should not be permitted to dominate the auction design process. ICANN’s board must seek independent advice about auction design to be faithful to its statutory mandate to act in the public interest.

D. gTLD Auctions Have Comparative Advantages over the Feasible Alternatives

Fundamentally, gTLD auctions are a good idea, because they put a scarce resource, the root, to its highest and best use. Our argument thus far, however, is incomplete, because we have yet to consider the alternatives to auctions. No doubt the
human imagination can devise an almost infinite number of conceivable policies for the allocation of the root space. Here we consider four options that we believe are within the feasible choice set and are at-least somewhat likely to be on the agenda for consideration by ICANN.

1. A Static Root

The first option is a static root. It is likely that within the ICANN process, there will be some advocates for a static root. For example, Verisign derives an economic rent from its position as the quasi-monopolist registry for the .com domain and as the legacy registrar for many of the second level domains in .com, .org, and .net. We do not pretend to know whether the expansion of the gTLD name space will have a significant impact on Verisign’s rents, but there are good theoretical reasons to suspect this might be the case. New gTLDs can compete with Verisign in the provision of registry service, and competition will tend to drive prices down to the level of costs (including, of course, the cost of capital). Proprietors of other gTLDs, for example, the .biz, .info, and .name gTLDs may be in a similar economic position. To take one example, the proprietors of .name may fear that a .nom domain would be a potential competitor for the registration of individual names as second level domains.

But these advocates for a static root do not represent the public interest. They are rent seekers; that is, they seek to charge prices higher than those that they could charge in a competitive market. Those rents come at the expense of information providers and end users. Such rents lack economic justification. They are naked wealth transfers to the firms that receive them.

But a static root does more than simply benefit some existing stakeholders at the public’s expense; it also precludes innovative uses of the gTLD space that could produce substantial benefits. We do not pretend to know what these uses are. Some of the possible uses are contained in the various proposals that were submitted to ICANN in the last round of gTLD proposals. Undoubtedly, others would emerge in a gTLD auction. We do know that private firms that submit gTLD bids will not make the bids, unless they believe that they can make a profit on the operation of the new gTLD.

2. The Taxonomy Alternative

A second alternative is for ICANN to expand the root by adopting a taxonomy. By taxonomy, we mean a structured set of names. The current root was intended to be taxonomized. The ccTLDs are semantically significant designators for geographical regions, nations and their territories. The gTLDs were intended to designate various categories of information providers. Thus, .com was for commercial enterprises, .org was for nonprofit enterprises, .net for internet related information providers, and so forth. This same concept could be extended, to add additional categories. These categories might be laid out by ICANN or by some other body charged by ICANN with the task of expanded the taxonomy. For ease of reference, we shall refer to whatever body would produce the taxonomy as the “taxonomy committee.”
Auctions would be superior to an expanded taxonomy for reasons that we have already made clear in our discussion of a static root. The taxonomy approach does not permit the market to operate in the allocation of the root resource. If the gTLDs that would be proposed by the “taxonomy committee” are the highest and best use of the root, then private firms will have an incentive to bid and win the right to provide this gTLD names that would be included in the taxonomy. It seems more likely, however, that a gTLD auction can do a superior job of identifying those gTLD names that would put the root to its highest and best use. There are several reasons for this conclusion:

- Auctions bring the resources of many firms into the identification process. Each firm that bids will expend resources and deploy personnel in the process of deciding on a maximum bid price. A taxonomy committee, however, would consist of a small number of individuals, likely volunteers, likely without a substantial staff, who would work part-time on the project of developing the taxonomy.
- Auctions bring the profit motive to bear. Whereas a taxonomy committee has no profit incentive to identify the highest and best uses for the root, firms bidding in a gTLD auction would have such incentives.
- Adoption of the taxonomy approach is itself a decision about the highest and best uses of the root, but this decision would be made on the basis of limited information. If ICANN did decide to expand the root by creating an expanded taxonomy, that decision would be made by the bottom-up, consensus driven ICANN process. But that process is not well suited as a method for determining the highest and best uses of the root. Participants in the ICANN process are, for the most part, technical specialists, and not entrepreneurs. Moreover, some participants in the process have economic incentives to resist expansion of the root.
- The name space is not the only method of access to the Internet. Guessable domain names are supplemented by search engines and other means of access. A thoroughly organized taxonomy would simply be yet another hierarchically organized outline of links to IP Addresses. But we do not need to taxonomize the root in order to add Yet Another Hierarchically Organized Outline to those that already exist. Such taxonomized schemes of Internet access are provided by YAHOO, Google, Lycos, and dozens of other services.

Advocates of the taxonomy approach might argue that a taxonomy has the advantage of “guessability,” e.g. that a top-down taxonomy will allow Internet end users to know intuitively which gTLD to query for a desired host service. The argument might have prevailed in the early days of the Internet, before the advent of comprehensive search engines. Moreover, the taxonomy paradigm has already been violated by the opening of restricted TLDs (such as .org, .net, and even ccTLDs such as .tv and .us) to general commercial use. But given the existing Internet, guessability does not prove that a taxonomy is better than auctions:

- Guessability is doomed to failure, because the DNS is not uniformly taxonomized at the level of SLDs. A truly taxonomized root might have
.com as a gTLD, .car as a SLD, .fordmotorcompany as a third level domain, and so on.

- Taxonomy can be provided by auctions in a variety of ways. For example, one proposal for the root might be for a gTLD that is designed for guessability. Thus, chevron.petroleum.guess, chevron.oil.guess, chevron.servicestation.guess and chevron.gasoline.guess might all be sold by the proprietors of the .guess domain as a package to Chevron. If guessability has market value, we can expect that some portion of the root will be used for guessable domain names.

3. Case-by-case Public Interest Evaluations by ICANN

Indeed, our point is precisely that ultimate economic value of various creative uses of the root is difficult to predict in advance. Entrepreneurial firms are in a far better position to value their proposals for new gTLDs than is ICANN. Such firms possess more information than ICANN about their own proposals, and have better internal resources for evaluating the profit potential of their resources.

In addition, profit-maximizing firms have strong incentives to maximize the accuracy of their bids. If their bid exceeds the difference between revenue generated by the gTLD minus the non-auction costs, then the firm will lose money. If the bid falls below both that difference, then the firm will fail to realize profits. By way of contrast, ICANN lacks such incentives. ICANN is a nonprofit corporation, and ICANN’s staff, management and board do not have strong incentives to approve the most profitable gTLD proposals or to deny gTLD proposals which do not rank high in terms of profitability. Even if ICANN’s staff, management, and board make a good faith effort to select new gTLDs in the public interest, they are unlikely to be any more successful than the FCC has been on this score. Indeed, we think the effects of such efforts are pernicious. Rather than assure that licenses or gTLDs are put to the most beneficial uses, they tend to defeat innovation and homogenize the respective services. In other words, ICANN with its public interest mandate must necessarily be risk averse to innovation. Moreover, a wrong guess by a commercial entity, with losses borne by investors, is preferable to a wrong guess by a regulator, with losses borne by the entire Internet community.

4. A Rule of First Occupation

First occupation has history on its side as an allocation model for distribution of natural resources. It has been used for real property, water, minerals, as well as the radio spectrum in pre-regulatory days. Supporters argue that first occupation promotes discovery and hard work. The early bird gets the worm. Unfortunately, the traditional conception applies poorly to intangible rights where vast numbers of claims (e.g., domain names) can be filed with little effort. In practice, a rule of first occupation has lead to cybersquatting because the investment required to stake a claim is so low. As with tangible property, counter-rules are necessary to assure that first occupation doesn’t lead
to waste. Thus, common law doctrines of adverse possession, usufructory use, and active working of claims, have developed to prevent squatting on first occupation rights.

Given zero transaction costs, the Coase theorem predicts that the choice of allocation method (e.g. a rule of first occupation versus an auction) has no impact on who ultimately emerges as the right holder. In the case of gTLD sponsors and operators, first occupiers can be expected to monetize their rights by transferring control over their registries to firms that will put them to higher and better uses. Of course, they are likely to reap a windfall, as is the case with SLDs now. Auctions capture that windfall and repose it where it can do most good. The windfall can be suppressed by using non-market allocation schemes and erecting barriers to transfer. That describes the current regime. It has little to commend itself.

V. CONCLUSION: THE PATH TO RATIONAL DOMAIN NAME POLICY

There is a compelling case for auctioning new gTLDs as the mechanism for expanding the root. In this Part, we explore the process by which gTLD auctions might be adopted by ICANN or by some other agent or process. We end with a recapitulation of our major themes.

A. Auctions and the ICANN Process

Is our proposal practical, given ICANN’s structure and history? Could ICANN adopt an auction plan, even if the ICANN Board of Directors were to be convinced that auctions best serve the public interest? Some may argue that the answer to these questions is “no.” ICANN’s unwieldy governance structure, it might be argued, will not permit a substantial shift in DNS policy.

We have already given some of the reasons for skepticism. Even if we focus exclusively on ICANN’s board of directors, there are reasons to doubt that a consensus will emerge on what constitutes the public interest with respect to the operation of the root. As we have already discussed, ICANN’s board has a complex structure, as does the nominating committee (NOMCOM) that selects a majority of board members. The formal structure of the board interacts with ICANN’s tradition of bottom-up consensus-based decision making. Many of the parties with an economic stake in domain name policy are represented directly or indirectly on the ICANN board and in the various supporting organizations that are the locus of bottom-up consensus-based decision making. The result is predictable. Any change in DNS policy that might adversely affect the entrenched interest groups can be opposed by a variety of delaying or blocking tactics. It would be surprising, given ICANN’s structure, if the ICANN board were able to overcome such resistance in every case, and even more surprising if the board were able to reach speedy decisions that adversely affected entrenched players when the negative economic impact of the decision was substantial. gTLD auctions may be such a case.

Moreover, the ICANN board has institutional interests of its own. Board members are unpaid volunteers. The ICANN board does not delegate substantial policy making authority to the CEO. ICANN does not have a large professional staff. Indeed,
compared to the FCC, which has a regulatory task of similar economic importance, ICANN’s staff is miniscule. For example, ICANN does not have even a single economist on its staff, much less a Chief Economist with a large staff of highly qualified candidates with PhDs. Given this bare bones structure, it would not be surprising if ICANN became dependant on its supporting organizations for information and analysis. But the supporting organizations are in even worse condition than ICANN itself. None of the supporting organizations have any staff at all, much less full-time economists and lawyers. Given ICANN’s organizational structure and lack of internal resources, ICANN’s board has an institutional interest in avoiding decisions that will create conflict or controversy among the most powerful stakeholders. The lack of independent staff and resources means that controversial decisions would impose personal costs on board members—as they are personally lobbied and are forced to devote even more time to an already time-consuming process.

Despite these reasons for pessimism, we believe that an auction proposal could be attractive to ICANN. First, there are good reasons to believe that members of the ICANN board have good intentions—that they attempt (given the constraints they face) to act in the public interest. One advantage of an auction play is that it is relatively easy for the board to confirm for itself the arguments advanced in this paper. If the ICANN board consults economists who are acknowledged as experts in auction theory and design or communications policy, they will soon discover that the case for auctions and against ad hoc public interest hearings is overwhelming, both in theory and in terms of empirical confirmation. If the ICANN board consults with experts and policymakers at the FCC, they will hear a similar story. Although there are horror stories about badly designed auctions, the ICANN board can verify that a well-designed auction is far superior to the methods of root name space allocation utilized by ICANN to date. The fact that the case for auctions is not controversial will make it easier for ICANN’s board to resist lobbying pressure.

In addition, auctions have institutional advantages for ICANN. Auction revenues could assist in putting ICANN on a sound fiscal basis—of necessity, primary concern for board members and staff. Moreover, auction revenues would allow ICANN to hire sorely needed technical staff—particularly a Chief Economist as well as staff with expertise in other areas (such as linguistics and anthropology) relevant to DNS policy.

B. Alternatives to ICANN

If ICANN is unable to adopt an auction plan, are there alternative institutional mechanisms? The experience of the FCC suggests that there are. DOC could require auctions as a condition for renewing the MOU. Congress could mandate auctions by statute. We believe that these are inferior policy choices. The Internet is a global system of cooperation, and not the property of the United States government. A mandate of auctions by the United States might well be viewed as less legitimate by other institutions, particularly other nations and the ccTLD operators. For this reason, we believe that the best path to auctions is through ICANN and not through federal mandates. However, as new proposals for name space expansion appear, ICANN must either take them seriously or run the risk that someone else will.
C. A Recapitulation of the Argument

This article has argued for expansion of the generic top level domain name space using a specific market allocation mechanism – auctions. In this conclusion we briefly recapitulate the several steps that support gTLD auctions.

First, the domain name space is scarce in economic terms. There are two dimensions to this scarcity. At one level, scarcity is due to the Internet's architecture, the hierarchical addressing system embodied in the Domain Name System (DNS). Theoretically, there could be an infinite number of top-level domain names, but one would have to revamp the current DNS and re-engineer the Internet to make it happen.

The other level of scarcity is "artificial." It results from regulatory choices by ICANN that have persistently limited the number of gTLDs to levels far below those warranted by any technical requirements. These limits create monopoly power in stakeholders who, by virtue of ICANN's structure, reinforce the ICANN’s resistance to name space expansion. Artificial and unnecessary scarcity has profound consequences: it impedes economic growth and promotes rent-seeking by incumbents.

Second, domain names, both at the top and lower levels, are classic private goods as economists use that term to analyze allocation policies. They are both rivalrous and excludable. Preference for market allocation of private goods is supported both by economic theory and by experience in comparable telecommunications industries. As a matter of theory, regulatory decisions are inferior to market choices in determining the highest and best economic and social uses for the goods. Moreover, in the absence of transaction costs, regulatory decisions will have little impact on who ultimately gets to use the good, only on who reaps the windfall of below-market pricing.

The domain name space is functionally similar in salient respects to the spectrum and telephone numbering space. As an empirical matter, regulatory allocation of those scarce resources has been sub-optimal, and has done little to achieve the underlying goal and rationale of regulation – promotion of the public interest.

Third, experience at the FCC has demonstrated the economic and social utility of scarce resource allocation using auctions. Even telephone numbers will soon be auctioned off, rather than dispensed for free. Auctions reduce administrative costs, replace arbitrary decision making with predictable criteria, disentangle the web of agency capture, and produce revenue for the public fisc or public interest programs. If properly constructed, auctions can approach allocative optimality from nearly all perspectives.

Fourth, specific auction design and implementation should proceed cautiously. ICANN should consult economists and auction specialists to construct and hold a test round. We have proposed, as a framework, a fixed-length ascending bid auction for 50 gTLDs. We think this number is technically feasible; economically supportable; and unlikely to materially disrupt existing expectations. The number might be higher or lower, and the auction design may be different, but the fundamental policy choice to hold an auction is, we believe, unassailable.

Fifth, alternative mechanisms, such as taxonomy or first occupation are either inefficient or counter-productive. A static root or lethargic expansion merely entrenches vested interests and perpetuate economic inefficiencies. The current "beauty contest" system is corrupt and disserves the public interest. It is anti-democratic; has solidified
American hegemony over the Internet; and violates ICANN's federal mandate to promote competition in name services.

Sixth, auction revenue will enable ICANN to pursue its contractual and bestowed mission – to maintain a stable root and domain name system. Surplus revenue, if any, will enable ICANN to accomplish public interest projects related to its jurisdiction – such as upgrading IP Addressing and inclusion of non-English characters in the DNS. gTLD expansion will also remove most of the monopoly pricing in name services. That, by itself, is an excellent public interest outcome.

In sum, the case for gTLD auctions is compelling. ICANN has a duty to make domain name policy in the public interest. An obvious first step for the ICANN board would be to begin a process to seek independent advice from reputable economists. Once the ICANN board is satisfied that the case for gTLD auctions is sound, the next step is to begin a process of auction design. In the meantime, the root lies fallow. Already years have passed without significant expansion of the root name-space; undoubtedly, the cost of delay has already been substantial. ICANN’s laudable commitment to a bottom-up, consensus based policy process should not be allowed to trump its most fundamental responsibility—to manage assigned names and numbers in the public interest. In the case of expansion of the root name space, that responsibility demands that ICANN proceed with deliberate speed.