

Prepared Statement of
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before the
Senate Commerce, Science and Transportation Committee
Communications Subcommittee

"ICANN Governance"

February 14, 2001

Mr. Chairman and members of the Subcommittee, my name is Michael Fromkin. I would like to thank the Subcommittee for inviting me to appear today at this hearing on ICANN governance. I commend the Subcommittee for its wisdom and foresight in recognizing the importance of this issue.

I believe it is useful to separate this complex issue into three parts: (1) ICANN's mission or, if you will, ICANN's "jurisdiction"; (2) ICANN's internal organization; (3) The extent to which ICANN is subject to oversight by the Commerce Department, the U.S. Congress, or any other outside forces.

These three issues are intertwined. The nature and extent of ICANN's powers over the Internet and over Internet users that determines the type of internal governance structures which are appropriate for it. Similarly, the nature and quality of both ICANN's powers and its internal representativeness, not to mention checks and balances, determines the extent to which it needs to be subjected to searching external oversight. In particular, it is appropriate for this committee to enquire into the nature of the workings of the relationship between the Department of Commerce and ICANN.

Summary of Testimony

ICANN's go-very-slow policy on new gTLDs had no technical basis. Why then would ICANN adopt such a policy? The reason is that ICANN's policies are a product of an internal deliberative process that under-weighs the interests of the public at large and in so doing tends towards anti-competitive, or competitively weak, outcomes skewed by special interests

ICANN routinely claims to be either a technical standards body or a technical coordination body. If this were correct, then it might be proper for the Department of Commerce to defer to ICANN's presumed technical expertise and rely on ICANN's standards or allocation decisions without undertaking independent Administrative Procedure Act (APA) -compliant processes of its own. When, however, ICANN acts as policy-making rather than a standard-making body, then due to ICANN's unrepresentative nature its decisions do not carry any presumption of regularity or correctness and the US Government cannot rubber-stamp its decisions without additional independent fact-finding and deliberation.

We would all be better off if ICANN could confine itself to true standards issues, or to true technical coordination. If ICANN cannot, then ICANN needs to be subjected to constant scrutiny.

Terminological note: A “registrar” is a firm that contracts with clients (“registrants”) to collect their information and payment in order to make a definitive and unique entry into a database containing all domain names registered in a top-level domain (TLD). This database is maintained by a “registry.” Top-level domains are sometimes grouped into “generic TLDs” (gTLDs), which are currently three- or four-letter transnational domains, and “country code TLDs” (ccTLDs) which are currently two-letter TLDs. The "root" is the master file containing the authoritative list of which TLDs exist, and where to find the authoritative registries that have the data for those TLDs. Registrants typically register second-level domains (e.g. myname.com), but sometimes are limited to third-level domains (e.g. myname.genericword.com).

I. ICANN’s Mission

ICANN's processes little resemble either standard-making or technical coordination. To date, ICANN's "standard making" has produced no standards. ICANN's "technical coordination" has been neither technical nor has it coordinated anything. Rather, in its initial foray into the creation of new gTLDs, ICANN has acted like a very badly organized administrative agency. Instead of engaging in standards work, ICANN is instead engaged in recapitulating the procedural early errors of federal administrative agencies such as the Federal Communications Commission (FCC)..

What real standard-making would look like

A standard-based (or, at least, standardized) approach to gTLD creation would required ICANN to craft a pre-announced, open, neutral, and objective standard of competence rather than to pick and choose among the applicants on the basis of the ICANN Board’s vague and inconsistent ideas of aesthetic merit, market appeal, capitalization, or experience. All applicants meeting that standard would be accepted, unless there were so many that the number threatened to destabilize the Internet (as noted below, if there is such a number, it is very large). ICANN might also put in reasonable limits on the number of TLDs per applicant, and on sequencing, in order to keep all of them going online the same day, week, or month.

Under a standards-based approach ICANN would have tried to answer these questions in the abstract, before trying to hold comparative hearings in which it attempted to decide to which of specific applicants it should allocate a new gTLD registry:

- What is the minimum standard of competence (technical, financial, whatever) to be found qualified to run a registry for a given type of TLD?
- What open, neutral, and objective means should be used to decide among competing applicants when two or more would-be registries seek the same TLD string?
- What are the technical limits on the number of new TLDs that can reasonably be created in an orderly fashion per year?

- What open, neutral, and objective means should be used to decide among competing applicants, or to sequence applicants, if the number of applicants meeting the qualification threshold exceeds the number of gTLDs being created in a given year?

Today, reasonable people could no doubt disagree on the fine details of some of these questions, and perhaps on almost every aspect of others. Resolving these issues in the abstract would not necessarily be easy. It would, however, be valuable and appropriate work for an Internet standards body, and would greatly enhance competition in all the affected markets.

Once armed with a set of standards and definitions, ICANN or any other allocation body, would be on strong ground to reject technically incompetent or otherwise abusive applications for new gTLDs, such as those seeking an unreasonably large number of TLDs. A thoughtful answer would inevitably resolve a number of difficult questions, not least the terms on which a marriage might be made between the Department of Commerce's "legacy" root and the so-called "alternate" roots.

What technical coordination would look like

An alternate approach to gTLD creation, one that would most certainly enhance competition, would take its inspiration from the fundamental design of the Internet itself—and from major league sports. The Internet was designed to continue to function even if large parts of the network sustained damage. Internet network design avoids, whenever possible, the creation of single points of failure. When it comes to policy, however, ICANN is currently a single point of failure for the network. A solution to this problem would be to share out part of ICANN's current functions to a variety of institutions.

In this scenario, ICANN would become a true technical coordination body, coordinating the activities of a large number of gTLD policy partners. ICANN's functions would be: (1) to keep a master list of TLDs, (2) to ensure that there were no 'name collisions'—two registries attempting to manage the same TLD string; (3) to fix an annual quota of new gTLDs; (4) to run an annual gTLD draft; (5) to coordinate the gTLD creation process so that new gTLDs came on stream in an orderly fashion instead of all at once.

Each of ICANN's policy partners would be assigned one or more draft choices, and then ICANN would randomly (or, perhaps, otherwise) assign each one their draft picks. As each policy partner's turn came up, it would be entitled to select a registry—imposing whatever conditions it wished—to manage any gTLD that had not yet been claimed on ICANN's master list. In keeping with the transnational and public/private nature of the Internet, ICANN's policy partners could be a highly diverse mix of international, national, and private "civil society" bodies.

While I think this alternate solution would best achieve the ends of internationalization, competition, and diversity, it might well require legislation since it is unclear if the Department of Commerce has the will (or the authority) to implement such a plan, and we have seen no sign that ICANN is about to divest itself of any policy authority unless forced to do so.

What ICANN actually did: select an arbitrarily small number of gTLDs based on arbitrary appraisals of aesthetic merit, market appeal, capitalization, and experience.

Rather than adopt either a standards or a technical coordination approach, ICANN instead adopted an arbitrary approach. First it set an arbitrarily low ceiling on the number of TLDs, then it allocated most but not all of that quota based on its arbitrary appraisals of the applicants aesthetic merit, market appeal, capitalization, and experience.

ICANN's decision to impose an arbitrary limit on the number of new gTLDs

The closest thing to technical standards work that ICANN has done to date was to adopt an artificially low limit on the number of gTLDs it would recommend the Commerce Department create – under the guise of a so-called "proof of concept". The grounds on which ICANN based this arbitrarily low limit on the number of new gTLDs demonstrate as clearly as anything else that ICANN is not making technical decisions but instead making policy choices on the basis a wholly inadequate an unrepresentative structure.

ICANN has never claimed that the technical stability of the DNS would in any way be threatened by the introduction of a very large number of new gTLDs. Indeed, it could not easily make this claim, since all the technical evidence is to the contrary. Rather, the dangers that ICANN seems concerned about are social – potential consumer confusion, and a potential 'land rush' mentality due to the enormous pent-up demand. (In my opinion, however, ICANN has selected a policy that maximizes the risk of a 'land rush'. Panic buying happens when consumers fear a shortage. Here, ICANN is proposing the creation of a very small number of gTLDs, with no assurances as to when if ever the next batch will be created. This gets it exactly backwards: the way to avoid a land rush would be to have a very predictable path for new gTLDs so that everyone understands that there's no need to panic since plenty of names will always be available.)

I am not an expert on Internet engineering. However, my understanding is that while experts do not agree on precisely how many gTLDs could be created without adverse consequences to DNS response time, there appears to be a technical consensus that we are nowhere near even the lowest possible limit. ICANN At-Large Director Karl Auerbach, himself a technical expert, has suggested that the smallest technically-mandated upper level for the number of gTLDs might be as high as a million.¹ Persons with long experience in DNS matters, including BIND author Paul Vixie, apparently agree.² Others have performed tests loading the entire .com file as if it were a root file, and found that it works. In principle, this is not surprising, as there is no technical difference between the root file containing the information about TLDs and a second-level domain file. Given that there are currently about sixteen million registrations in .com, if this argument is right, then the maximum number of TLDs may be *very* high.³ Some experts worry, however, that a very large number of new TLDs, such as a million, might affect DNS response time.⁴ If so, that still means that with fewer than 300 TLDs in operation today (gTLDs + ccTLDs), we can afford to create tens of thousands, and probably hundreds of thousands, more.

It is an article of faith among Internet entrepreneurs that possession of a good domain name is a necessity for an Internet startup. Many traditional firms also consider the acquisition of a memorable or short domain name to be of strategic importance. Recently, for Internet startups, possession of a "good" name was seen as a major asset – reputedly enough in some cases to secure venture financing.

For some time now, however, it has also been an article of faith in the Internet community that "all the good names are taken" Recently it has seemed as if simply *all* the names that were a single word were taken. This apparent shortage, especially in .com, has driven firms seeking catchy names into the aftermarket. There does appear to be a reasonably large stock of names in the existing gTLDs being held by domain name brokers for resale in the aftermarket. Prices are very variable. Although few firms paid millions of dollars like the purchasers of business.com, and loans.com, it appears that at least until the .com bubble burst, the shortage of attractive names in .com, and the resulting need to purchase them at high markups in the aftermarket created what amounted to a substantial "startup tax" on new businesses.

ICANN justifies its very tentative initial foray into gTLD creation as a "proof of concept" but it has not disclosed the concept that it believes it is trying to prove, nor described how one tells if the test is successful, nor even when one might expect ICANN to do the evaluation. The "concept" cannot be gTLD creation itself: There is no rocket science to the mechanics of creating a new gTLD. From a technical perspective, creating a new gTLD is exactly like creating a new ccTLD, and creating new ccTLDs is quite routine. Indeed, .ps, a TLD for Palestine, was created less than a year ago with no noticeable effect on the Internet at all.⁵

In fairness, ICANN is not originally responsible for the gridlock in gTLD creation policy, which in fact long predates it. Indeed the Department of Commerce – which currently has the power to create new gTLDs – called ICANN into being because it wanted to find a politically feasible way to create new TLDs in the face of difficult political obstacles, not least a belief in the intellectual property rights holders community that new TLDs might add to the risk of customer confusion and trademark dilution.

This *political* fear, more than any mythical *technical* consideration requiring a "test" or "proof of concept", explains why ICANN imposed a needlessly low limit on the number of new gTLDs it would recommend the Department of Commerce create in this first round, and why ICANN has as yet not been able to consider when if ever it will contemplate future rounds of gTLD recommendations. It does not explain, however, why ICANN why ICANN persists in falsely claiming consensus for its artificially low number of TLDs, nor why went about selecting its seven finalists in the manner it did. Indeed, as described below, ICANN's gTLD selection procedures were characterized by substantial failures.

Nevertheless, it might seem that despite any procedural irregularities, ICANN's recommendation that the Department of Commerce create a small number of new gTLDs can only be good for competition as it will increase supply and thus drive down prices. And indeed, supply will increase. Unfortunately, of the new gTLDs, only .biz and maybe .info are likely to be of

attractive to the majority of startups and other Internet newcomers. Because there are only two such domains, and because there is no easily foreseeable date at which additional gTLDs might become available, there is a substantial risk of a speculative frenzy in which domain name brokers, cybersquatters, and amateur arbitrageurs all seek to register the catchy names that have not already been snapped up by trademark holders who took advantage of their pre-registration period. I am concerned that the faction which controls ICANN will use this very predictable speculative frenzy as 'evidence' that new gTLDs are a bad idea, or that the number must be kept down in the future.

The surest way to drive down and keep down the price of domain names, thus eliminating the "startup tax" and enhancing the ability of new firms to enter new markets and incidentally greatly reducing, perhaps even almost eliminating, cybersquatting, is to create healthy expectations. As soon as participants in the market understand that a steady supply of new domain names in attractive gTLDs will continue to become available on a predictable schedule, the bottom will fall out of the after-market, and the incentive (albeit not the opportunities) for cybersquatting will be greatly reduced, thus helping e-commerce by making attractive names available on reasonable terms to a much greater number, and wider variety, of persons and firms.

Selection of gTLDs

In ICANN's recent gTLD process, ICANN acted not as a standards or coordination body, but as if it were allocating scarce broadcast spectrum in some kind of comparative hearing process. ICANN created no standard. It 'coordinated' no projects with running code being deployed by outside parties. Rather, ICANN acted like a foundation grant committee, trying to pick 'winners.' In practice, ICANN's exercise of its gatekeeper committee role contributes to the artificial shortage of gTLDs. Worse, the selection processes ICANN employed were amateurish and arbitrary.

Although all applicants were charged the same non-refundable \$50,000 fee, a sum that immediately skewed the process towards commercial uses and away from non-profit or experimental uses, it appears not all applicants received equal treatment. During the Los Angeles ICANN Board Meeting, it transpired that the staff had not subjected all the proposals to the same level of analysis. Thus, when Board members sought more detailed information about proposals that interested them, but which the staff had relegated to the second tier, that information sometimes did not exist, although it existed for the staff's preferred picks.

ICANN then attempted to hold a one-day comparative hearing between more than 40 applicants, each of whom had complex applications that referenced multiple possible gTLDs. During this process, each applicant was given three minutes to speak.

Both before and during the one-day Board meeting, both the staff and the Board seemed excessively concerned with avoiding risk. Although true competition in a fully competitive market requires that participants be allowed to fail if they deserve to do so, there are reasonable arguments as to why it makes sense to have a body like ICANN require potential registry operators to meet some minimum standard of technical competence. One can even make a case for requiring a showing of some financial resources, and for requiring the advance preparation of basic registry

policy documents spelling out who will be allowed to register names and under what terms. Perhaps there are other neutral criteria that should also be required and assessed. This is a far cry from ICANN's apparent tendency to tend to prefer established institutions and big corporations, and to downplay the value of experience in running code. If in 1985 the Internet itself had been a proposal placed before a committee that behaved as ICANN did in 2000, the Internet would have been rejected as too risky. Risk aversion of this type is antithetical to entrepreneurship and competition.

Worst of all, ICANN applied its criteria arbitrarily, even making them up as it went along. The striking arbitrariness of the ICANN decision-making process is illustrated by the rejection of the ".union" proposal based on unfounded last-minute speculation by an ICANN board member that the international labor organizations proposing the gTLD were somehow undemocratic. (That this same Board member was at the time recused from the process only adds to the strangeness.) The procedures ICANN designed gave the applicants no opportunity to reply to unfounded accusations. ICANN then rejected ".iii" because someone on the Board was concerned that the name was difficult to pronounce, even though the ability to pronounce a proposed gTLD had never before been mentioned as a decision criterion. I am not in a position to vouch for the accuracy of each of the claims of error made by the firms that filed reconsideration requests after the Los Angeles meeting (available at <http://www.icann.org/committees/reconsideration/index.html>) but as a group these make for very sobering reading.

If ICANN were to limit itself to either standard making or technical coordination it would have approached its mission very differently from the arbitrary and amateurish procedures it used. It is critical to note that the relevant standards of comparison for ICANN's decision making are not the private sector. As a non-profit standards body contracting with the US government, ICANN should either be held to standards of openness, professionalism, and neutrality appropriate for standard-making or, if making political and social choices, be treated as a state actor and expected to act in conformity with fundamental norms of due process. Suggestions heard from some victorious gTLD applicants that ICANN's processes compare favorably with those used for procurement in the private sector are both erroneous and irrelevant. ICANN is not engaged in procurement. It is not "buying" anything. And ICANN paid almost no attention to the prices proposed by would-be registries.

II. Internal Organization

ICANN's go-very-slow policy on new gTLDs had no technical basis. Why then would ICANN adopt such a policy? The reason is that it is a product of an internal deliberative process that under-weighs the interests of the public at large and in so doing tends towards anti-competitive, or competitively weak, outcomes skewed by special interests.

The source of this predisposition is the distribution of decision-making authority on the ICANN Board, and in ICANN's subsidiary institutions, which have been manipulated to neuter the public voice, and the role of individuals, non-profits, and civil society groups. Originally, half of

ICANN's governing Board would have been elected by at-large members of ICANN. Instead, ICANN has worked at every turn to prevent this.

In July, 1999, ICANN Chair Esther Dyson told the House Commerce Committee's Subcommittee on Oversight and Investigation that ICANN's "highest priority" was to elect nine at-large Board members,⁶ exactly as ICANN had committed to do as an original condition of being approved by the Department of Commerce. Instead, ICANN reneged on its commitment to the United States government, and to the public, that half its Board would be elected by an at-large membership. Thus, today:

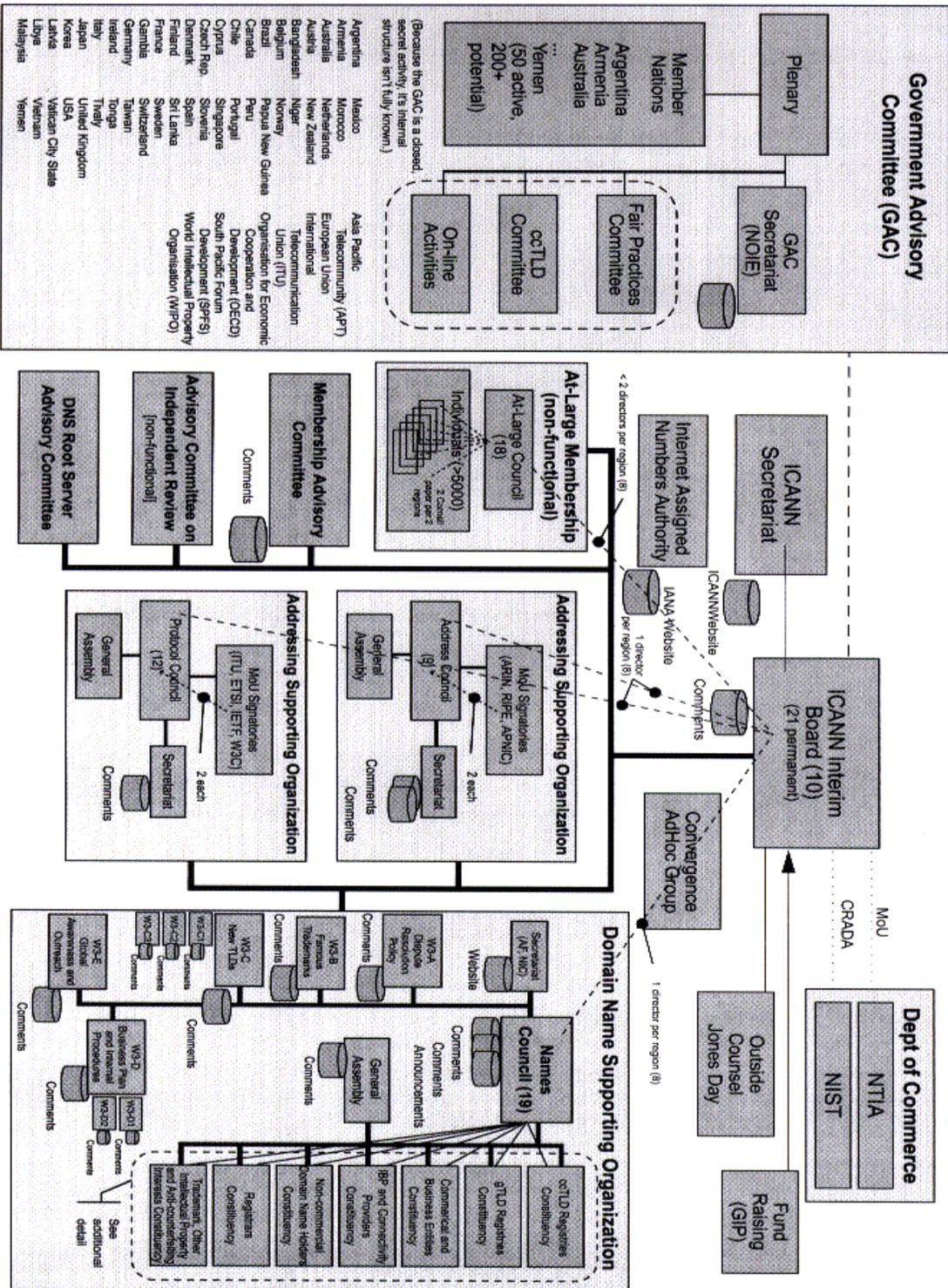
- Instead of half (nine) of the Board members being elected at large, as promised to NTIA and to Congress, ICANN amended its by-laws to allow only five members to be elected at large;
- Instead of all the self-appointed nine original directors leaving office as they promised Congress and the public they would do, four remain in office;
- Instead of allowing the five elected at large members to participate in the selection of the new gTLDs, ICANN amended its by-laws to seat them at the close of a meeting, instead of at the start (the process used for all previous new directors). Then ICANN rushed its processes so that it could make the final decisions minutes before the new directors took office.
- In a move that risks further neutering the five elected at-large members, ICANN announced that their jobs would all be abolished at the end of their two-year terms, unless a majority of the full Board voted (after a "clean sheet study") to re-establish elected at-large Board seats. [Note that under the current by-laws, the un-elected directors apparently get to keep their jobs indefinitely.]
- The internal institutions that ICANN created to take the lead in domain name policy – the seven constituencies in the "Domain Name Supporting Organization" (DNSO) – were designed from the start to exclude individuals from membership. The very engineers who built the Internet are not represented in their personal capacities – only if their employers choose to send them.
- All non-commercial groups, including all universities, all consumer groups, all political groups throughout the world are shoehorned a single DNSO constituency. They are, in the main, ineligible for full voting membership of any of the other six constituencies.; Meanwhile, many businesses such as Internet first-movers and others who have an interest in reducing on-line competition for established firms are eligible to be in two, three, or even four of the seven constituencies, thus allowing them multiple votes—and a certain majority.

The interest groups that acquired a voting majority in those institutions have shown relatively little interest in the rights and needs of small businesses, non-commercial entities, or individuals. They have shown considerably more interest in securing special protections for trademarks, above and beyond what is provided by statute, than they have in maximizing the liberty-enhancing and competitive potential of the Internet.

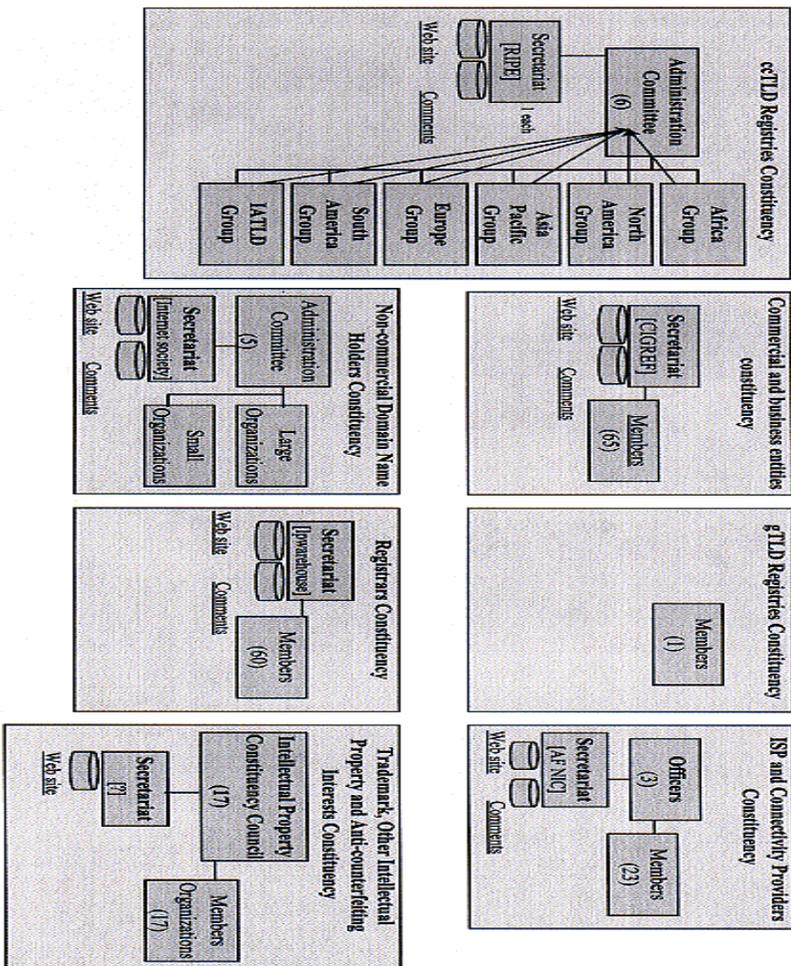
ICANN is a highly complex organization (see attached charts, prepared by Tony Rutkowski). It is simply impossible for anyone to keep track of what is happening in all the different pieces,

The ICANN-GAC Organization

V1.1 17 Sep 95



DNSO Constituencies (Detail)



except an organization capable of deploying a fleet of lawyers. Similarly, because ICANN sees its mission as global, it meets four times a year on four different continents. Next month's meeting, for example, is in Australia. The result of this laudable attempt at internationalization is that only interests wealthy enough to attend all these meetings – with several representatives – can achieve the continuity of participation required to influence ICANN's decisions in any sort of a consistent manner. The result tends to be a 'consensus' of those with the necessary expense accounts.

III. External Checks on ICANN

I do not deny that one can identify potentially serious social issues that might be caused as side effects of the creation of new gTLDs. I do submit that ICANN has no competence to deal with them, and that its actions have to date in creating special domain name registration rights for trademark holders, well in excess of the rights granted to them by Congress, have been anti-competitive, unfair, and counterproductive.

ICANN's mandate and its competence is, at most, for technical matters. Social policy issues such as the intellectual property consequences of new gTLDs, the number of days a person should have to respond to an arbitration over a domain name, or issues of content management, should not be decided by engineers or by the people who happen to have seized control of ICANN. Rather, they should be decided via the means we traditionally use for making social policy choices – markets and representative democracy.

Since ICANN's decisions as to its gTLD recommendations were not based on purely technical criteria, as a formal matter ICANN is making social policy choices, not just acting as a standards body. It is therefore right that ICANN's decisions are subject to external checks. Indeed, as I argue in my article *Wrong Turn in Cyberspace: Using ICANN to Route Around the APA and the Constitution*, 50 DUKE L.J. 17 (2000), available online <http://www.law.miami.edu/~froomkin/articles/icann.pdf>, as a matter of law ICANN as currently constituted amounts to a state actor, and thus is subject to the same Due Process constraints as apply to any federal agency. Accordingly, its arbitrary and capricious decisions violate both the APA and the Due Process Clause of the Constitution.

ICANN and the U.S. Department of Commerce dispute this characterization. They prefer to rely on form over reality, and insist that ICANN is legally private despite the fact that ICANN derives all of its authority and revenue from Commerce's loan to ICANN of authority over the root. It follows, however, that if this characterization of ICANN as a purely private body is correct, then there are strict limits on the extent to which the Department of Commerce can implement ICANN's recommendations without violating the Administrative Procedures Act, or the Constitution's Due Process clause.

Once ICANN makes its formal recommendations, the Department of Commerce will have to decide how to proceed. Rubber-stamping of ICANN's decisions by the Department of Commerce

would amount to adopting ICANN's arbitrary and capricious choices, since the U.S. government would essentially endorse both ICANN's practices and its conclusions.

The Department of Commerce has maintained that its relations with ICANN are not subject to the APA, or indeed to any legal constraint other than those relating to relations with a government contractor and/or a participant in a cooperative research agreement. But whatever the legal arguments, when contemplating decisions which will shape the very nature of the Internet naming system, Commerce should proceed with deliberation, and act only on the basis of reliable information. The need for reliable information, proper public participation, and transparent and accountable decision-making is even stronger when Commerce contemplates making the sort of social policy choices - as opposed to mere technical standard-setting - embodied in creating new gTLDs and imposing conditions on their use. Basic requirements of fairness, due process, and the need to make reasonable decisions counsel in favor of notice, public access, the making of an official record, and deliberation.

There is no question but that if a federal agency had acted as the ICANN Board did, its decisions would not satisfy even cursory judicial review. In the circumstances, therefore, it would be unreasonable and a denial of due process for Commerce to rely on the outcome of such a flawed process without conducting its own review.

ICANN faces a choice: On one path it becomes a true standards body, or a true technical coordination body, and leaves the social policy choices to those – like Congress – who have the legitimacy to make them. On the other path, the one it currently seems to be following, it is a state actor. In that case, its actions to date have been far too arbitrary to survive judicial review.

NOTES

1. Posting of Karl Auerbach, karl@CaveBear.com, <http://www.dnso.org/wgroups/wg-c/Arc01/msg00195.html> .
2. E-mail from Paul Vixie, BIND 8 Primary Author, to Eric Brunner (Dec. 15, 1999) (“A million names under ‘.’ isn’t fundamentally harder to write code or operate computers for than are a million names under ‘COM.’”), <http://www.dnso.org/wgroups/wg-c/Arc01/msg00203.html> .
3. See *Quickstats*, at <http://www.dotcom.com/facts/quickstats.html> (reporting twenty million registrations, of which 80% are in .com).
4. See, e.g., E-mail from Paul V. Mockapetris, BIND Author, to Paul Vixie, BIND 8 Primary Author, & Eric Brunner (Dec. 15, 1999) (querying whether one million new TLDs would impose performance costs on DNS), <http://www.dnso.org/wgroups/wg-c/Arc01/msg00202.html> .
5. See *IANA Report on Request for Delegation of the .ps Top-Level Domain*, at <http://www.icann.org/general/ps-report-22mar00.htm> (Mar. 22, 2000).
6. Testimony of Esther Dyson, Chair, ICANN, before the House Commerce Committee, Subcommittee on Oversight and Investigations, July 22, 1999, <http://www.icann.org/dyson-testimony-22july99.htm> .

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EDUCATION

J.D., Yale Law School, 1987.
Articles & Book Review Editor, *Yale Law Journal*, 1986 - 1987.
Articles Editor, *Yale Journal of International Law*, 1985 - 1986.
M.Phil, History, Cambridge University, England, 1984.
B.A., *summa cum laude*, Yale College, New Haven, CT., 1982.
Double major in Economics and History.

HONORS

John Anson Kitteredge Educational Trust Grantee, 1990.
Thirkill Travel Grant, Clare College, 1984.
Mellon Fellowship (tuition and all expenses), 1982-84.
Phi Beta Kappa, Yale College, 1982.
Distinction in History, Yale College, 1982.
Presidential Scholar, 1978.

LEGAL EXPERIENCE

Tenure & Promotion to Professor, 1998.
Associate Professor, University of Miami School of Law, 1992 - 1998.
Associate, Wilmer, Cutler & Pickering, London office, 1989 - 1992.
Admitted to the District of Columbia Bar, Nov. 13, 1989.
Law Clerk, Judge Stephen F. Williams, United States Court of Appeals, D.C.
Circuit, 1988 - 1989.
Admitted to the New York Bar, Jan. 26, 1988.
Law Clerk, Chief Judge John F. Grady, United States District Court, Northern
District of Illinois 1987 - 1988.
Summer Associate, Shea & Gardner, Washington, D.C., 1987.
Summer Associate, Kramer, Levin, Nessen, Kamin & Frankel, N.Y, N.Y., 1986.
Intern, Environmental Defense Fund, Berkeley, CA, Summer 1985.

OFFICES AND MEMBERSHIPS

Current Offices

Founding Director, Disputes.org, 1999-
Non-executive director, Out.Com. 1999-
Member, International Chamber of Commerce, Ad hoc Task Force on
Jurisdiction and Applicable Law in Electronic Commerce, 1999-
Member, ACM Committee on Law and Computing Technology, 1999-
Editorial Board, *Information, Communication & Society*, 1997-
Overseas Correspondent Editor, *Amicus Curia*, Institute of Advanced Studies
(London, England), 1997-

Advisory Boards

ZeroKnowledge.com, 2000-
Scientific Committee, Net Jus Project (U. Bologna, Italy), 1999-
PrivacyExchange, 1997-
Editorial Board, *Lex Electronica (Cybernews)*, 1997-
Centro de Investigaciones en Information Technology (CENIT), Buenos Aires,
Argentina, 1997-
BNA Electronic Information Policy & Law Report, 1996 -
Cyberlaw Abstracts, Legal Scholarship Network, 1996 -
Journal of Online Law, 1996 -

Memberships

Fellow, Cyberspace Law Institute, 1996 -
Association for Computing Machinery, 1995 -
Internet Society, 1995-
Member, Royal Institute of International Affairs (Chatham House), 1991 -
American Bar Association, 1988-

Past Offices and Memberships

Program Committee, Conference on Electronic Commerce 2000 (EC-00), 2000
University of Miami Committee on Faculty Ownership of Intellectual Property,
1999-2000
Member, Small Drafting Committee, ICANN UDP, 1999
Member, World Intellectual Property Organization (WIPO) Panel of Experts for
WIPO Internet Domain Name Process, 1998-99
University of Miami Faculty Senate Internet Committee, 1997-1999
Chair, American Association of Law Schools (AALS) Section on Law &
Computers, 1998
Planning Committee, Financial Cryptography '97 & '98 (Anguilla)
Planning Committee, Computers Freedom & Privacy, 1996 - 1998
Member, Information Security Committee, EDI and Information Technology
Division, Science and Technology Section, ABA, 1995.

COURSES TAUGHT

Administrative Law
Civil Procedure I
Constitutional Law I
Electronic Commerce (seminar)
Internet Law
Internet Governance (seminar)
Intellectual Property in the Digital Era (seminar)
Jurisprudence

PRIOR TEACHING EXPERIENCE

Research Assistant to Professor Jerry Mashaw, 1987. Helped design course in legislation.
Teaching Fellow 3, American Colonial History and American Revolution, Yale History Department, Professor Edmund S. Morgan, 1985 - 1986.
Graduate Affiliate of Saybrook College, Yale, 1984-86.

BUSINESS EXPERIENCE

Assistant to the President, Partners in Enterprise, Inc., Washington, D.C., summer 1981.
Research Assistant, Operations Evaluation Dept., World Bank, Washington, D.C., summer 1980.
Programmer/Clerk, Computing Activities Dept., World Bank, summer 1978, and 1979.

POLITICAL EXPERIENCE

Elected to Committee of 50, Democrats Abroad (UK), 1990 - 1992; 1983 - 1984.
Assistant, Morrison for Congress, New Haven, CT, 1984. Directed telephone canvass and phonebank.
Ward Nine Democratic Committee, New Haven, CT, 1984 - 1986.
Elected Asst. Sec., Clare College Middle Common Room, 1984.
Press Secretary, Lechner for Congress, Falls Church, VA. 1982. Supervised staff of three, and volunteers.
Press Secretary, Southern CT, National Unity Campaign for John Anderson, 1980. Co-founder of managing committee for CT.
Elected Vice-Chairman of Neighborhood Planning Council #2 (Washington, D.C.), 1977-1978.

JOURNALISM

Editor-in-Chief, *Yale Political Monthly*, 1981 - 1982.
Yale Stringer, Associated Press, 1981.
News Editor, Chief Copy Editor, Reporter, Columnist, *Yale Daily News*, 1978 - 1981.
Disk Jockey, WYBC - AM (New Haven), 1978.

LANGUAGES : English, French (fluent).

FORTHCOMING PUBLICATIONS

Habermas@discourse.net
The Virtual Law School
Private Rules for Public Problems (tent. title)
ICANN & Anti-Trust (tent. title)

PUBLICATIONS

Wrong Turn in Cyberspace: Using ICANN to Route around the APA and the Constitution, 50 DUKE L.J. 17 (2000), *available online* <http://www.law.miami.edu/~froomkin/articles/icann.pdf>

The Death of Privacy? 52 Stan. L. Rev. 1461 (2000), *available online* <http://www.law.miami.edu/~froomkin/articles/privacy-deathof.pdf>

Speculative Microeconomics for Tomorrow's Economy (with James Bradford De Long) (book chapter) INTERNET PUBLISHING AND BEYOND: THE ECONOMICS OF DIGITAL INFORMATION AND INTELLECTUAL PROPERTY 6 (Brian Kahin & Hal Varian, eds., 2000), *available online* <http://www.law.miami.edu/~froomkin/articles/spec.htm>

Semi-Private International Rulemaking: Lessons Learned from the WIPO Domain Name Process, book chapter in CHRISTOPHER T. MARSDEN (ED), REGULATING THE GLOBAL INFORMATION SOCIETY 211 (Routledge 2000), *available online* <http://www.law.miami.edu/~froomkin/articles/tprc99.pdf>,

Beating Microsoft at its Own Game (with J. Bradford DeLong), HARV. BUS. REV. 159 (Jan-Feb. 2000) (Review of CHARLES FERGUSON, HIGH STAKES, NO PRISONERS (1999)).

The Constitution and Encryption Regulation: Do We Need a "New Privacy"?, 3 N.Y.U. J. LEGIS & PUB. POL. 25 (1999-2000).

Of Governments and Governance, 14 BERKELEY LAW & TECHNOLOGY JOURNAL 617 (1999), *available online* <http://www.law.miami.edu/~froomkin/articles/governance.htm>

Legal Issues in Anonymity and Pseudonymity, AAAS SYMPOSIUM VOLUME, 15 THE INFORMATION SOCIETY 113 (1999).

A Commentary on WIPO's The Management of Internet Names And Addresses: Intellectual Property Issues, *available online* <http://personal.law.miami.edu/~amf/commentary.htm>

2B as Legal Software for Electronic Contracting -- Operating System or Trojan Horse?, 13 BERKELEY LAW & TECHNOLOGY JOURNAL 1023 (1999), *available online* <http://www.law.miami.edu/~froomkin/articles/2b.htm>

A Critique of WIPO's RFC3, <http://www.law.miami.edu/~amf> (1999)

Comment, *The Empire Strikes Back*, 73 Chi-Kent L. Rev. 1101 (1998)

Firme digitali e Autorità di Certificazione: La garanzie di validità degli atti elettronici, 23 INGENIUM (Italy) 12 (March, 1998) (tr. Giovanni Nasi)

CONTINUED

- Recent Developments in US Computer Law*, AMICUS CURIAE 27 (Jan., 1998), available online <http://www.law.miami.edu/~froomkin/articles/RENO.htm>.
- Digital Signatures Today* in FINANCIAL CRYPTOGRAPHY 287 (Rafael Hirschfeld ed., 1997) (Springer Lecture Notes in Computer Science vol. 1318), available online <http://www.law.miami.edu/~froomkin/articles/digsig1.pdf>.
- The Internet as a Source of Regulatory Arbitrage* (book chapter) in BORDERS IN CYBERSPACE (Brian Kahin and Charles Nesson, eds.) (MIT Press, 1997), available online <http://www.law.miami.edu/~froomkin/articles/arbitr.htm>.
- It Came From Planet Clipper*, 1996 U. CHI. L. FORUM 15 (The Law of Cyberspace symposium volume), available online http://www.law.miami.edu/~froomkin/articles/planet_clipper.htm.
- Flood Control on the Information Ocean: Living With Anonymity, Digital Cash, and Distributed Databases*, 15 U. PITT. J. L. & COM. 395 (1996) (Conference for the Second Century of the University of Pittsburgh School of Law Symposium volume), available online <http://www.law.miami.edu/~froomkin/articles/ocean.htm>.
- The Essential Role of Trusted Third Parties in Electronic Commerce*, 75 ORE. L. REV. 49 (1996) (The Law and Entrepreneurship Program: Innovation and the Information Environment, Symposium Volume), available online <http://www.law.miami.edu/~froomkin/articles/trusted.htm>. Reprinted in READINGS IN ELECTRONIC COMMERCE 119 (Ravi Kalakota & Andrew B. Whinston, eds. 1997).
- Reinventing the Government Corporation* 1995 ILL. L. REV. 543, available online <http://www.law.miami.edu/~froomkin/articles/reinvent.htm>.
- Anonymity and Its Enmities*, 1 JOURNAL OF ONLINE LAW art. 4 (1995), available online at <http://www.wm.edu/law/publications/jol/froomkin.html>.
- The Metaphor is the Key: Cryptography, the Clipper Chip and the Constitution*, 143 U. Penn. L. Rev. 709 (1995), available online <http://www.law.miami.edu/~froomkin/articles/clipper.htm>.
- The Constitutionality of Mandatory Key Escrow--A First Look* in BUILDING IN BIG BROTHER: THE CRYPTOGRAPHIC POLICY DEBATE 413 (Lance Hoffman, ed. 1995).
- The Imperial Presidency's New Vestments*, 88 NW. L. REV. 1346 (1994).
- Still Naked After All These Words*, 88 NW. L. REV. 1420 (1994).
- Politiké Finance V ČSFR* (with Steve Gordon), 12 PRÁVNÍK 1079 (1990).
- Climbing the Most Dangerous Branch: Legisprudence and the New Legal Process*, 66 TEX. L. REV. 1071 (1988) (book review).
- Note, In Defense of Administrative Agency Autonomy*, 96 YALE L.J. 787 (1987).

CONTINUED

CONFERENCE PRESENTATIONS (including forthcoming conferences)

5 th Circuit Judicial Conference, Moderator, Panel on Privacy, New Orleans, May, 2001.

Cardozo Law School, *Privatizing Trademark Law: The Case of Domain Names*, New York, NY, Feb. 12, 2001.

Universidad Complutense de Madrid, *Internet Governance: the ICANN Experiment (Or, Three Paradoxes in Search of a Paradigm)*, Facultad de Ciencias de la Información, Jan. 25, 2001.

University of Ottawa & Canadian Dept. of Justice, Globalization & the Evolution of Legal Systems, *Internet's International Regulation: Emergence and Enforcement*, Ottawa, Canada, October, 21, 2000

22nd International Conference on Privacy and Data Protection, *Privacy: New Challenges*, Venice, Sept. 29, 2000

Arthur Anderson, E-Commerce and V-C, Tilburg University, *Online Dispute Resolution*, The Netherlands, September 15, 2000

Tilburg University Faculty of Law, *Anonymity*, The Netherlands, September 14, 2000

Cornell Law School, Computer Policy & Law Seminar, Internet Governance Panel, Ithaca, N.Y., July 29, 2000 (by video conference).

United Nations, Economic and Social Committee (ECOSOC), Panel on Governance of The Global information Economy, New York, N.Y. June 28, 2000.

Law & Society Assoc., *Private Rules for Public Problems*, Panel on Annual Meeting, Miami Beach, FL May 28, 2000

Computers Freedom & Privacy 2000, Moderator, *Domain Names under ICANN: Technical Management or Policy Chokepoint*, Toronto Canada, April 5, 2000.

New York University Law School, Engelberg Center on Innovation Law and Policy, Colloquium on Innovation Policy, *Private Law for Public Problems*, March 16, 2000

Duke Annual Administrative Law Symposium, *Quangos In Cyberspace*, Durham, N.C., March 3, 2000.

Markle Foundation Experts Meeting, Panelist, New York, February 15, 2000

Www.Internetlaw.com III, *Goodbye Network Solutions, Hello ICANN; domain Name Registration and dispute Resolution under the New Regime*, FI Bar Business Law Section, Miami, FL, Feb. 11, 2000

Computers Freedom & Privacy 2000, Moderator, *Domain Names under ICANN: Technical Management or Policy Chokepoint*, Toronto Canada, April 5, 2000.

New York University Law School, Engelberg Center on Innovation Law and Policy, Colloquium on Innovation Policy, *Private Law for Public Problems*, March 16, 2000

Duke Annual Administrative Law Symposium, *Quangos In Cyberspace*, Durham, N.C., March 3, 2000.

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- Www.Internetlaw.com III, *Goodbye Network Solutions, Hello ICANN; domain Name Registration and dispute Resolution under the New Regime*, FI Bar Business Law Section, Miami, FL, Feb. 11, 2000
- Stanford Law School, Privacy Symposium, *The Death of Privacy?*, Palo Alto, CA., Feb. 7, 2000.
- Association of American Law Schools, Mini-Workshop on the Impact of Technology on Law and Legal Culture, Plenary Session: The Intersection of Law and Technology, *The Virtual Law School*, Washington, D.C. January 6, 2000
- Association of American Law Schools, Mini-Workshop on the Impact of Technology on Law and Legal Culture, Breakout Session: *Teaching Complexity*, Washington, D.C. January 6, 2000
- Berkman Center for Internet and Society, ICANN: Issues Ahead, *ICANN Uniform Dispute Resolution Policy*, Los Angeles, Oct. 31, 1999 (participation by webcast).
- 27th Annual Telecommunications Policy Research Conference, Global Governance Panel, *Semi-Private International Rulemaking: Lessons Learned from the WIPO Domain Name Process*, Alexandria, VA, September 27, 1999.
- Computer Professionals for Social Responsibility, Governing the Commons: The Future of Global Internet Administration, *The Root of All Evil?*, Alexandria, Va., Sept. 25, 1999.
- 56th *Curso Internacional de Criminologia: Mundialização, Criminalidade E Violência*, Technological Progress and the Destruction of Privacy, Miami, Sept. 8, 1999.
- Communications Regulation in the Global Information Society, *Making Fair Rules on the Internet*, University of Warwick, June 5, 1999 [by telephone & powerpoint].
- 1999 Annual Meeting Law & Society, *Fearfully Strong Encryption*, Chicago, IL, May 30, 1999.
- University of California, Davis, Faculty Seminar, Davis, CA, April 23, 1999
- CFP99, BOF: Trademarks, *Human Rights*, & *WIPO's RFC*, Washington, D.C., April 7-8, 1999
- Law Culture & the Humanities, *Habermas@discourse.org*, Winston-Salem, NC., March 12, 1999
- U.C. Berkeley Center for law & Technology, Haas School of Business, Symposium on Legal and Policy Framework for Global Electronic Commerce: A Progress Report on the Magaziner Report Two Years Out, *Of Governments and Governance*, Berkeley, March 6, 1999.
- 6th Annual Counsel Connect Seminar of Law of the Electronic Road (e-symposium), Nov, 1998.
- NYU Law School Journal of Legislation and Public Policy, Panelist, Symposium on Constitutional Ramifications of Encryption, N.Y., N.Y., Nov. 19, 1998.
- 26th Annual Telecom Policy Research Conference (TPRC), Moderator, Panel on The Impacts of Policies for Restricting Dissemination and Reception of Illegal Speech on the Internet, Alexandria, Oct 3-5, 1998.
- 1998 EPIC Cryptography and Privacy Conference, Panelist, *US Export Control Litigation: What Will the Courts Decide*, Washington, D.C., June 8, 1998.

CONTINUED

- IMPRIMATUR, Legal SIG Workshop: Privacy, Data Protection, Copyright and ECMSs, *Do Privacy Enhancing Technologies (PETs) Make a Difference?*, Instituut voor Informatierecht, Faculteit der Rechtsgeleerdheid, Amsterdam, Netherlands, May 23, 1998.
- Online OffShore, *Regulatory Arbitrage in Action*, Grand Cayman, Cayman Islands, Apr. 29, 1998
- U.C. Berkeley, *Symposium on UCC 2B, 2B as Legal Software for Electronic Contracting -- Operating System or Trojan Horse?*, Berkeley, CA, Apr. 24, 1998
- Florida Bar, 24th Annual Media-Law Conference, *Media-Law Approaches the Millennium*, Panelist on *Death of Defamation: How the Internet Will Destroy the Tort*, Miami, FL, March 21, 1998
- Chicago-Kent Law Review, *The Empire Strikes Back* (Comment), Chicago, March 13, 1998
- University of Miami School of Law, Third Annual International Tax Institute: Tax Aspects of Electronic Commerce, *The Internet: A Free Port in Every PC?*, Coral Gables, FL, Feb. 21, 1998.
- Computers, Freedom & Privacy 1998, Moderator, *Cryptography at the Fringes*, Austin, TX, Feb. 19, 1998.
- Association of American Law Schools, Section on Mass Communications, *Metaphors on the Internet*, San Francisco, Jan. 9, 1988
- American Association for the Advancement of Science (AAAS), National Science Foundation Seminar on Anonymity, Invited Paper on *Legal Issues in Anonymous Electronic Communication*, Nov. 21-23, 1997.
- General Services Administration, Invited Speaker, Round Table Discussion on *Identity Proofing by Certification Authority Services in support of Personal Electronic Notary Services (PENS)*, Washington, D.C., Nov. 4, 1997.
- Southeastern LawTech '97, *Document Security & Cyberspace*, Miami, FL, Oct. 28, 1997.
- Georgetown University Law Center, Chair, Panel on Privacy and Technology, *Privacy at the Crossroads: Law, Technology and Public Policy*, Washington, D.C., October 20, 1997.
- Hate Speech on the Internet, Panelist, University of Miami Law School Forum (with Anti-Defamation League), Coral Gables, FL, Oct. 8, 1997.
- 25th Annual Telecom Policy Research Conference (TPRC), Chairman, Panel on Privacy, Alexandria, Va. Sept. 29, 1997.
- The Law of the Electronic Road -- Commerce, Property, Privacy and Free Speech on the Information Highway (Lexis Counsel Connect, Online Seminar, Aug 11-Sept. 10, 1997.
- National Research Council, Computer Science and Telecommunications Board, Invited Guest, Workshop on Economic and Social Impacts of Computing and Communications, Berkeley, CA, June 30-July 1, 1997.
- U. Miami Continuing Legal Education, Speaker, *Ethics and the Internet*, Miami, FL, June 27, 1997.

CONTINUED

- Virtual Institute of Information, Panelist, *Secrecy or Social Contract: The Worldwide Cryptography Debate*, June 5, 1997, online at <http://www.ctr.columbia.edu/vii>
- First Annual Institute on Law in the Information Age: The Legal Internet, *Digital Signatures and Certificates*, Miami, FL, April 18, 1997.
- National Law Journal, Tele-conference on Legal Ethics in Cyberspace, Panelist, April 10, 1997.
- Organizational meeting of the Computer Science and Telecommunications Board (CSTB) of the National Research Council joint NRC/GAAC (German American Academic Council) project on "Local Values and the Global Internet," invited speaker, Washington D.C., April 2-3, 1997.
- Financial Markets Association, 6th Annual FMA Treasury and Capital Markets Compliance Seminar: Managing Compliance Risk in a Complex Banking Environment, Discussion Leader, March 19, 1997.
- Computers, Freedom & Privacy 1997, Judge CDA Moot Court; Moderator, Panel on *Social Consequences of Electronic Cash*, Burlingame, CA, March 15, 1997.
- Bricks & Bytes, *Thinking the Unthinkable About the Virtual Law School*, ABA Section of Legal Education, Washington University School of Law, St. Louis, March 7, 1997.
- Financial Cryptography '97, Conference Co-Chair; Panelist, *Digital Cash Issues*, Anguilla BVI, February 27, 1997.
- Datanet Security '97, *Electronic Cash is Hard to Regulate*, Miami, FL, Feb. 19, 1997.
- Harvard Information Infrastructure Project, *The Next Economy?*, Internet Publishing and Beyond: The Economics of Digital Information and Intellectual Property, Cambridge, MA, Jan 24, 1997.
- AALS, *Three Scary Scenarios for Cyberbanking*, Joint Session of Sections on Law & Computers, Privacy, and Banking, Washington, D.C., Jan. 5, 1997.
- AALS, *Self-Publishing on the World Wide Web: Tools, Tips, Tricks and Troubles*, Mini-Workshop on Computer Assisted Learning, Washington, D.C., Jan. 4, 1997
- American Society for Information Science, New England Chapter (NEASIS), Your Business, The World's Business? Privacy in the Electronic Environment, *The Essential Role of Trusted Third Parties in Electronic Commerce*, MIT, Boston, MA., Nov. 13, 1996.
- IC² Institute, University of Texas, International Conference on Electronic Markets, *Flood Control on the Information Ocean*, Nov. 7, 1996.
- Florida Department of State, Digital Signature Advisory Committee, Tallahassee, FL, *Issues in the Regulation of Certification Authorities*, October 15, 1996.
- Security and Freedom through Encryption (SAFE) Forum, July 1, 1996, Stanford University, *Panelist: Addressing Law Enforcement Concerns in a Constitutional Framework*
- UNCITRAL Advisory Group, Washington, D.C, May 19, 1996.
- NCAIR Conference on Electronic Dispute Resolution, Invited Guest, Washington, D.C., May 18-19, 1996.
- University of Texas, Communicating and Conducting Business On-Line, *Encryption and Anonymity*, Austin, Texas, May 17, 1996.

CONTINUED

Computers, Freedom & Privacy 1996, *Moot Court Problem Design Team*, Boston, Mass., March 1996.

Harvard Law School & Kennedy School, Harvard University, Information, National Policies, and International Infrastructure, *The Internet as a Source of Regulatory Arbitrage*, Cambridge, Mass., Jan 27, 1996.

Association of American Law Schools (AALS), Law and Computers Section, *Commerce on the Net: Digital Signatures and the Law*. San Antonio, TX, January 6, 1996.

Sun User's Group, Computers & the Law II, *Debate: Is the Internet a New Jurisdiction?*, Tampa, Fl. Nov. 12, 1995.

University of Chicago Legal Forum, The Law of Cyberspace, *It Came From Planet Clipper*, Chicago, Il, November 4, 1995.

University of Oregon, Eugene, Oregon, Internet Law Conference, November 3, 1995, *The Essential Role of Trusted Third Parties in Electronic Commerce*

Worldwide Electronic Commerce: Law, Policy, Security & Controls Conference, *When You Forget Your PIN or Die: Key Escrow in Secure Communication*, Oct. 18-20, Bethesda Md.

University of Pittsburgh, Conference for the Second Century of the University of Pittsburgh School of Law: The Adequacy of Current Legal Paradigms to Meet Future Challenges, Panel on The Regulation of Computing and Information Technology. *Flood Control on the Information Ocean: Living With Anonymity, Digital Cash, and Distributed Data Bases*, September 21, 1995.

17th IVR World Congress: Challenges to Law at the End of the 20th Century, A *Model of International Law & Society*, Bologna, Italy. June 17, 1995.

Electronic Privacy Information Center Conference, 1995 Privacy Seminar, Moderator, Panel on Privacy and Encryption, 1995. Washington, D.C., June 5, 1995.

Law and Society Association, Annual Meeting: Being, Doing, Remembering: The Practices and Promises of Sociological Research at the Close of the 20th Century, *The Internet as a Model of International Law and Society*, June 1-4, 1995.

Panelist, Cryptography Section, The Law of the Electronic Road – Commerce, Property, Privacy and Free Speech on the Information Highway (Lexis Counsel Connect, Online Seminar, May 30 - June 15, 1995.

University of Texas, Data Security, Encryption and Privacy, The Emerging Law of Computer Networks, An Introduction to Internet Anonymity, Austin, Texas, May 19, 1995.

George Washington University Engineering Dept. Colloquium lecture, *Clipper and the Law*, April 12, 1995.

Computers, Freedom & Privacy 1995, Panel Chairman, Can We Talk Long-Distance? Removing Impediments to Secure International Communications, Burlingame, California, March 31, 1995.

Columbia Institute for Tele-Information, Discussant, Constitutionality of Mandatory Key Escrow, Cryptography: Technology, Law and Economics, Columbia University, New York, N.Y., March 3, 1995.

CONTINUED

Unix & the Law, Sun User's Group, *Clipper and the Constitution* Austin, Texas, Nov. 16, 1994.

The Law of the Electronic Road -- Commerce, Property, Privacy and Free Speech on the Information Highway, Panelist, Cryptography Section, (Lexis Counsel Connect, On line Seminar, Nov. 8 - Dec. 9, 1994.

Conference on the New Czechoslovak Federal Constitution, Panelist, (Salzburg & Prague, April 1990).

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