INTERNET DOMAIN NAME: ALLOCATION POLICIES

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

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FOREWORD

This report was presented to the Working Party on Telecommunication and Information Services Policy (TISP) at its meetings in 1997 and was recommended to be made public by the Information, Computer and Communications Policy (ICCP) Committee in November 1997.

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MAIN POINTS

The Domain Name System (DNS) maps Internet addresses and is a necessary element enabling communication routing to function. While some may view the DNS as a narrow technical issue its implications for GII-GIS are extremely important. At present there is no consensus among the Internet community and all sectors of the Internet industry on how a governance structure will evolve for the DNS. There is increasing agreement that decisions over reforms to the DNS should involve all stakeholders and in particular industry. Accordingly the transition period must be inclusive particularly of the for-profit sector, since, (to a large extent) educational and research institutions would only be minimally affected by the proposed addition of new generic TLDs. To ensure public confidence, the transition process itself should be subject to standards of openness, transparency, and public accountability, and so should the rules which bind the final authority.

In addition the leading proposals for reform all call for competition to be introduced into domain name markets. The role of governments is to ensure that the administration and operation of the DNS is stable and that competition occurs in a fair and open manner. The DNS may also prove to be very important for governments in areas such as taxation compliance and protection of minors. The databases of DNS registries not only perform critical functions in signposting information highways, they are the only identification records available for governments, businesses, consumers and parents.

Several main issues are emerging which OECD governments could benefit from reviewing. In commenting on these issues the OECD notes that Member governments hold, as a fundamental GII-GIS principle, that they should exercise caution before implementing regulation on a new communication media such as the Internet. On the other hand, experience shows that monopolies are open to potential abuse and that some government action may be required to ensure that this and other public policy matters can be addressed. Despite their critical importance for electronic commerce the policies and procedures of many registries in the OECD area have had little input from business or consumer groups.

DNS Registrars currently have monopoly power based on their administration of national or generic top level domain names. In the transition to a commercial and competitive market for DNS the need to introduce safeguards, to ensure transparent and non discriminatory practices, is increasing. A first step could be to monitor prices via international benchmarks and for monopoly registrars to publish accounts. Over the longer term governments could benefit from supporting industry-led reforms seeking to introduce competition in generic and other top level domain markets. As in other communication markets which have been opened to competition it may be necessary to introduce safeguards to ensure DNS infrastructure, where it can be said to form a bottleneck, can be accessed on an equal and non discriminatory basis.

In those areas where governments are looking to exercise some regulatory oversight, law enforcement, consumer protection, taxation compliance, protection of intellectual property rights, protection of minors and so forth in respect to the Internet, the information and database associated with the DNS may prove to be critical. As a general rule this information should be made public and readily accessible. Registrars, who have not already done so, should make available search and retrieval tools for

users to interrogate registration databases. These databases need to have appropriate information included such as the full contact details of registrants. Consideration should be given to the frequent suggestion that certain domain names, such as **.adult**, might be usefully employed in ongoing efforts to protect minors. If after careful consideration this idea is proves to be impractical, this analysis should be published given the public interest in this question. Further consideration should also be given to the longer term impact intelligent agents may have on the definition of location and the responsibilities of users.

Currently there are a great number of disparate practices and policies associated with domain names throughout the OECD area. Accordingly it is necessary to ask whether this lack of harmony forms a barrier to electronic commerce. In other instances some policies raise fundamental issues of rights. For example the restriction preventing individuals from registering a domain name in some OECD countries seems to stem from some registrars wanting to avert legal action that might result from trademark disputes. Whatever the merits or otherwise of these different requirements they have not been devised in an open and transparent manner with all public policy implications considered. Accordingly the differences across the OECD area need to be be highlighted and potential benefits or drawbacks discussed. Users need to be be very much involved in this process to a much greater degree than in the past in virtually all OECD countries.

DNS reform will be ongoing over the next several years at the national and international level. Much of this reform is expected to be industry-led. A growing number of governments are also reviewing their requirements, across of all sectors of activity, and publishing policy principles in relation to the DNS to assist the development of industry self regulation codes and other industry-led reforms. In respect to generic Top Level Domains reform the Clinton Administration had, at the time of writing, an interagency task force preparing policy recommendations based on a public consultation process. The European Commission has also been actively studying and raising awareness of DNS reform. The declaration arising from the European Ministerial Bonn Conference stressed the importance of Internet domain names for the development of electronic commerce.[1] European Ministers also noted support for the principle of an internationally recognised and transparent system of DNS management.

INTERNET GROWTH AND THE DOMAIN NAME SYSTEM

All indications are that the number of computers connected to the Internet continues to grow very rapidly. Between January 1996 and January 1997 the number of hosts connected to the public Internet grew from 9.1 million to 15.5 million in OECD countries (Statistical Annex -- Table 15).[2] A host is a domain name that has an Internet protocol address record associated with it and would include computers connected to the public Internet.[3] These data can be regarded as a lower bound for the size of the Internet. While the Internet is growing apace the relative level of connectivity, as measured by the number of hosts weighted by population, it has extreme variations across the OECD area (Statistical Annex Table 16). Differences of this magnitude are not common for most indicators of communication development amongst OECD countries. They highlight the need to review the initial institutional frameworks governing the public Internet as these arrangements face increasing challenges in countries with high growth rates or to examine if they raise barriers in countries with low growth rates.

In those countries leading Internet developments attention has focused on reforming the institutional arrangements in the transition from a largely academic based network to one-offering commercial services to the public. The lead has mainly come from within parts of the Internet community rather than government. According to some commentators business concerns and public policy issues have not received the attention they deserve in this process. One commentator, Anthony Rutkowski, has questioned the balance of decision making in the Internet community on reform. Rutkowski, a past president of the Internet Society, says that industry and public policy issues have not received the attention they deserve within the Internet community's 'governing bodies'. According to Rutkowski "Few people in the corporate or public policy worlds are familiar with, or participate in, the kinds of forums traditionally used by the Internet community for collaboration and decision making - which are fine tuned for working technical level and research and academic participation." [4] A growing number of people believe that because DNS issues raise commercial and other public policy issues, discussion should not be confined to technical forums. Certainly parts of the Internet industry, such as the Commercial Internet Exchange (CIX) and other groups representing Internet Access Providers, believe they should be involved to a greater extent in efforts to lead public policy making in respect to Internet governance.[5] Additional parties wanting to be further involved in DNS reform include the Association for Interactive Media, which formed the Open Internet Congress, and the Domain Names Rights Coalition.[6] Others would no doubt point to recent international initiatives that have tried to draw greater participation from outside the traditional Internet community. This trend, particularly in respect to private sector involvement, should continue to be encouraged. The transition period for administration of the DNS must be inclusive, particularly of the for-profit sector, since, (to a large extent) educational and research institutions would only be minimally affected by the proposed addition of new gTLDs. To ensure public confidence, the transition process itself should be subject to standards of openness, transparency, and public accountability, and so should the rules which bind the final authority.

The Clinton Administration is currently studying a number of proposals for allocating and managing gTLDs, and the underlying issues to determine what role, if any, it should play. Accordingly, at the time of writing, the US Government has not endorsed any plan but has said it believes its is very important to reach consensus on the policy issues related to the implementation of domain name systems.

As a result the US Dept of Commerce requested comments, via an Notice of Inquiry (NOI), on principles for gTLD-DNS reform by 18 August 1997.[7] This NOI sought public comments on the appropriate underlying principles, some general organisational framework issues, trademark issues, the creation of new gTLDs and policies for registries. The public comments received, together with a summary, are available at: http://www.ntia.doc.gov/ntiahome/domainname/domainname.htm.

Much of the current focus of the DNS debate is the 'Final Report' of the Internet International Ad Hoc Committee (IAHC) which recommends reform to the Internet domain name system (DNS:--Refer Box 1) and its implementation (IAHC: Refer Box 2).[8] Notwithstanding this some have been critical of how the IAHC initiative has been undertaken and some private sector companies are actively implementing their own proposals and DNS infrastructure (e.g. top level domains, root-level name servers, registries).[9] Network Solutions (NSI), the current manager of registrations, under the generic top level domains registry, has also been critical of elements of the IAHC plan and has proposed an alternative. Accordingly, there is not a consensus at this time on how issues concerned with the DNS system should be resolved.

Membership of the IAHC includes organisations that have not previously been prominent in forums concerned with Internet governance. These include the International Trademark Association (INTA) as well as international organisations such as the International Telecommunication Union (ITU) and the World Intellectual Property Organization (WIPO). In May 1997, following a signing ceremony for the IAHC's Generic Top Level Domain- Memorandum of Understanding (gTLD - MoU), this group was disbanded and had formed in its place an interim Policy Oversight Committee (iPOC) to oversee the implementation of this proposal.[10] As at 15 September 1997 some 150 entities had signed the gTLD-MoU. Statements related to the gTLD-MoU were signed separately by the ITU and WIPO, together with a related signing by the Universal Postal Union. (Box 9). At the time of writing, Albania was the only government to have signed the gTLD-MoU. However a number of fully government owned entities had signed the gTLD-MoU.

For their part, supporters of the IAHC process contend that their Members, and Signatories to the gTLD, do represent a significant cross-section of the Internet community. For example the Secretary General of the ITU has stated that he is persuaded that the way IAHC carried out its work was open, representative and transparent.[11] IAHC supporters also say someone needed to take the initiative to get reform to the DNS initiated and that they are open to participation by other stakeholders in shaping the final outcome. Support for the IAHC, and other groups proposing reform, has been fluid with supporters being won and lost during the debate. Among the Signatories to the gTLD-MoU, the IAHC plan has gained the support of a growing number of Internet companies such as MCI, UUNET Technologies, and Digital Equipment. EuroISPA, the pan-European association of the Internet services providers, is also supportive of the gTLD-MoU plan's implementation.[12] On the other hand PSINet, the first commercial Internet provider and an original commercial sponsor of the IAHC, has withdrawn its support for the committee's process, and resulting proposal, on the grounds that this is a global public policy issue which requires considered debate by all of the Internet's stakeholders.[13] The events in some rival groups to the IAHC process can only be described as extremely volatile, including instances of the 'hacking' of the global DNS system.

The status of the IAHC initiative in October 1997 was that iPOC had opened gTLD Registrar Application Period (from 18 July - 16 October 1997) for potential registrars and was continuing to publish related draft documents. At its meeting, on 26 June 1997, the ITU Council endorsed the approach taken by the International Telecommunication Union to act as the depository for a new Memorandum of

Understanding on Internet gTLDs.[14] The ITU Council also asked the Chairman of the Council, to carry out an inquiry into the substance of the MoU and on the ITU's role. A period of 60 days would be allowed for response, after which the ITU would circulate the results to its Membership and all concerned.

. Alternative proposals for DNS reform have been made by a number of other organisations including the Enhanced Domain Name System (eDNS) group and Network Solutions, the company that currently manages the InterNIC. A brief summary of the key points of these proposals is made later in this report (eDNS in Box 3 and NSI in Box 8).[15] eDNS is only one of many alternative Root Server Systems (RSSs) which have formed and become operational. Others include, AlterNIC, PGMedia and the Universal Domain Name System (uDNS), and Ah Net in Australia. Not all these groups are in accord in respect to DNS reform and statements ranging from disclaiming association to attacks on each other are not infrequent. They are generally uniform in opposing the IAHC plan if it does not adapt the public Internet's DNS to recognise their systems.

The main reason forwarded by IAHC, and others, for reform of the DNS system is the tremendous increase in the number of domain names users of the Internet are seeking to register. When DNS procedures involved relatively small numbers or registrations, as was the case before the relaxation of the so-called 'acceptable use policy', the process was managed by volunteers in academic institutions (mainly computer science departments or managers of university networks) or through contractual arrangements. By most accounts these arrangements worked reasonably well given the requirements at that time. They were not designed to cope with the rapidly increasing demand for registration under top level domain names (TLD), and generic top level domain names (gTLD), that has built greater momentum every year since 1994 (Table 1).

Box 1: How the Domain Name System Works

The DNS essentially maps Internet addresses and is a necessary element enabling communication routing to function. It works for any Internet service that requires domain names: e-mail, WWW, FTP and so on. To function as part of the Internet a host needs a domain name that has an associated Internet Protocol (IP) address record. This includes any computer system connected to the Internet via full or part-time, direct or dialup connections. A top-level domain name (TLD) is either an ISO country code (for example **.be** stands for Belgium) or one of the generic top level domains (a so called gTLD such as **.com, .org**, **.net**). Internet domain names consist of a number of domains joined together by a dot (".") following a form similar to the following example: **www.oecd.org.** This example has three separate domains (www, oecd, and org). There can be four or more domains within the domain name, but it is often impractical to go much beyond four. The domains follow a hierarchy where the left-most domain is the lowest level, and the right most domain (known as the top level domain) is the broadest coverage. Left of the TLD is the second level domain (i.e. oecd), then a third level domain if applicable and so on. The OECD's domain name is registered under a gTLD (i.e. **oecd.org**) with InterNIC. This name provide a user friendly address which overlays a numeric address (i.e. 204.180.228.0). The OECD has also registered a TLD in France (i.e. **oecd.fr**), although this address is not currently used as part of the organisation's universal resource locator (URL) on the world wide web or for the e-mail address.

DNS servers perform the necessary function of translating back and forth between names and numbers. These servers contain databases of IP addresses and corresponding domain names and they are interrogated each time a user wants to send an e-mail or request data over the world wide web.[16] For example if a government official in Ottawa wanted to send a message to colleague in the Japanese Ministry for Posts and Telecommunications (e.g. **person@mpt.go.jp**), and copy that message to a colleague in Industry Canada (e.g. **person@ic.gc.ca**) their mail programme would initiate a request to the DNS server of their Internet access provider. Due to the fact that the Canadian colleague's machine is hosted on the same government network its address would be located on the same DNS server and routed accordingly. By way of contrast because the Canadian government DNS server would not contain a record for the domain name **.go.jp** it would initiate a request to a root-level server. Root-level servers contain databases with information about which DNS servers on the Internet act for which domain names. The root-level server would, in this case, point the Canadian DNS server to a counterpart that knows the IP address for the **.go.jp** domain name. Following this a request is made to the DNS server hosting **.go.jp** and the DNS server then returns the IP address that receives mail for **person@mpt.go.jp**. The e-mail can then be sent and received. There are eleven global root-level servers. Ten of these are located in the US and one in Sweden (Refer: Table 4).

At the beginning of 1997 the OECD estimates there were just over 1 000 000 domain names registered in OECD countries.[17] To put this growth into perspective there were less than 100 000 registrations at the start of 1995 and only around 350 000 by the beginning of 1996. The greatest initial demand for registration occurred under the gTLDs and in particular with commercial demand for **.com**. Not surprisingly this growth brought about need for reform for gTLD registrations in advance of national TLD registration procedures. The US National Science Foundation has contracted Network Solutions Inc. to manage certain gTLDs and authorised the company to charge users for registration from September 1995. In 1996 more than 530 000 registrations were made under **.com** and about 70 000 in other gTLDs at InterNIC.

In most OECD countries the registrars responsible for TLDs have followed the reforms instituted at InterNIC. Most commonly registrars, once housed in universities, have been spun off into private companies or associations run by members (Table 2). Typically the members of organisation-based registrars are Internet Access Providers (IAPs) and in a growing number of countries the marketing of TLDs is done through their offices. TLD registrars have also followed InterNIC's lead and introduced fees for registration. As a result, the incentives TLD registrars and resellers have to market these services have radically changed between 1995 and 1997. Whereas university based registrars did not have the will

or resources to market TLDs in a commercial manner this is far from the case in 1997. A commercial customer of a registrar, who may once have been referred to InterNIC, will now have a TLD recommended. When this factor is added to the increase in demand for domain names the result is that second level domain names under TLDs, as a share of total registrations in the OECD area, has now stabilised at around 23 per cent.

The OECD estimates, by taking the number of registered domains and the average annual payments made by users, the newly commercialised 'DNS market' to be worth around US$60 million going into 1997.[18] All indications are that this is set to increase over the next several years. The main reason is that demand currently shows no sign of abating. In March 1997 InterNIC registered its one millionth domain name.[19] Growth will also be generated because the remaining registrars without any fees, or without annual fees, are introducing charges and increasing their marketing efforts. Another factor which can be expected to increase registrations is the potential increase in the number of gTDLs, and gTDL registrars, if the IAHC recommendations are implemented. To better understand this process it is necessary to examine how the registration of the DNS currently operates as it is making the transition toward a fully commercial market.

Some contend that while reform of the DNS system is needed it is not urgent in the case of gTLDs. In support they point out that InterNIC has been better equipped to handle market growth than some TLD registries. Virtually all parties agree, however, that reform of the gTLD and TLD systems is needed in the future. Gabriel Batista the CEO of Network Solutions, the company that manages the InterNIC has stated, "Many of its critical functions rely on systems run by volunteers with inadequate legal guidance or protection, its directories are not centralised, registration policies vary and it is too vulnerable to technical attack and 'name speculation'. International growth in domain names requires greater co-ordination and global solutions to these problems."[20]

. Adding impetuous to the need to discuss reform of the DNS is the fact that NSF has announced that it will not renew its co-operative agreement with Network Solutions, or enter into a new agreement with any other entity. This means a decision on the continued management of the existing system is required although an interim extension or 'six month ramp down period' is an option in the transition from NSF oversight.[21] An additional factor is legal action being undertaken by PG Media against NSI was before a court in the US at the time of writing.[22] Should the court side with PG Media's request,. NSI would have to enable PG Media's gTLDs to be universally resolved. NSI suggests this would open the way for other alternative RSSs to demand the same right via the courts.[23]

Another aspect of the issue on the timing of reform is the use of national TLDs. Many argue that greater use of TLDs associated with country names could have forestalled the alleged "crisis" in the administration of the DNS system. In support they point out that if users in the United States had made greater use of **.us** there would be less need for an 'international solution'. By way of background the overwhelming majority of DNS registrations in the US are made under gTLDs such as **.com** rather than **.us** based on the ISO country code. In future the greater commercialisation of TLDs in countries outside the US should lead to greater use of these domains. Nevertheless the question has been raised as to why not retire gTLDs as separate domains and bring them under national TLDs.[24] Both sides of this issue are fairly well known but the main points can be briefly summarised as follows. Those that would like to see gTLDs eliminated argue that this would mean DNS policy could be managed under each TLD related to an ISO code. In other words questions of competition, creation of domains, and so forth, could be decided as second level domain name issues under each ISO coded TLD. On the other hand many existing users of gTLDs would be loathe to see them disappear as they have spent a considerable investment of time and money in promoting their second level domain in relation to a gTLD such as **.com.** They might also argue that they derive considerable commercial benefit by not being tied to a TLD based on an ISO code which

are inevitably associated with a country or a region in the United States as in the case of **.us**. In the absence of eliminating gTLDs the current US-centric system needs to be developed in a fully global system and a range of transition options to achieve this goal should be fully explored.

Table 1. Domain Name Registrations in Selected Registrars

Total Registrations	January 1994	January 1995	January 1996	January 1997
Belgium (.be)	129	294	1151	3404
Canada (.ca)	767	1631	4766	13280
France (.fr)	500	750	1500	3600*
Greece (.gr)			467(2)	844
Ireland (.ie)		347	739	1488*
Japan (.jp)	1341	2206	4781	15477
Mexico			396	3162
Norway (.no)		550	1380	3700*
Spain (.es)	250	350	800	3000*
Portugal (.pt)	39	78	207	1000
InterNIC (.com)(3)		29202	232004	769039
InterNIC (.edu)			2463	3309
InterNIC (.org)			17775	55141
InterNIC (.net)			10890	44431
InterNIC (.gov)			460	548
InterNIC (.other)			168	194

1. Figures for shaded countries are rounded. Asterisk indicates data are for end 3rd quarter 1996 (Spain is November 1996).
2. Figure for Greece is from March 1996.
3. Data for InterNIC for 1996 is for February 1996.

Source: OECD

Table 2. Domain Name Registries in OECD Countries

Registrar	Status	Date of Fee Introduction	ISO Code	URL
Melbourne IT (com.au)	University Company	1996	.au	http://www.MelbourneIT.com.au/
Unvie/ACOnet	University Computer Centre	1997	.at	http://www.aco.net/aconetus.htm
DNS - BE Registration Office	University Computer Dept. (K.U. Leuven)	Jan-1996	.be	http://www.dns.be/
CA Domain Committee	Industry Committee	Proposed	.ca	http://www.canet.ca/canet/index.html
EU-Net	Private Company	Proposed	.cz	http://www.ripe.net/cgi-bin/whois?-T+domain+CZ
Danish Network Information Centre	Policies set by FIL (an Internet access provider's industry association)		.dk	http://www.nic.dk/
TAC	Telecommunications Administration Centre	1997	.fi	http://www.thk.fi:80/yleista/englanti/internet.htm
NIC France	(INRIA) Public firm of scientific and technological nature	1995	.fr	http://www.nic.fr/
DE - NIC	Universitaet Karlsruhe		.de	http://www.nic.de/
FORTHnet SA	Institute of Computer Science (ICS) of Foundation For Research and Technology - Hellas (FORTH)		.gr	http://www.forthnet.gr/DNS
NIC HU			.hu	http://www.nic.hu/
INTIS/ISnet		Oct-95	.is	http://www.ripe.net/cgi-bin/whois?-T+domain+IS
IE Internet Domain Registry	University College Dublin	Aug-96	.ie	http://www.ucd.ie/hostmaster/ie-dom.html
RA Italiana	GARR- NIS		.it	http://www.nis.garr.it/netdoc/TLD-RA/
JPNIC	Association of Network Providers (Industry and others)	Jun-95	.jp	http://www.nic.ad.jp/
KRNIC			.kr	http://www.krnic.net/ENG/index-eng.html
RESTENA	Luxembourg Education and Research Network	1997	.lu	http://www.dns.lu/
NIC - Mexico		1997	.mx	http://www.nic.mx/
Stichting Internet Domeinregistratie Nederland	Non-profit association.	1996	.nl	http://www.domain-registry.nl/
ISOCNZ Registry	NZ Internet Society Registry Company	July-1996	.nz	http://servius.waikato.ac.nz/isocnz/
NORID	UNINETT. (Academic Network)		.no	http://www.uninett.no/navn/english.html

Table 2. Domain Name Registries in OECD Countries (continued)

Registrar	Status	Date of Fee Introduction	ISO Code	URL
NASK	Company with a status of research and development unit.		.pl	http://www.nask.pl/
Fundação para a Computação Científica Nacional			.pt	http://www.dns.pt/dns/
ES - NIC	Centro de Comunicaciones CSI RedIRIS		.es	http://www.nic.es/
SUNET	Swedish University Network		.se	http://www.sunet.se/
Switch	Swiss Academic and Research Network (Foundation)	Jan-1996	.ch	http://www.nic.ch/newdom-reg.htm
METU	Middle East Technical University		.tr	http://www.metu.edu.tr/~dnsadmin/
Nominet	Company limited by Guarantee	Aug-1996	.uk	http://www.nic.uk/
USC - ISI	University of Southern California		.us	http://www.isi.edu/us-domain/
InterNIC	Private Company (Network Solutions Inc.)	Sept-95	.com .net .org	http://www.netsol.com/
InterNIC	Private Company (Network Solutions Inc.)	Sept-95	.edu .gov	Registered by InterNIC but currently paid for by NSF. (2)

1. Shaded countries do not charge for registration of second level domains under TLDs.
2. There are several other three letter generic TLDs including .mil (US Military) and .int (international organisations).

Source: OECD

DOMAIN NAME SYSTEM OPERATIONS IN OECD COUNTRIES

The Internet Assignment Number Authority (IANA) acts as the clearinghouse to assign and co-ordinate the use of numerous Internet protocol parameters.[25] The IANA says its authority to undertake this task is derived by virtue of being chartered by the Internet Society (ISOC) and the US Federal Network Council (FNC). The Internet Society is a non-governmental international organisation for global co-operation and co-ordination for the Internet and its internetworking technologies and applications.[26] The Society has individual and organisational members and was brought into existence in January 1992. The US Federal Networking Council is chartered by the US National Science Foundation to establish an effective interagency forum and long-term strategy to oversee the operation and evolution of the US Federal Interagency Internet Program in support of research and education.[27]

Few issues bring the question of Internet governance to the fore as quickly as authority to administer the DNS system. Most commentators would agree that the present authority, claimed by the IANA, emerged from a US government contracting process over many years when the network was primarily for military and then academic purposes.[28] There is much less agreement on how this authority and governance structure should be interpreted in the transition to a fully commercial Internet or on how it translates in terms of international jurisdiction.[29] The governance structures appropriate when the Internet was a relatively closed network, while noting more recently that the actual DNS authority has derived as much from pragmatic consensus as US government contracts, are under increasing pressure from commercial developments. This is why the structure of governance inherited from the IANA authorised DNS system is the focus of current reform initiatives and legal challenges.[30]

The IANA has authorised one entity in each country to administer TLDs (as per Table 2). These registrars have, in the main, emerged from university computer science departments or organisations charged with administering academic networks. While some of the original recipients of the authority delegated by the IANA, still manage national TLDs they are increasingly designating others to perform this task. In some cases the original recipient has delegated the authority to a private company (owned by a university or other entity). In other instances, authority has been delegated to a committee or association of Internet Access Providers. Only in Finland has the authority been passed into the hands of a government agency (Telecommunications Administration Centre).[31]

The IANA also allocates the authority to administer IP addresses to regional registries. There are currently three such regional registries: ARIN (the American Registry of Internet Numbers which performs this duty for North and South America, South Africa and the Caribbean), RIPE NCC (Europe), and APNIC (Asia/Pacific). Regional registers do not necessarily have anything to do with domain name registration but rather provide regional organisation of IP number allocation. For example, RIPE or the RIPE NCC does not directly have anything to do with domain name registration. The 'Local Internet Registries' the RIPE network co-ordination centre has, only have to do with the scheme of allocating/assigning IP numbers, not domain names. A TLD registrar for a domain name gets that responsibility directly from the IANA, not from RIPE. In other words, in Europe the assignment of IP

addresses (RIPE NCC to local registries) and domain names (IANA to TLD administrator) are separate and do not necessarily go through the same organisation. One reason for this separation is to ensure that there is no cross subsidy of IP addresses by domain name registrations.

The Administration of Top Level Domains and Market Structure

The national rules applying to the administration of that particular top level domain name are defined by each of the IANA authorised registrars. Only in Finland has the government, through the Ministry of Transport and Communications, in consultation with the Internet community, initiated a project to develop the terms for the approval of domain names and to establish the procedure for domain name administration.[32] In most other countries the rules and procedures for TLD administration have been defined by the IANA appointed registrar, largely without government participation.

For a user wanting to obtain a second level domain name under TLD there is ultimately only one registrar in each country. This raises the question of whether given the current administration of TLDs, registrars can be said to have national monopolies over a fundamental part of information infrastructure. It is clear that registrars do not have exclusive rights based on a legal privilege granted by government.[33] Nevertheless having the sole practical right to administer TLDs, irrespective of a legal authority, would reasonably seem to approximate to a monopoly position.

A further complication on the monopoly question is that gTLDs, and some TLDs, can be seen by some users as substitutable. This would mean, that even if it was agreed that a monopoly for a TLD existed, the effect of the monopoly might be argued to be weak at best. For example, although Mercedes-Benz can only register **mercedes-benz.de** with the German registrar, the company may also register the second level domain name (i.e; **mercedes-benz)** under a gTLD (i.e. **.com**) in the US or, where rules permit, under a TLD in another country (e.g. **mercedes-benz.ch** in Switzerland). In other words the company is not obliged to register a TLD in Germany to be able to have a unique company presence on the Internet. On the other hand companies invest a great deal of time and money in company and brand names and Mercedes-Benz may feel compelled to register **mercedes-benz.de** under other national TLDs (Table 3). This is because prospective customers might find this an 'Internet friendly address' which is easy to find. For example a world wide web user typing in the universal resource locator section of an Internet browser the address **www.mercedes.de** is automatically transferred to **www.mercedes-benz.com/home.htm.** It may also be because the company believes **.de** or another domain name (e.g. **.ch** or **.co.uk**) has certain marketing advantages. One potential advantage is that TLDs can give an indication of the country in which the source of information or service is based. It is also a possibility that Mercedes-Benz might not want others to use, perhaps improperly or fraudulently, its company name. If so the company might register names without necessarily needing them for its own network purposes.

Perhaps the simplest way to decide whether a registrar can be said to have a monopoly is to see what position the Internet industry takes on this matter. RIPE (Reseaux IP Européens) is a collaborative organisation open to all European Internet service providers.[34] The objective of RIPE is to ensure the necessary administrative and technical co-ordination to allow the operation of a pan-European IP network. RIPE does not operate a network of its own, but rather has as one of its principal functions supporting localised Internet Access Provider registries. In mid-1996 there were 434 such local registries and RIPE projects: this will more than double by the end of 1997.[35] As part of its co-ordination role RIPE has published a paper entitled "Charging by Local Internet Registries" which makes recommendations on pricing principles for the operation of European registries in general, and additionally for those with monopoly positions.[36] While noting there is a competitive market amongst Internet access providers for most services they offer, the RIPE document says:

> "As indicated ... there are certain exceptions to the market principle in the Internet registration services. These occur where, by virtue of their location in the hierarchy of Internet registration, certain registries find themselves in a monopoly position. In the case of namespace, this applies to top-level domain (TLD) registries (in Europe, these are all country registries), as well as certain administratively unique second-level domain registries (such as .co.uk, .ac.at etc). When it comes to IP address allocation, regional registries constitute monopolies within the communities they serve. The RIPE NCC is the regional registry for the European region. Other possible examples are the last resort ("non-provider") IP registries, although nowadays the customer has an alternative to their services."[37]

Accordingly the RIPE document recommends, "It is important that there be transparency in the procedures and accounts of such 'special case' registries. They must not generate excessive surplus by virtue of their monopoly position."[38] IANA also acknowledges that the entities it has authorised to administer TLDs and gTLDs have monopoly power. Jon Postel, at IANA, has written "... a concern with the top-level domain name system is that there is only one registry for the top level domain names and it is charging fees apparently unconstrained by effective regulation or competition; it is in a monopoly position."[39] Postel adds that in his opinion it seems "...reasonable to introduce competition in the form of other registries to provide equivalent services." The IANA was a member of the IAHC whose recommended reforms include introducing multiple registrars for gTLDs.

The Administration of Generic Top Level Domains and Market Structure

The InterNIC was established, in January 1993, as a collaborative project between several companies supported by five-year co-operative agreements with the National Science Foundation (NSF). One of these companies Network Solutions Inc. (NSI) was contracted to manage the InterNIC Registration Services project. InterNIC Registration Services is located at Network Solutions, Inc., Herndon, VA, in the United States and provides gTLD registration services for the Internet community. The NSF has approved a plan from Network Solutions, Inc. (NSI) which establishes the American Registry for Internet Numbers (ARIN). Under the plan, ARIN will assume full responsibility for Internet Protocol number assignments and related administrative tasks previously handled by NSI. The shift, expected to be fully implemented before March 1998, separates the assignment of Internet numbers (addresses) used for Internet routing from domain name registration activities in which NSI will still be involved.

The InterNIC/Network Solutions, Inc. operate two of the 13 global root-level name servers in support of the IANA recognised DNS (Table 4).[40] In May 1997 one of the global root-level nameservers operated by Network Solutions (InterNIC) was shifted to the UK. In addition a further global root server was established at Keio in Japan. There are now two such nameservers located in Europe, one in Japan and ten in the US. To obtain a second level domain name under a gTLD, that is recognised by IANA, a user needs to apply to the InterNIC registrar. InterNIC then updates the root-level name server database enabling a domain name to function as part of the Internet. The most common way users become aware of this aspect of Internet routing is if they make an error in inserting a URL. For example if as user typed **www.oecd.orb,** instead of **www.oecd.org** they would receive the message "DNS name lookup failure". This would be followed by (a) DNS Domain 'www.oecd.orb' is invalid (b) Host not found (authoritative), and (c) this means that the named host probably does not exist.

In mid 1997, the AlterNIC conducted a 'hack' into the IANA authorised system administered by InterNIC. As a first stage this enabled many users on the Internet to resolve addresses such as **www.per** and **www.alternic.**[41] This was followed by another 'hack', known as cache poisoning', which redirected requests for **www.internic.net** to **www.alternic,** albeit the perpetrator included a link to InterNIC.[42] The supposed basis of the hack has been described in the following terms:

> "When a client or DNS server performs an address lookup, the responding DNS server sends back the IP address of the requested host. Along with the address, the DNS server can send a 'helpful hint' with the address of other domains that might be queried. The idea was to minimise the number of overall DNS queries. But the problem is that the requesting DNS server can be tricked into associating domain names with a different IP address through the 'help hint' field."[43]

The owner of the AlterNIC said he conducted this 'hack' as a protest to highlight the NSI's claim of ownership to the gTLDs it manages. Subsequently NSI took legal action against AlterNIC and a settlement was agreed before a court.[44] This included a public apology by the perpetrator and a commitment to work with NSI to help prevent similar hacks in future.[45] These events highlighted the critical need for security, integrity and stability in the management of the DNS and the global root-level nameservers. Of immediate concern was the reported comment by the perpetrator that he could work his way through the most accessed sites on the Internet and redirect requests to other sites.[46] Similarly, was the reported boast by the perpetrator that this 'hack' could effectively remove a country level TLD from the global DNS.[47] Several technological solutions are being investigated by the Internet Engineering Task Force's (IETF) Domain Name System Security working group so that only data from a trusted source -- such as one of the global DNS root-level servers operating under the IANA authorised system -- would be accepted.[48]

In a related development RSA Data Security, Inc., announced in October 1997 that it plans to provide the Internet Software Consortium (ISC) with a free license to use DNSsafe™ software, a security engine designed to prevent address spoofing on the Internet.[49] This software aims to create cryptographically trusted responses from DNS servers connected to the Internet to make address spoofing difficult. RSA say the 'DNSsafe' software enables developers to add digital signatures to their implementation of the Domain Name System. There are currently a number of problems with the e-mail system for electronic commerce. For example some senders of unsolicited advertising (i.e. 'spam' the Internet equivalent of 'junk mail') intend that the message not be answerable and therefore alter the e-mail address information. As a result of the address information not being 'real' the system at the receiver's end treats it differently and in the absence of one domain name may add another domain name. For example if a 'Spam Advertiser' sent an e-mail to a person at the OECD the domain name oecd.org would be added to the end of the originator's e-mail address (e.g. message received from sales@spamcomany.oecd.org). Such instances have the potential to mislead consumers, if their Internet access provider's domain name is inserted, and employees if their company or organisational domain name is inserted. This type of activity has been called 'technology fraud' by the Center for Democracy and Technology because spammers conceal their identity, including the practice of hijacking mail servers and 'spoofing' message headers.[50]

. In the same week as the 'second hack' by AlterNIC, two other events occurred which showed that even reception of data from a global root level server could be subject to serious problems. First was a deception wherein a fraudulent communication (fax and letter) requested InterNIC to remove WebCom's name, a web hosting and email service provider, from their DNS records.[51] This was subsequently done with the result that customers could not, in some instances, access WebCom's website. In the same week an InterNIC staff member loaded incomplete **.com** and **.net** zone files that included

about 35 per cent of Internet host addresses.[52] This meant that for several hours many gTLDs addresses served by these files could not be resolved. These events further highlight the critical importance of stability, integrity and security of the DNS for electronic commerce.

In September 1995, following NSF authorisation, Network Solutions began charging for registrations. The Co-operative Agreement issued by the NSF to Network Solutions to provide InterNIC Registration Services provides for 30 per cent of the funds collected for registration and renewal of domain names to be:

> "...placed into an interest-bearing account which will be used for the preservation and enhancement of the "Intellectual Infrastructure" of the Internet in general conformance with approved Program Plans. [Network Solutions] will develop and implement mechanisms to insure the involvement of the Internet communities in determining and overseeing disbursements from this account. [Network Solutions] will also establish and maintain publicly available records of all deposits to and disbursements from the account."[53]

Between September 1995 and January 1997 US$ 15.2 million was deposited into the "Intellectual Infrastructure' account by Network Solutions (Table 5). This is essentially a 'tax' on users of gTLDs. By the end of 1996, there had been no disbursements from the account. This indicates the total revenue received by Network Solutions for registration of second level domain names under a gTLD, for which deposits have been made by the beginning of 1997, to be in the order of US$51 million. By October 1997 the 'Intellectual Infrastructure' account had grown to more than US$30 million and a proposal before the US Congress was to use part of this money to fund a project called 'Internet2'.[54] Internet2 is a planned high speed network linking US federal laboratories and universities. Not surprisingly a market this large, and one that is growing very rapidly, has attracted the interest of other suppliers. The first alternative registry to try to attempt to enter the market for gTDL registrations was AlterNIC.

AlterNIC says the reason it established an alternative registrar was out of a frustration of working with monopoly registrars (InterNIC and TLD registrars) and the limited range of domain name abbreviations.[55] AlterNIC commenced taking registrations for a range of alternative domain names in 1996. Since that time the AlterNIC has deployed a worldwide set of root zone name servers that will resolve existing domain names in addition to gTLDs such as **.usa**, **.biz**, **.art**, **.law** and numerous others. However because the majority of existing root-level name servers are not programmed to recognise domain names created outside those specified by IANA they are less attractive to users. One estimate is that only 0.5 per cent of the Internet recognises the names of independent registries.[56] A user trying to access **http://www.alternic.nic/** from the OECD receives the message that a DNS look-up failure has occurred because the domain is 'invalid', albeit during the AlterNIC 'hack' of InterNIC it was possible to resolve this address from the OECD.

Some claim the importance of AlterNIC has been in demonstrating that there are not technical barriers to an expansion of the number of top level domains.[57] In January 1997, a group of like minded IAPs, at that stage supported by AlterNIC, formed the Enhanced Domain Name System (eDNS) consortium. eDNS says it was founded "... on the principle that no individual, organisation or corporation has the right to monopolise the top-level domain namespace, either effectively through accumulation of market power or by edict."[58] eDNS deployed an alternative 'name server infrastructure' to that established by IANA and proposed by the IAHC (Box 3). Some of the eDNS supporters advertise services under gTDLs such as **.per** (Iperdome's proposed service for individuals[59]). However, in May 1997, one of the founders of eDNS released a statement saying there was no longer a consensus amongst all the original

members and that AlterNIC would no longer be part of that group. The eDNS systems was briefly shut down and then returned to operation, as one of a number of so called alternative Root Server Systems (RSSs).

The IAHC, NSI and the various 'alternative RSSs' proposals aim to inject competition into the gTLD system. The primary differences between these proposals are that the IAHC plan proposed a measured introduction of competition accomplished via a system similar to franchising. Other proposals were generally for open market entry. Subsequently iPOC, in working to implement the IAHC plan, amended the proposal to remove limits on the number of registrars in total and by geographical location and selection by lottery. This change was widely welcomed including support from a number of OECD governments and the European Commission. This means the major difference between the IAHC plan and other proposals by NSI and alternative RSSs entities, in terms of market structure, is the issue of whether gTLDs are marketed on a shared or proprietary basis and the question of who decides which gTLDs are placed in use. Under the IAHC plan existing gTLDs, and at first a limited number of additional gTLDs, would be shared by all authorised registrars. These registrars would receive authorisation to operate from a proposed Council of Registrars (CORE) which would also have responsibility for any additional gTLDs. By way of contrast NSI and the 'alternative RSS operators', would like to be able to market proprietary 'brands', such as **.biz** or **.xxx**, or enable users to select their own gTLD names. Authorisation of these registrars would reside amongst the owners of RSS systems or under NSI's proposal a US Government agency for an interim term of two years -- followed by the establishment of an international authority (Table 6). In respect to trademark issues the IAHC proposed a voluntary review period for new applications and on-line mediation and arbitration for disputes. By way of contrast the eDNS proposal says second level domain names under gTLDs will be granted on a 'first come first served' basis and can be held by users in the absence of a court decision compelling change. NSI's current policy on trademark issues is discussed in the following section on the policies of existing TLD and gTLD registrars.

All sides of this debate argue that their are technical and commercial reasons why their approach to market structure issues is superior and that other proposals are severely deficient. For example supporters of the IAHC model have suggested that allowing anyone to create gTLDs would potentially lead to an unstable and inefficient system.[60] They also contend it is necessary to introduce competition into the marketing of the existing gTLDs and not just between registries. Supporters of some rival plans suggest they need proprietary branding of gTLDs to make business models work and that there would be technical and commercial problems with shared databases for registration.[61] NSI, for example, says that simultaneous registration of second level domain names at different registries could pose a serious problem. Others are confident that software can be developed to deal with any technical problems that might arise from shared databases for gTLDs, although the precise timing can not be specified with certainty.[62]

In respect to trademark issues the IAHC proposes a voluntary review period for new applications and on-line mediation and arbitration for disputes. Work is underway at WIPO to further develop the IAHC plan. By way of contrast the general approach of alternative RSS operators is that registrars should establish their own operating procedures, including second-level domain name dispute policies. Some aspects of NSI's current policy on trademark issues are briefly discussed in the following section on the policies of existing TLD and gTLD registrars. NSI's position is that, "The problem of domain name disputes on the global Internet cannot be adequately resolved by an arbitration body lacking international or at least national judicial authority. The dispute problem requires a body of international law, or at least civil procedure, that is specifically applicable to domain names and trademarks."[63]

One aspect of DNS reform which it is important for governments to consider is the involvement of the intergovernmental organisations. Under the IAHC plan the ITU and WIPO would both have ongoing roles (Box 10). Under the proposed plan the ITU would act as a Depository for the gTLD-MoU and work to encourage its implementation. At the same time WIPO is asked to work on procedures for creating administrative domain name challenge panels to deal with second level domain name disputes and for bringing challenges before the panels.[64] In addition it is proposed that ITU have two representatives on the Policy Oversight Committee (POC), one direct and one as gTLD Depository, and WIPO would have one representative. This would give intergovernmental organisations three of the initially proposed twelve representative members of the POC. This part of the plan would give intergovernmental organisations an ongoing policy making role due the fact that the POC will set policies for CORE and its Registrars. In the case of the ITU, Member government's views on this ongoing role may become clearer after the results of the inquiry into the substance of the MoU and on the ITU's role. At issue here is whether governments want the ITU and WIPO to have an ongoing gTLD policy making role in addition to the functional tasks (e.g. Depository, Challenge Procedures/Panels etc.) outlined in the gTLD-MoU. For their part the General Assembly of the WIPO, in its Twenty First Session, held September 22 to October 1, 1997, noted with approval, and without dissent, that preparations were being undertaken by the WIPO Arbitration and Mediation Center (the "WIPO Center") for administration of dispute resolution activities concerning Internet domain names, in conjunction with the Generic Top-Level Domain Name Memorandum of Understanding.[65] The WIPO General Assembly did not express any position concerning the Memorandum of Understanding itself.

In considering the involvement of international governmental organisations in DNS administration governments need to bear in mind competing claims. In comments made to the US Department of Commerce's NOI on domain names supporters of involvement by international governmental organisations felt that they provided ready-made fora for reconciling competing national and commercial interests.[66] Critics of the IAHC plan say that it appears prematurely to bind international governmental organisations to one proposal and preclude the development of alternatives.[67] They point out that international governmental organisations have not played a role in Internet governance in the past and they question the need for future involvement.[68] For these groups international intergovernmental involvement and other aspects of planned gTLD reform should only occur after consensus has been reached based on a wider public policy discussion of the type initiated by the US Department of Commerce's NOI. To this end the Clinton Administration has given a preliminary indication of the key elements it would like to see included in gTLD reform initiatives:

> (i) The memorandum of understanding proposed by the Ad Hoc Committee should be amended, or another vehicle should be created, to reflect the concerns about governance, dispute resolution, and trademark voiced in the comments received by the Department of Commerce.
>
> (ii) The Government should support private sector development, testing, and deployment, based on the procedures set forth in the Ad Hoc Committee's memorandum of understanding and the Council of Registrars Memorandum of Understanding or another vehicle, of technology needed to administer shared top level domains.
>
> (iii) The United States should work with the global Internet community to establish an independent, self-sufficient policy oversight body with sufficient authority, global credibility, as well as a structure and process that will minimize the risk of anticompetitive conduct to carry out the core aspects of Internet governance that must be undertaken on a centralized basis.[69]

Some of these principles, while not the final recommendations of the Clinton Administration's inter-agency task force, lend themselves to some proposals and elements of plans for gTLD reform more than others. In particular the expressed support of deployment of shared gTLDs reflects the majority view

of respondents to the US Department of Commerce's NOI that there should be non-exclusive control of some gTLDs. In particular many respondents believed there should not be exclusive control of the .com gTLD. One advantage of shared gTLDs is that it would enable users to exercise 'portability' between registries. On the other hand the Clinton Administration has noted that a "sizeable group" of respondents to the NOI favoured a mix of exclusive and non-exclusive gTLDs as the best way to promote competitive offerings and choice.

Table 3. Selected Mercedes-Benz Related Domain Names

Applicant	Domain name	Related WWW-Page (or referral)
Mercedes-Benz Finance Australia	mercbenz-au	
Mercedes-Benz Australia	mb-net-au	
Mercedes-Benz, AG	mercedes.com	http://www.mercedes-Benz.com/home.htm
Mercedes-Benz Credit Corp.	mbcredit.com	
Mercedes-Benz Credit Corp.	mbcc.com	
Mercedes-Benz Credit Corporation	credithighway.com	
Mercedes-Benz Credit Corporation	credithwy.com	
Mercedes-Benz Leasing Mexico	mblm.com	
Mercedes-Benz Leasing Manhattan	mb-manhattan.com	http://www.mb-manhattan.com/
Mercedes-Benz SA	mercedes	
Daimler Benz Information Systeme Haus	db-net	
Daimler Benz of North America	daimlerbenza.com na-daimlerbenz.co	http://www.usa.mercedes-benz.com/http://www.daimler-benz.com/
Daimler Benz Research and Technology	net-daimlerbenz	http://www.rtna.daimlerbenz.com/
Mercedes-Benz	mercedes.de	http://www.mercedes-benz.com/home.htm
Mercedes-Benz, AG	mercedes-benz.ch	http://www.mercedes-benz.ch/
Mercedes-Benz, AG	mercedes.ch	http://www.mercedes.ch/
Mercedes-Benz	mercedes.co.uk	
Mercedes Club of Cyberspace	mercedes.org	http://www.mbca.org
Mercedes-Benz Car Club of America	mbclub.com	http://www.mbclub.com/

1. Shaded rows indicate registration was not made by the Mercedes-Benz company.

Source: OECD from "Whois database"

Table 4. Operators of the Internet's Root-level Name Servers

Operator	Status	Location
Network Solutions, Inc. (A)	Private Company	United States http://www.netsol.com/
University of Southern California (ISI2) Information Sciences Institute	University	United States http://www.usc.edu/
Performance Systems International Inc. (C-YSER)	Private Company	United States http://www.psi.com/
University of Maryland (UMD-TERP) Computer Science Center	University	United States http://www.umd.edu/
NASA Ames Research Center	Government	United States
Internet Software Consortium (ISC)	Non-profit organisation	United States http://www.isc.org/isc/
GSI (DIIS-NS)	Military	United States http://www.nic.ddn.mil/
Army Research Laboratory (B)	Military	United States
M-Wide Keio	WIDE Project	Japan
NORDU	Private Company (1)	Sweden http://www.nordu.net/
RIPE NCC. (K)	European Network Co-ordination Centre http://www.ripe.net/	LINX (United Kingdom) http://www.linx.net
Network Solutions, Inc. (J)	Private Company	United States http://www.netsol.com/

1. NORDUnet is a limited company (A/S) based in Denmark with a small administrative staff. The NORDUnet shareholders are: UNI-C, Danish Computing Centre for Research and Education, Denmark, the Finnish Ministry of Education, Finland, University of Iceland, Iceland, UNINETT A/S, Norway, Verket for högskoleservice, Sweden. The root-level name server is located in Sweden.
2. For a graphical map of root-level name servers refer http://nic.mil/DNS/root-server.html.
3. In May 1997 K.root-servers.net was shifted from Network Solutions (InterNIC) to be housed within LINX and managed by RIPE NCC. LINX is a London based exchange point for Internet traffic in the UK and externally. Two other global root name servers exist at ISI at the Unversity of Southern California one of which was moved to Keio, Japan in August 1997.

Source: OECD based on http://nic.mil/DNS/root-server.html and ftp://rs.internic.net/domain/named.ca.

Table 5. Network Solutions Deposits for 'Intellectual Infrastructure' Fund

US$ Million	Sept-95-96	31 Oct-1996	30-Nov 1996	31 Dec-1996	31 Jan-1997
Cumulative Amount Deposited	7.1	8.5	9.9	12.7	15.3
Cumulative Revenue (1)	23.6	28.5	33.0	42.3	50.9

1. For which Intellectual Infrastructure Fund portion has been deposited.

Source: Network Solutions, OECD

Table 6. Comparison of IAHC, eDNS and NSI Proposals for gTLD Reform

	Current Situation (InterNIC/NSI)	IAHC/iPOC proposal (Refer Box 2)	eDNS revised proposal (Refer Box 3)	NSI Proposal (Refer Box 8)
Number of gTLD Registrars	One Registrar	Originally up to 28 initially with 4 per WTO region. Now, no limit on the number and geographical location of registrars sharing registration activities for gTLDs.	Unlimited	Unlimited.
Method of obtaining 'Authorisation'	NSF contract until March 1998. NSF has announced that it will not renew the co-operative agreement with NSI or any other entity.	Originally a lottery for qualified applicants. Now open market for qualified applicants.	Open market entry.	Open market entry for anyone meeting 'minimum criteria' to apply.
Number of gTLD names	IANA specified.	An additional 7 new gTLDs and .tm.int	Unlimited number of gTLDs but a limit of 10 gTLDs per organisation.	Unlimited number of gTLDs but a limit on gTLDs per organisation (e.g. 3).
Status of gTLD and associated database.	Unique marketing of gTLDs. NSI reported to say it owns IPR on database for existing gTLDs.	Shared gTLDs (proposed and existing) that are competitively marketed by all Registrars. Co-operative sharing of databases as required.	'Branded' gTLDs. Sees IAHC proposed gTLDs and existing NSI marketed gTLDs as brands of these organisations.	'Branded' gTLDs. Registrar databases to be proprietary.
Trademarks	Refer Table 9.	Voluntary 60 day review period. On-line arbitration and mediation system.	Registrars make policy on 2nd level domain names. RSC guidelines on TLD registration say trademark claims must be documented if not patently obvious (i.e.: "IBM" is obvious, ".Q" is not).	Registrars would establish their own operating procedures, including second-level domain name dispute policies.
Legal	Registrar is named in a number of suits.	Binding arbitration as an alternative to courts. Panels do not substitute for national or regional sovereign courts; they have authority over the domain names only, not the parties.	Absent proper legal process, the allocation policy at the root level should be first come, first served.	The problem of domain name disputes on the global Internet cannot be adequately resolved by an arbitration body lacking international or at least national judicial authority. The dispute problem requires a body of international law, or at least civil procedure, that is specifically applicable to domain names and trademarks.

Table 6. Comparison of IAHC, eDNS and NSI Proposals for gTLD Reform (continued)

Authority/Oversight	IANA	POC/PAB/CORE	The Root Server Council (RSC) comprised of operators of root servers that handle eDNS requests.	Interim authority by branch of US Govt. during 2 year transition period. Authority then passed to an international legal authority.
Role of ITU/WIPO	Invited by IANA to participate in defining a proposal for gTLD reform. No previous role.	ITU to act as gTLD Depository. WIPO to administer the procedures for creating the administrative challenge panels and for bringing challenges before the panels. ITU and WIPO have ongoing representation on POC.	Recognise ITU and WIPO's right to participate in administration of 'their proposed gTLD brands'.	No explicit role proposed in NSI proposal.
Proposal for TLD reform (e.g. **.au**, **.be** etc.).	N/A	Recognise national interests of sovereign nations in setting policies. Urge national registrars to consider expanding the number of TLDs they offer.	Originally said they will not register ISO country codes on the basis that they are reserved for country codes. However **.usa** is available as an alternative gTLD supported by AlterNIC. This may be seen as an alternative to **.us** which is specified by IANA.	No explicit statement on TLDs reform in proposal, but like the IAHC and eDNS proposals, implementation would enable establishment of new registries in all OECD countries. NSI has raised issue of how to address other 200 TLDs in presentations and said it wants global solution.
Current Status	US Dept of Commerce requested comments, via an NOI, on principles for gTLD-DNS reform by August 18 1997. US DOJ has requested information from NSI's parent company in relation to registration services. Inter-agency task force recommendations forthcoming.	MoU signing ceremony held in May 1997. IAHC then dissolved and replaced by iPOC, which is working to implement the IAHC proposals. This group's Registrar Application Period is open from July 18 - October 16, 1997.	eDNS is now only one of many alternative Root Server Systems (RSSs) which have formed and become operational. Others include, Alternic, PGMedia and the Universal Domain Name System (uDNS), Ah Net in Australia. Not all these groups are in accord in respect to DNS reform(2)	NSI has reportedly said it would consider shared marketing of existing gTLDs subject to this being best for a stable and reliable Internet.(1) NSI says the US Department of Commerce has framework for further discussion.

1. Reported comments of Gabe Battista, CEO of NSI, in an address to the ITAA/ISA/CDT Washington Forum on Domain Name Issues, held on 30 July 1997. Refer "NSI May Cede to Changes in Domain Name System" by Todd Spangler in "Web Week", at http://www.webweek.com/current/news/19970804-nsi.html
2. For example AlterNic is no longer part of eDNS and PGMedia has no affiliation with eDNS.

Source: OECD based on proposals of IAHC, eDNS and NSI.

Box 2: Summary of IAHC proposed gTLD Governance and Market Structure (Source: Selected Extracts from IAHC Final Report)

The IAHC plan includes establishment of a non-regulatory policy framework in the form of a Memorandum of Understanding (MoU) which both the public and private sector will be invited to sign. The framework is enabled by the required signatories of the gTLD DNS Memorandum of Understanding (gTLD-MoU): IANA and ISOC. The gTLD-MoU will provide a mechanism for additional signatories to advise on future policy evolution of the global Internet domain name system. The International Telecommunication Unions (ITU), has agreed, in principle, to act as the depository for the gTLD-MoU and to publish the list of signatories.

gTLD administration and management will comprise multiple competing registrars, globally dispersed, under a Council of Registrars (CORE) established by a Memorandum of Understanding (CORE-MoU) which is signed by the registrars. CORE will operate as a Swiss non-profit association. Stewardship of the gTLD space is assigned to the gTLD DNS Policy Oversight Committee (POC) comprising members named by the Internet Society (ISOC), Internet Assigned Numbers Authority (IANA), Internet Architecture Board (IAB), International Telecommunication Union (ITU), International Trademark Association (INTA), World Intellectual Property Organization (WIPO), and CORE. A gTLD DNS Policy Advisory Body (PAB) is formed from gTLD-signatories, to obtain public and private sector consultation and review of POC and CORE activities. Changes to policy can be initiated by POC and enabled upon the agreement of ISOC and IANA, with the review of PAB and CORE. CORE will be responsible for providing common services among the registrars, in particular operating a shared data base repository for the gTLD registries.

The IAHC has defined an additional set of seven gTLDs. Any additional gTLDs will be defined under the aegis and policy co-ordination of the gTLD-MoU. The newly-defined gTLDs are: **.firm** for businesses, or firms; **.store** for businesses offering goods to purchase; **.web** for entities emphasising activities related to the WWW; **.arts** for entities emphasising cultural and entertainment activities; **.rec** for entities emphasising recreation/entertainment activities; **.info** for entities providing information services; **.nom** for those wishing individual or personal nomenclature. In November 1997 iPOC changed the recommendation from .store to .shop.

iPOC Position on New gTLD Registrars

iPOC, the group charged with implementing the IAHC plan, has stated it will "...retain the previously-published financial and technical qualification criteria for becoming a registrar but would remove the limit on the number and geographical location of registrars sharing registration activities for generic Top Level Domains (gTLDs). Hence, anyone satisfying the qualification requirements may become a registrar." Application details are available at http://www.gtld-mou.org/docs/application.htm.

IAHC/iPOC Position on Trademark Issues

Trademark concerns indicate some value in allowing registrants to voluntarily authorise the registrar to undertake a 60-day publication period, prior to registration of an SLD under a gTLD. ISO 3166-based TLDs are encouraged to make similar notification mechanisms available to registrants under their own portion of the name space. In addition it is suggested that a dedicated name space, called .tm.int, be created to accommodate the international character of some trademarks. Trademark concerns require the availability of dispute mechanisms which are alternatives to court litigation. These include an administrative challenge process against the assignment of SLDs that allegedly violate gTLD policy regarding internationally known intellectual property rights, as well as mediation and expedited arbitration options. In addition, the SLD application and renewal process will include detailed contact information including submission to jurisdiction, publication of all SLD applications on a publicly accessible site, a voluntary 60 day pre-assignment waiting period and permanent identification of those applicants who chose to utilise the 60 day period. iPOC's "[Revised] Substantive Guidelines Concerning Administrative Domain Name Challenge Panels" are available at http://www.gtld-mou.org/docs/racps.htm.

Box 3: eDNS Governance Rules for gTLD Administration
(Source: Extract from eDNS Documentation: http://www.edns.net)

eDNS does NOT hold forth this set of root servers as the "one true" root server set, nor does it represent that by registering with eDNS you will be reachable to any portion of the Internet at large. The eDNS/nDNS Root Server Council (RSC) recommends that you pursue registration with whatever other root server sets you are able to acquire rights to operate under, and declares that it is operating these roots for the purpose of proving operational integrity, capability, and deployability of alternative TLD registration systems.

1) The RSC, or "root server council" is comprised of the operators of the root servers which handle eDNS requests.

2) Each root server owner may appoint one person to the RSC.

3) Each person may be appointed only once to the RSC; that is, no individual may hold two or more RSC seats (i.e.: you cannot "aggregate" your RSC vote with another root server operator).

4) The RSC votes on all bylaw changes, inclusion of all new TLDs, and removal due to abandonment or for cause of TLDs and Registries.

5) The RSC votes on proposals with a quorum being the entire RSC, and a simple majority being required to pass a proposal put before it. Should the RSC consist of an even number of members, a tie vote shall be deemed a failure to pass the proposal.

6) The RSC shall set forth the procedures for votes internal to the RSC.

7) The RSC is empowered to:

1) Certify new Registries.
2) Decertify Registries and TLDs which violate any provision of the operating rules and/or issue formal warnings for same.
3) Certify new root servers for service, thereby increasing the number of seats on the RSC, subject to technical limitations, the evaluations of the RSC as to need, and the technical, operational, and personnel that a new root server applicant brings to eDNS/nDNS.
4) Remove, by majority vote, an existing RSC member and the associated root server.
5) Make and pass on edits to the root zone, either by vote or by delegation to an individual or organisation as the RSC sees fit.
6) Require documentation from registries to prove compliance or lack thereof over disputed points of the bylaws. Failure to produce requested documentation within five (5) business days of an RSC request shall constitute constructive refusal and the RA and/or registry involved agree that the RSC may treat such a refusal as an irrefutable statement that the documents sought do not exist.

POLICY COMPARISON BETWEEN DOMAIN REGISTRARS

Registrars have published guidelines describing the procedures and policies they apply to applications for second level domain names under TLDs. These 'rules of registration' cover a wide variety of subjects ranging from the construction of proposed names (e.g. minimum number of letters required) through to acceptable content (e.g. limitations on use of geographical place names and dictionary words, through to ethical and moral issues). It would be a lengthy task to compare all these policies and national nuances. Rather this section provides a comparison of registrar policies in four key areas of interest for government and business. These issues are whether a registrar requires a local presence for applicants to qualify for the right to register a domain name (Table 7); whether a registrar limits the number of domain names for which any single entity can apply (Table 8); and whether a registrar has an explicit policy in regard to trademark issues (Table 9); whether registrars have implemented facilities to enable users to search their existing DNS database (Table 10).

Location requirements

In regard to location requirements registrars of TLDs in OECD countries can be broadly categorised into two main groups. Around two thirds of registrars have a policy of only taking registrations from entities that have a 'local presence' in that country. In these cases the definition of 'local presence' usually refers to an existing registration process, such as company registration. Sometimes this requirement is accompanied by an explicit rule that second level domain names under TLDs will only be allocated to companies or organisations and that individuals are excluded from applying for such a registration. The requirements for local presence may have implications for any future trade discussion in relation to the Internet.

A second group of registrars have a policy of not requiring any local presence in those OECD countries concerned. It is true that some of these registrars require a local postal address while others require a local administrative or contact person to be specified. Both these requirements call for a degree of 'local presence' but the strength is arguably weaker than referring to an existing registration procedure (e.g. company registration). For the purpose of this report, these obligations have not been defined here as 'local presence'. Similarly, recommendations or expressed expectations have not been deemed to be local presence obligations as in the case of Switzerland and the US.

The question of 'local presence' does not arise in the case of gTLDs. Any qualified applicant can register a name under **.com**, **.org** and **.net** irrespective of their global location.

Application limits

TLD Registrars have widely differing policies in respect to the number of second level domain names for which a single entity can apply. Registrars in about half the total number of OECD countries limit a company to only one domain name while the remainder have no such restriction. In those countries where registrars do permit multiple registration under TLDs some offer discounts for additional

names (e.g. Germany). In some countries, with such discounts, users are only allowed to register one name but IAPs can register multiple names and receive a discount (e.g. Norway). This is to encourage individual organisations to forward their application via an IAP. By way of contrast, in requesting additional names under the Netherlands TLD a user would pay a higher charge for additional domain names than the initial name. Some registrars stipulate that they will allow companies, with subsidiaries or divisions, to register multiple names while others make no such indication.

The question of multiple application did arise in the case of gTLDs. Initially Network solutions proposed only to permit one second level domain name under a gTLD to be granted per applicant. This policy was later reversed based on demand from users. Some companies have registered several hundred second level domain names under gTLDs. They do this for a variety of reasons. Examples include wanting to ensure the exclusive use of certain names (i.e. trademarks) in each and every 'domain name market' or because they have subsidiaries engaged in a diverse range of company activities. In some cases it has been because they believe there may be some intrinsic future value in generic words (e.g **headache .com** or **beautiful.com**).[70]

Trademark policies

Many consider the starting gun was fired on domain names and trademark disputes when a journalist from *Wired Magazine* registered **mcdonalds.com** in his name ahead of the McDonalds Corporation.[71] The subsequent publicity alerted many to the fact that while there can be two trademarks awarded (if the companies are selling different products - e.g. soap and ice-cream) there can only be one owner of a unique domain name. The McDonalds experience has become a much cited case and raised concern in other companies that someone might register their company or product name ahead of their own initiative. Indeed, someone now typing a URL to see if McDonalds has possession of the domain **mcdonalds.com** with slightly different spelling (ie. **www.macdonalds.com)** -- is presented with an advertisement for a company registering domain names on behalf of clients.

The most common approach by TLD registrars to trademark issues, in respect to domain names, has been to place the onus on users to ensure they have 'the right' to a particular name. In a growing number of cases TLDs registrars limit acceptable names to those registered in other procedures (e.g. registered company names). This policy, of course, does not resolve the problem of two parties with the same company name wanting the same domain name.[72] Rather the policy appears to be aimed at mitigating speculation on domain names.

Like national TLDs NSI's policy for gTLDs is to place the onus on the user to ensure that they believe they have 'the right' to a particular domain name. However, in respect to gTLDs and trademark issues, NSI has a dispute resolution policy for its operation of InterNIC registration services.[73] Essentially NSI will intervene under certain circumstances to place a disputed trademark on hold pending further deliberation by the courts or NSI. Few TLD registrars in OECD countries explicitly specify a dispute policy. In this they would be supported by the International Trademark Association which advocates registrars abstaining from intervening in dispute resolution (Box 4). The INTA position has implicit support in the eDNS proposal and explicit support in the IAHC (of which it was a member) final report where it is stated,

> "One possible approach is for the registrar to insert itself as an arbiter of disputes between trademark owners and SLD [second level domain name] holders: The registrar would put an SLD on hold at the behest of the owner of a trademark registration certificate if the holder of an "identical" SLD, once challenged, could not produce its own, trumping trademark certificate or

otherwise establish that its use of the domain predates either the effective date or first use date of trademark registration. Such a well-intentioned policy, summarily confers upon a non-judicial body the discretion to essentially grant an injunction against continued use of a SLD, without any adjudication of the merits of the trademark owner's claim against the domain holder. The IAHC feels that such an approach is inconsistent with basic tenets of trademark law and principles of equity and fair play. The dispute policy unfairly burdens the domain holder - who may actually have trademark rights superior to those of the challenging trademark registrant."[74]

Information availability

One of the leading requests from business is for TLD registrars to have harmonised policies and procedures in respect of domain name registration. The INTA advocates that registrars world-wide adopt identical domain name registration and renewal procedures along with publicly available registries of domain names. A current problem for users in some countries is that many directories are not publicly available. Business users would like data bases which allow for searches of domain names and that contain accurate contact information on registrants for all registrars. The InterNIC's Whois service provides a way of finding e-mail addresses, postal addresses and telephone numbers of those who have registered "objects" with the InterNIC.[75] By using a 'Whois' search engine anyone can not only tell whether a domain name is in use but who administers a particular site and a list of a site's name servers. Only around one half of the registrars in OECD countries have a 'Whois', or similar search facility, which allows users to see if a certain domain name has been registered (Table 10). A slightly lesser number again make contact information available on the registrant.

Table 7. Registrar Location Requirements for Applicants

	Local Presence (1) (Yes/No)	Note
Australia	Yes	A legal entity which is a commercial organisation, and which trades in Australia, may register only one domain name in com.au to the exclusion of all other DNS domains.
Austria	No	None specified.
Belgium	Yes	If you connect your computer system(s) to a network in Belgium, you can choose a domain name for your organisation in the **.be** domain. The DNS-BE accepts only requests for domain names from a commercial legal entity, a public or private institute or organisation. The DNS-BE does not accept names for individuals (for non-commercial purposes) or informal groups. Requests for domain names based on the name of the organisation or its tradename are accepted only for organisations located in Belgium.
Canada	Yes	Only companies with a legal entity in Canada are eligible for **.ca**
Czech Republic	Yes	Organisation must be registered in the Czech Republic.
Denmark	No	The application for the use of a domain name under the **.dk**-domain is to be filed with an Internet Supplier under FIL [since disallowed by Competition Council]. The application must contain the name and the address of the applying party. The application will be transmitted electronically to the DK-Hostmaster by the Internet Supplier. Organisations must have a valid postal address in Denmark.
Finland	Yes	Company must be registered in Finland. TAC is releasing new guidelines in 1997.
France	Yes	For a company, a KBIS certificate and a SIRET number is required. The domain name must be consistent with the company name, the commercial sign or the acronym which is mentioned on the KBIS. For an association, a copy of the publication in the Official Journal or the acknowledgement of declaration at the prefecture is required.
Germany	No	The administrative contact in the application must reside in Germany.
Greece	Yes	Name service is granted only for companies/institutes/organisations legally located in Greece.
Hungary	Yes	Applicant must be from an organisation registered in Hungary. At least one administrative-contact should be from the company office located in Hungary.
Iceland	Yes	Applicant must be a registered company in Iceland.
Ireland	Yes	Local presence for the domain holder is required by the registry.
Italy	Yes	Names only allocated to organisations located in or having a subsidiary in Italy.
Japan	Yes	Company must be registered in Japan. Administrative contacts must have local address.
Korea	Yes	Only official organisations or corporations in Korea can register under a TLD.
Luxembourg	No	No local presence required.
Mexico	No	Not necessarily required but customers should be able to remit fees.
Netherlands	Yes	Registering a domain name under .nl is open only to organisations in The Netherlands (which can be subsidiaries of a company in some other country). The organisation must be legally registered (e.g. with a Chamber of Commerce) in the Netherlands. In the case of a subsidiary, the subsidiary itself has to apply for the domain name.
New Zealand	No	No local presence required.

Table 7**. Registrar Location Requirements for Applicants (continued)**

	Local Presence (1) (Yes/No)	Note
Norway	Yes	Applicant must be a company or organisation registered in Norway. Must have a Norwegian address.
Poland	No	The organisation applying for the domain registration must have some kind of representative / administrative contact in Poland. The name servers can be located anywhere on the Internet.
Portugal	Yes	An applicant must be registered with Portuguese government at the RNPC *(Registo Nacional de Pessoas Colectivas*) and provide a registry number. Companies must be legally registered in Portugal.
Spain	Yes	The company must be registered in Spain.
Sweden	Yes	The company must exist and be registered as a company in Sweden.
Switzerland	No	Any entity may register domain names, independent of the location of the entity. It is, however, recommended to register or reserve second level domain names with .ch only for entities located in Switzerland.
Turkey	No	No local presence required.
UK	No	No local presence required.
US	No	The US Domain currently registers hosts of federal government agencies, state government agencies, K12 schools, community colleges, technical/vocational schools, private schools, libraries, museums, city and county government agencies, as well as in businesses and home computers. Any computer in the United States may be registered in the US Domain hierarchy. Generally, computers outside the United States are expected to register in other domains, however, there may be exceptions when a computer is used as part of a project or in a community with other computers in the US Domain. There is no requirement, as far as the overall US domain administration is concerned, that the user of a "locality" US domain name actually be in or have any connection with that locality.
InterNIC	No	gTLDs do not refer to location so the question of 'local presence' does not arise.

1. Local presence requirement is here defined with reference to another registration procedure (e.g. company registration or other).

Source: OECD

Table 8. Registrar Registrictions on Number of Domain Applications

Registrar:	Restrictions on number of domain names (Yes/No)	Note
Australia	Yes	One per qualified applicant unless justifiable to registrar.
Austria	No	None specified.
Belgium	No	No restriction as long as applicant is entitled to use these names (e.g. company, service marks).
Canada	Yes	Limit of one name registered per company.
Czech Republic	No	
Denmark	Yes	Only one domain name per organisation. Individuals cannot get their own domain names.
Finland	Yes	One name registered per entity. TAC releasing new guidelines in 1997.
France	Yes	Several trademarks which come from the same organisation can be registered under ".tm.fr", but only one domain name is allowed by society/organisation under ".fr".
Germany	No	Discounts for additional names registered.
Greece	Yes	Only one name per company is delegated.
Hungary	Yes	Only one name per organisation.
Iceland	Yes	Limit of one name registered per company.
Ireland	Yes	Applicant may only hold one .ie name.
Italy	Yes	Each organisation will only be provided with one name.
Japan	Yes	Each organisation will be provided with one name (some exceptions for IAPs).
Korea	Yes	One name per organisation or corporation. If applicant can provide a certificate that their company and their subsidiary company are different organisations, a new domain name can be assigned.
Luxembourg	Yes	Under normal circumstances, there should be one domain name per organisation. Domains for single private persons should be avoided.
Mexico	No	Multiple registrations permitted.
Netherlands	No	Multiple domain names permitted but registration price is more expensive.
New Zealand	No	No restriction specified.
Norway	Yes	Individual organisations are restricted to one name per applicant but IAPs can register more than one name on behalf of multiple clients at one time (i.e. one per client).
Poland	No	Individual names for branches of large companies can be registered.
Portugal	No	Multiple registrations allowed if they reflect company or service mark.
Spain	Yes	An organisation can only register one domain name.
Sweden	Yes	An organisation can only register one domain name.
Switzerland	No	
Turkey	Yes	One name should be used by one company or institution so as to avoid confusion.
UK	No	No restriction specified.
US	No	The US Domain hierarchy is based on political geography. The basic namespace under US is the state name space, then the "locality" name space, (like a city, or county) then organisation or computer names and so on. A company can register as many locations as they like.
InterNIC	No	

Source: OECD

Table 9. Registrar Trademark Policy for Applications

Registrar	Explicit Policy (Yes/No)	Note
Australia	Yes	Name must be closely derived from either the legal name of the applicant organisation, or which has been registered as a business name by an appropriate government authority in Australia. It should not contravene any third party's rights to use of the name.
Austria	Yes	Onus on applicant to ensure they have right to use name.
Belgium	Yes	The applicant is responsible for the selection of its own Domain Name. DNS-BE has neither the resources nor the legal obligation to screen requested Domain Names to determine if the use of a Domain Name by an Applicant may infringe up on the right(s) of a third party. Consequently, as an express condition and material inducement of the grant of an applicant's ("Applicant") request to register a Domain Name, Applicant represents and warrants as follows: 1.Applicant's statements in the application are true and Applicant has the right to use the Domain Name as requested in the Application; 2.Applicant has a bona fide intention to use the Domain Name on a regular basis on the Internet; 3.The use or registration of the Domain Name by Applicant, to the best of Applicant's knowledge, does not interfere with or infringe the right of any third party in any jurisdiction with respect to trademark, service mark, tradename, company name or any other intellectual property right.
Canada	Yes	Users responsibility to ensure they have right to use name.
Czech Republic	No	
Denmark	Yes	A statement is required from the applying party that the using of the domain name will not infringe any rights of any third party. Any objections to the use of a domain name shall be raised against the user only. Neither FIL, the members of FIL nor the DK-hostmaster are responsible for the user's registration or his use of domain names. Any user of domain name may transfer his rights to a third party. Such transfer must be reported to the DK-hostmaster by the user through their Internet Supplier. Known names (e.g. fdm) - These will, of course, be given to the organisation itself. If a name which does not directly relate to the organisation name is chosen, the reason for the chosen name (e.g. patented product name) must be given.
Finland	Pending	TAC releasing new guidelines in 1997.
France	Yes	If the name is a trademark, the INPI registration number is required. If it is just a registration request at the INPI, the organisation must inform in writing within 6 months the trademark refusal. In that case the domain would be withdrawn. The INPI trademarks are directly registered under the "tm.fr" domain. The organisation must own the trademark. The applicant on the registration form is the responsible for the domain. Note that a mark can be registered in the hierarchy of the company itself as an under-domain.
Germany	Yes	Onus on applicant to ensure they have right to use name.
Greece	Yes	There is no trademark status for domain names. It is up to the requester to make sure they are not violating anyone else's trademark. First come first served.
Hungary	Yes	The domain name must be related to the organisation name in a unique fashion and an organisation can only register one main domain. Names on products, services, trade marks etc. cannot be registered as a main domain. Individuals can not apply for a name.
Iceland	Yes	Name must be related to company name - no servicemarks or trademarks unless prior use and ownership is established.
Ireland	Yes	A domain name shall correspond with reasonable closeness to the name of the applicant or to an abbreviation or trademark by which the applicant is well known. Where the proposed name is either already in use, or appears likely to be claimed by another applicant, another name shall be chosen. For example, such names as ibm.ie and dublin.ie, are protected by this requirement.
Italy	No	While not having policy on trademarks there is a procedure for disputes. The so called '*processo di publica contestazione*' (section D3) specifies procedures in case of dispute. However the Italian registry takes no part in the challenge procedure. The registrar says that its role is to provide both sides with the tools to solve the problem.

Table 9. **Registrar Trademark Policy for Applications (continued)**

Japan	No	JPNIC does not recognise trademarks or other intellectual rights as being criteria and first-come first-served is the basis applied.
Korea	Yes	KRNIC is not responsible for any conflicts on firm name right, trademark right, intellectual right of the registered and proceeded domain name.
Luxembourg	Yes	If at all possible the name should reflect the name of the requesting organisation. No personal names are allowed.
Mexico	Yes	User's responsibility to ensure no trademark is violated.
Netherlands	Yes	Name must be related to a the name of the applicant's trademark or company name. Onus on applicant to ensure they have right to use name.
New Zealand	Yes	The Registry will make no attempt to check whether the applicant has the right to use the name applied for, except to ensure that the name is not already in the DNS. It is the applicant's responsibility to ensure that they are entitled to use the name. ISOCNZ does not trade in, or license in any way any entity (including the entity requesting the listing) to trade in the requested name.
Norway	Yes	Name must refer in reasonable way to the name or company/organisation. Domain name must be part of name or well known abbreviation. The applicant certifies that to his/her knowledge, the use of the name applied for does not violate any trademarks or other statutes. Registering a domain name does not confer or imply any legal rights to that name and any disputes between parties over the rights to use a particular name are to be settled between the contending parties using normal legal methods.
Poland	Yes	NASK does not register product names or advertising slogans. NASK attempts to avoid registering the names of known companies for other parties, though it does not check any trademarks registries. Individuals can register their own domain names under priv.pl.
Portugal	Yes	Trademarks must exactly match marks registered in Portugal. Name must closely relate to name of company.
Spain	Yes	The name must be related to the applicant's registered company name.
Sweden	Yes	The name must be related to the actual organisation name.
Switzerland	Yes	Entities registering domain names are fully responsible for their right to said name.
Turkey	Yes	An applicant can only register a name which is directly related to operations. Generic names requested for speculative gains not permitted.
UK	Yes	NOMINET UK will determine eligibility for registration solely by reference to the criteria laid down in NOMINET UK's Domain Rules. NOMINET UK does not accept any responsibility for any conflict with trade marks, registered or unregistered, or with proprietary rights to names in other contexts. A Certificate of Registration is not intended to be evidence of ownership of a domain name.
US	No	Policies described in RFC 1480 - The US Domain http://www.isi.edu:80/in-notes/rfc1480.txt No reference is made to trademarks.
InterNIC	Yes	Domain names are registered on "first-come, first-serve" basis. - Network Solutions does not determine legality of domain name registrations. - Applicant represents that registration of the domain name does not interfere with the rights of any third party, and that the domain name is not being registered for any unlawful purpose. - Network Solutions does not act as arbiter of disputes. - The Policy does not confer any rights upon complainants. Network Solutions may take action under the Policy if they are provided both a certified copy of a federal trademark registration certificate and a copy of the notice provided to the domain name registrant. In such cases NSI may place a second level domain name under a gTLD on 'hold'.

Source: OECD

Table 10. Whois: Availability of Registrars

	'Whois?' search engine available	Registrant Contact Details provided by Search	Other	URL
Australia	Yes	Yes		**http://www.aunic.net/namestatus.html**
Austria	No	No		http://www.aco.net/aconetus.htm
Belgium	Yes	Yes		**http://www.dns.be/domain-info/info.html**
Canada	Yes	Yes		**gopher://nstn.ns.ca:7006/7**
Czech Republic	List Only	Yes	(No search engine)	**gopher://gopher.eunet.cz/1/cz-info**
Denmark	Yes	No		**http://www.DK.net/nic/reslPno.html**
Finland	List of .fi		(No search engine)	http://www.thk.fi:80/yleista/englanti/internet.htm
France	Yes	Yes		**http://www.nic.fr/info/whois.html**
Germany	Yes	Yes		**http://www.nic.de/whois.html**
Greece	No	No	List of 2nd level domains for July 1996.	http://www.forthnet.gr/DNS
Hungary	No	No	No Information on Home page	http://www.nic.hu/
Iceland	No	No	Home Page Unavailable	http://www.ripe.net/cgi-bin/whois?-T+domain+IS
Ireland	List only	No	No Contact details	http://www.ucd.ie/hostmaster/ie-dom.html
Italy	Yes	Yes		**http://www.nis.garr.it/cgi-bin/HYsystem/HYNISreadconf?/usr/local/NIS/WAIS/whois-wais-conf/NISconf.system**
Japan	Yes	Yes		**http://www.nic.ad.jp/cgi-bin/whois_gate**
Korea	Yes	Yes		**http://www.krnic.net/cgi-bin/whois**
Luxembourg	List only	No	No contact details	http://www.dns.lu/
Mexico	Yes	Yes		**http://www.nic.mx/who/**
Netherlands	Yes	Yes		**http://www.domain-registry.nl/NLwhois.html**
New Zealand	Yes	Not displayed		http://servius.waikato.ac.nz/isocnz/
Norway	Yes	Yes	Registrations under .no are available via RIPE 'Whois'. DNS Zone check available.	http://www.ripe.net/db/whois.html http://www.uninett.no/navn/english.html
Poland	No	No		http://www.nask.pl/
Portugal	No	No		http://www.dns.pt/dns/
Spain	Yes	Yes		**http://www.nic.es/whois/**
Sweden	Yes	Yes		**http://www.sunet.se/domreg/**
Switzerland	Yes	Yes		**http://www.switch.ch/domain/search_form.html**
Turkey	No	No		http://www.metu.edu.tr/~dnsadmin/
UK	Yes	Not Displayed		**http://www.nic.uk/new/tools.html**
US	Yes	Only registrar details	RWhois available for sub-registrars	**http://www.isi.edu/in-notes/usdnr/rwhois.html**
InterNic	Yes	Yes		http://rs.internic.net/cgi-bin/whois

1. In shaded countries one or both items were not readily available. URLs in bold indicate site of search facility.

Source: OECD

Box 4: International Trademark Association Policy on Domain Names
(Source: Extract from Statement)

With every new market that opens around the world trademark owners generally experience a rash of counterfeiting activity until the market matures and is brought into the mainstream of commercial and legal norms. The Internet is just such a new market, albeit a "virtual" and global one. Most trademark owners are capable of managing the counterfeiting problems posed by a developing market, which is not to say that they should be passively tolerated.

Nevertheless, despite its global nature, there is nothing about the Internet that is so new or different that we need to adopt draconian and potentially unfair procedures to protect the interests of trademark owners. Indeed, the damage suffered in most domain name disputes is usually far less substantial than that found in a counterfeiting case, or even the average infringement case. Rarely is the damage lost sales or harm to reputation. Rather, in most cases, the greatest harm is that one may not be able to use one's trademark as a second level domain name on one's registry of choice (although alternate registries and higher level domain names are still available). In short there is little to justify the current NSI/InterNIC dispute policy and its potentially unjust results.

Nevertheless, Internet participants should be held accountable for their actions on the Internet, including their choice of a domain name. If their activities violate the rights of others, it should not be more burdensome than necessary for a victim to pursue legal remedies. The Proposal set forth [at http://plaza.interport. net/inta/intaprop.htm by the INTA] attempts to address the legitimate interests of all trademark owners as well as all legitimate users of the Internet.

Accordingly, this paper proposes that the current NSI Dispute Policy be recognised as a failure and eliminated, that domain name disputes be left to the courts, that NICs not participate in the resolution of domain name disputes, and that all NICs worldwide adopt identical domain name registration and renewal procedures along with publicly available registries of domain names, thereby (i) ensuring accountability by domain name registrants, (ii) allowing complainants sufficient information to pursue appropriate legal remedies against extortionists and infringers, (iii) reducing "deadwood", i.e., unused domain names, (iv) increasing the available pool of domain names, (v) ensuring fair and legally supportable decisions regarding domain names, and (vi) reducing NIC legal exposure and costs by taking NICs out of the dispute resolution business.

The NIC would maintain a public domain name registry, regularly updated a minimum of every 60 days (preferably more often) to include newly registered, renewed, and expired domain names. [Note that publication of domain name applications would occur within one week of receipt of a complete application, as described above.] The application and renewal information would be available on-line and any supporting documentation would be available for a reasonable copying fee. (It is anticipated that commercial watch services would develop to watch the various registries around the world on behalf of trademark owners and other interested parties.)

DOMAIN NAME PRICING

The majority of registrars in OECD countries charge for registration of second level domain names under TLDs. This practice is, however, fairly recent with charges being introduced, in most countries, between 1995 and 1997. In February 1997 an OECD survey of domain name pricing found that registrars in only six countries did not charge for their service. To this group can be added the United States in respect to the **.us** domain name.[76] InterNIC, based in the US, does however charge under certain gTLDs (e.g. **com, .org** and **.net**). In addition while charges are proposed in Canada, the **.ca** domain name had, at the time of writing, no set price. However Canadian IAPs generally charge customers for registering a name. In countries without explicit charges they are either being proposed, such as in the Czech Republic, or rely on the costs being met from other sources. Mostly this involves voluntary work by an individual or group located in a university computer science department. This reflects the origins of the Internet, outside the US, in that most connections to NSFNET were initially made by academic institutions.

In as much as registration and maintenance of a domain name involves a cost to the registrar then levying a fee for such a service is appropriate. A widely accepted principle, guiding the formation of telecommunication policy, is to encourage prices that are cost orientated and transparent. Where prices are not explicitly charged to the user, or charges are excessive, they fail to meet these criteria. Indeed with the growing use of the Internet by commercial users then not applying charges implies a cross subsidy exists between a registrar and such users. This would be true in the case, for example, that university resources were used to maintain a TLD. Accordingly the trend toward commercialisation of domain names, with fees that are cost orientated and transparent, should be welcome. The current problem is that, because monopoly authority has been granted for TLDs, the system is potentially open to abuse. Before examining this question it is necessary to clarify how registrars are currently charging for second level domain names under TLDs and compare these charges.

Domain Name fee structure

The OECD survey found that registrars with fees mostly charge an initial registration fee and an annual maintenance fee (Table 11). The only exceptions to this pricing structure, amongst registrars with fees, are in Denmark, France, Japan and Poland where the registration involved a one time fee. The registrar in Denmark has announced that an annual fee is payable but that it is currently set at zero. The registrar in France expects to introduce annual maintenance fees in 1998 (see below). The registrar in Japan charges a one-off fee to applicants but charges to members are made on the basis of how many domains they support. In practice this means IAP members of JPNIC are responsible for annual maintenance charges. JPNIC began charging to IAP members in April 1993, and also imposed a one-off fee in June 1995, prior to when Network Solutions instituted charges. Since that time, most registrars seem to have adopted a similar fee structure to that established by NSF when it authorised Network Solutions to begin charging for second level domain names under gTLDs in September 1995.

In 1995 NSF stipulated that Network Solutions could charge US$ 100 for a two year registration period covering both the initial registration and an ongoing maintenance fee. NSF further stipulated that renewal, thereafter, would be on the basis of a US$ 50 per annum charge to users. Under the agreement between NSF and Network Solutions, the company was authorised to retain 70 per cent of income in consideration for service provided. The remaining 30 per cent of the revenue derived from these prices was to be directed into a fund for the preservation and enhancement of "Intellectual Infrastructure" of the Internet. This revenue sharing arrangement suggests that both entities envisaged that US$ 35 per registration was adequate to cover Network Solutions costs and provide a reasonable return on their capital.

If the InterNIC price, agreed by NSF and Network Solutions, provides a benchmark it raises the question of how prices in other OECD countries compare. The OECD survey indicates that over a three year period, on average, users would pay US$ 195 compared to US$ 150 to InterNIC. If allowance is made to exclude the charge for "Intellectual Infrastructure", since no other registrar has such a policy, then users registering under TLDs pay nearly twice what users of gTLDs pay (US$ 195 versus US$ 105).

Among countries with registrars who have commenced charging fees the gap between registering a second level domain name under a gTLD and TLD nearly doubles in comparison (US$260 versus US$ 150). In the most extreme case a user in Iceland, over three years, would pay nearly six times (US$919 versus US$150) the amount for registering under a TLD (e.g. **mercedes.is**) as they would to register their chosen name as a gTLD (e.g. **mercedes.com**) with InterNIC. A similar situation exists in Germany where users would pay just over five times more to register under a TLD as opposed to a gTLD.

If a user wanted to register under a TLD in every OECD country, assuming they qualified under the various rules imposed by registrars, the total cost excluding tax would be US$ 3 174 in the first year and US$ 1 260 in subsequent years. Over a three year period the total costs, excluding tax, would be US$ 5 694 for each second level domain name registered. If the user wanted to register multiple second level domain names the cost increase would be commensurate with how many registrars allowed for this practice and the number of names registered in each country. Not surprisingly a number of companies have begun offering a service whereby they will carry out the registration procedure with the registrar on behalf of their clients. One such company, NetNames USA, charges customers according to the number of names they require to be registered (Table 12). If a user commissioned NetNames to register one name in each of the 29 OECD countries the total cost would be US$ 6 119 plus the charges of each individual registrar as applicable. In summary over a three year period a company would pay around US$12 000 (excluding tax) to have one domain name registered in each OECD country.

The actual cost of registering under a TLD and gTDL may of course be greater than this sum depending on the number of domains registered in each country and under a gTDL. One example is provided by Apple Computer (Table 13). Apple Computer has registered second level domains in most OECD countries and more than 70 second level domain names under gTLDs with InterNIC. If Apple Computer undertook this exercise itself, without intermediaries such as IAPs or a firm like NetNames, the total cost for a period of three years would be around US$16 000 (excluding tax and assuming one TLD in each OECD country).

Are prices cost oriented?

The differences in price between registering domains under TLDs and gTLDs prompt the question of whether prices are oriented toward costs. An immediate caveat in comparing second level domain prices under TLDs against a benchmark of gTDLs is that prices were not set by markets and

therefore may not reflect actual costs. However there has been no indication from Network Solutions that the current pricing structure, agreed with NSF, is not covering costs and providing a reasonable return on capital. Placing this issue to one side, the extreme difference in prices between registering a second level domain name under different TLDs (in the order of a multiple of ten between least and most expensive registrars with charges) further reinforce the need for the cost orientation question to be addressed. Regrettably, little data on registrar costs are available on the public record to inform this question, with few registrars to date publishing accounts (**Box 5**). Apart from market structure explanations there are few obvious or persuasive reasons for vast differences. The available evidence indicates that some registrars with monopolies, and no independent regulation, are benefiting from this situation at the expense of their customers.

Who is setting the prices?

A further aspect of domain name pricing by monopolies arises where registrar policies are set by downstream suppliers. In these countries the authority for managing a registrar has often been delegated to an industry association of IAPs. The fees to join such an association, and the rules on who may join, vary a great deal in countries where this system operates. In the UK the fee to join 'Nominet' is US$ 774, in the Netherlands US$ 1 179 ('Stichting Internet Domain Registration'), while the fee to join 'NIC France' is US$ 4 559. In the Netherlands membership is only available to Internet Access providers while in the UK membership is open to both organisations and individuals.

Members of 'association based registrars' receive discounts for domain name registration on the price available to the public. They are then free to charge the public at a higher or lower price for undertaking the registration process on their behalf. In the case of NIC France a user applying direct to the registrar would pay US$ 426 for a single domain name. By way of contrast a member of NIC France would pay US$ 74 or US$ 128 depending on whether they require technical support. **Table 14** shows the structure of domain name pricing in France based on NIC and selected IAP charges. Between 1995 and 1997 a user paid a one-off fee to NIC France for a domain name. A new pricing structure is envisaged by NIC for 1998 which will introduce annual charges, albeit some IAPs already charge an on-going fee.

There is a large range of French IAP prices but all are considerably more than the discounted charge they pay NIC France. Only one company appears to pass on some of the discount it receives as an NIC France member. A number of French IAPs will also undertake registration with InterNIC of **.com** for their clients. Their initial prices for registration are comparable with NetName registration in foreign countries but the ongoing charges, not charged by NetNames, make this a relatively expensive way to register a second level domain name under this gTLD.

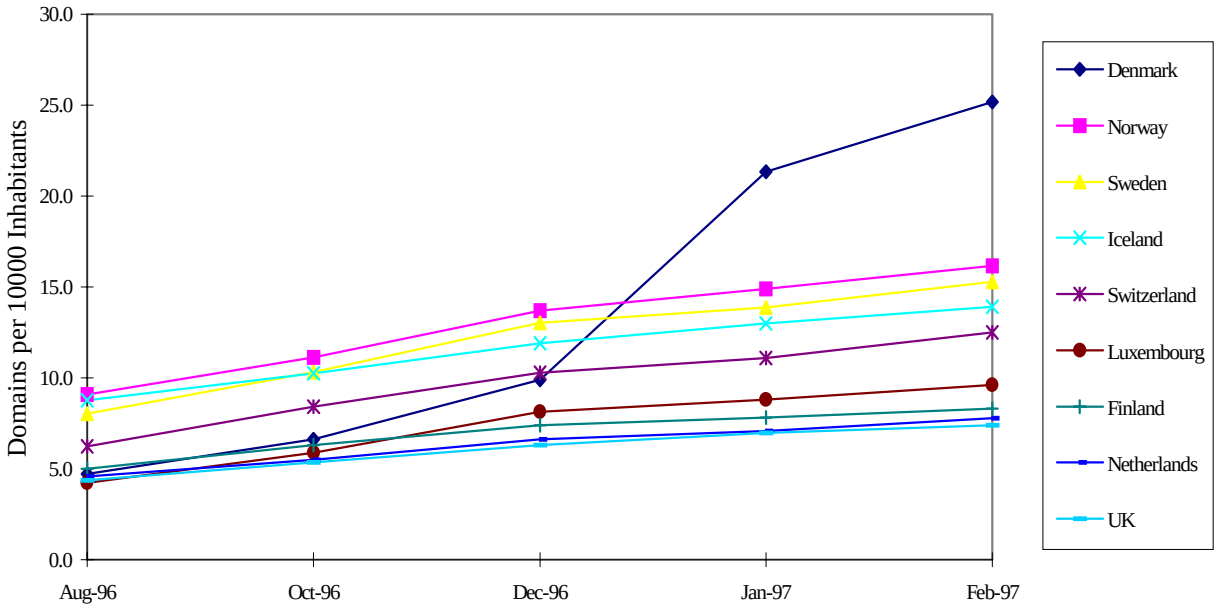
In one sense French IAPs are reselling NIC France services. In telecommunication markets resellers buy capacity in bulk and sell this capacity to their customers at a discount. The difference, of course, is that in the telecommunication industry the resellers do not play a part in setting the initial tariffs. Clearly, the danger with IAP's setting prices over a bottleneck based on a TLD registrar monopoly is that they can use this power to manipulate the prices they charge to end users. A further difference, between 'domain name resale' and telecommunication resale, has arisen in countries where registrar associations have created rules stating that end users can not apply directly to a TLD registrar for a domain name. In other words customers can only obtain a second level domain name under TLD from a member of the association controlling the registrar.

In January 1997 the Danish the industry association (FIL or *Foreningen af Internetleverandører*) controlling the **.dk** registrar created a rule stipulating that only its members could apply for second level domains under this TLDs. This rule was subsequently disallowed by the Danish Competition Council because they adjudged it to be against accepted competition principles. The question that needs to be addressed by policy makers in other countries, where associations control registrar pricing, is whether certain pricing structures have the same impact as the disallowed rule in Denmark. Clearly, if an association sets the 'direct to registrar price' at a much greater amount than they make available to themselves they are creating a barrier to customers dealing directly with registrars. Other competition issues were also raised by the Danish case.

In Denmark the introduction of new rules for the **.dk** registry caused an unprecedented rush to register domain names in January 1997 and its after effects were still being felt in February 1997. (Figure 1 -- Refer also Annex Table 17). The number of second level domain names registered under **.dk.** escalated from around 5 000 to 13 000 in just two months. Essentially what happened was that the members of the FIL took a decision to eliminate certain restrictions that had hitherto applied to the registration of domain names and to process only those applications made via FIL members. Examples of the restrictions that were lifted included not being able to register place names or needing to show that the name requested was already in use as a company name and so on. At the same time the ability for the public to directly access the **.dk** registrar was ended.

When the new **.dk** rules were implemented, Members of the FIL lodged thousands of prepared applications. In some cases IAPs registered between 300 to 400 names each including municipal place names as well as the names of prominent people and companies. The reasons why the FIL members acted this way are open to debate but the dangers are obvious. The primary motive would appear to have been that FIL members registered domain names, such as existing company names or others, on the basis that they might sell a service to the existing user of that name. In this way there are certain similarities between their actions and those of individuals registering existing trademarks and attempting to resell that name to the company concerned. The potential danger, before the intervention of the Competition Council, was two-fold. First the new rules opened up the possibility that a company's name might be held by an IAP that is not their preferred supplier of Internet access. In other words not only might their initial choice of service supplier be constrained but if they subsequently decided to change service suppliers they might not have been able to exercise 'domain name portability'. Second, the new rules had not clarified annual prices but said they would be determined by FIL members. While is was clear these prices would be payable by the customers no mention is made of FIL members paying annual fees. In other words the danger was that they could 'hoard' domain names without paying ongoing fees. It is clear from the available data that the names registered in Denmark ran significantly ahead of the expansion of Internet hosts between January-February 1997. The Competition Council has since insisted that access be non discriminatory and that users shall pay the same fee.

Figure 1: Domains Recorded in RIPE Survey



Box 5: How much does domain name registration cost registrars?

Large scale registration of domain names is a relatively recent practice and little information is available on the public record as to the ongoing costs of their undertaking. One organisation that publishes details of its expenditure is RIPE. In servicing regional IP registration needs of roughly 600 Internet Access Providers RIPE's budget for 1996 was US$971 000. Of this amount US$589 000 (61 per cent) was allocated against IP registration costs. This was accomplished with a total staff of 13 of which 6 worked on registration activities. In 1997 RIPE projected, that with an increase in demand from local registries, total staff will increase to 32 with 12 devoted to registration activities. The projected budget for 1997 is US$ 2.1 million. In January 1997 there were just over 150 000 second level domain name registrations under TLDs in European Member countries of the OECD. Allocating this number against the part of RIPE's budget devoted to registration activities in 1996 would imply that RIPE's share of the cost of registering a domain name was in the order of US$ 4 per second level domain names per annum. As RIPE does not directly manage the registration of second level domain names, but rather manages IP number allocation in Europe, this suggests the cost of managing IP numbers is a relatively inexpensive part of the DNS process. This raises the question of why the management of second level domains is more expensive than IP numbers. National registries for TLDs may point to the additional costs imposed by dealing with end users or economies of scale available to larger operators. On the other hand much of the process is or should be automated and IAPs undertake a significant part of the workload in many countries. At the same time there seems to be little correlation between the size of a registry and the price paid by users with some of the larger registries being more expensive than the smaller registries.

There are, of course, many other sectors of economic activity where registration is common and the costs well known. This raises the question of whether examples of registration costs in other sectors could provide benchmarks for examining domain name costs. The transport sector provides one of the most familiar registration and licensing processes.

The Californian Department of Motor Vehicles (DMV) is responsible for enhancing driver safety through the licensing of drivers, protecting the public by regulating the vehicle industry, issuing identification documents and collecting licensing and registration revenues.[77] As part of this responsibility, DMV collects revenue for various state and local government programs and provides information from its driver's license and registration files. DMV collects approximately $ 5.5 billion in revenues annually for the State of California. The Californian Governor's Budget proposed $ 531 million and 8 103 personnel years for DMV to carry out its responsibilities in 1996-97. At the end of 1995, DMV had 26.4 million registered vehicles and had issued 21.2 million current licenses and identification cards in California. If the total DMV budget, which involves numerous functions in addition to registration and licensing, is divided by the number of registrations and licenses then the cost of this process is US$11 per individual record.[78] This is much less expensive than the US$ 65 average annual fee for domain names across the OECD area.

Table 11. Domain Name Pricing, February 1997

	ISO Code	Initial Year(1) (US$)	Subsequent Years(2) (US$)	Total cost for first three years	Note
Australia	.au	46	46	139	
Austria	.at	108	36	180	
Belgium	.be	215	81	376	
Canada	.ca	121	0	121	i-Star charge one-off registration fee.
Czech Republic	.cz	0	0	0	Fees to be introduced during 1997.
Denmark	.dk	115	0	115	Registrar has as policy that annual fees are payable but is awaiting Competition Council fee approval.
Finland	.fi	80	32	144	TAC minimum proposed fee.
France	.fr	426	0 (N/A 1998)	426	Variable rates available from IAPs.(3)
Germany	.de	483	193	870	
Greece	.gr	0	0	0	
Hungary	.hu	0	0	0	
Iceland	.is	405	257	919	
Ireland	.ie	158	158	474	A discount is available to an entity registering five or more domains. Typically IAPs would be able to register second level domain names on behalf of their clients for half the standard price (4).
Italy	.it	0	0	0	
Japan (5)	.jp	114	0	114	Fee for an indirect application to JPNIC
Korea	.kr	0	0	0	
Luxembourg	.lu	124	74	273	
Mexico	.mx	50	50	150	
Netherlands	.nl	94	47	189	
New Zealand	.nz	47	33	113	
Norway	.no	66	11	87	
Poland	.pl	99	0	99	
Portugal	.pt	61	61	184	
Spain	.es	97	65	226	
Sweden	.se	0	0	0	
Switzerland	.ch	62	23	108	
Turkey	.tr	80	30	140	
UK	.uk	124	62	248	Trade discounts available from IAPs.
US	.us	0	0	0	

Table 11. Domain Name Pricing, February 1997 (Continued)

InterNIC	.com .org .net	50	50	150	
OECD Average(5)		107	44	195	
OECD Average of Countries with Fees(6)		140	60	260	

1. Registration fee and first year maintenance as applicable. Data shown are in US$ using purchasing power parity. In countries where prices are only quoted in US$ these data are used. Registrars in shaded countries did not charge for service in February 1997.
2. Annual fee as applicable (i.e. per annum fee in years subsequent to any period covered by registration fee).
3. NIC France plans to introduce a maintenance fee in 1998. Refer Table 14. The Danish NIC has also announced it will introduce an annual fee.
4. Some 90 per cent of second level domains under .ie qualify for a reduced rate rather than the standard registry charge (IEP 48 instead of IEP 100 annually). The reduced rate is available where five or more (number subject to revision) domains are handled by a single billing contact. This is usually, but not necessarily, an Internet Access Provider. IAPs have particular practices with regard to passing on this discount to the domain name holder.
5. The initial fee in Japan is 200 000 Yen. In Japan a user could pay US$57 registration fee via an indirect application through a JPNIC member. The JPNIC member can set an annual fee for these users. Users may also be liable for an annual fee from an IAP if they make a direct application to JPNIC.
6. OECD average includes the price of one gTDL from InterNIC.
7. This includes the price of one gTDL from InterNIC. Price includes 'Intellectual Infrastructure" levy.
8. These data were calculated by converting local currency to US$ expressed in 1995 purchasing power parity.

Source: OECD

Table 12. Netnames Registration Pricing

Quantity	Discount (%)	Amount per name (US$)
Under gTLDs from InterNIC		75
Under TLDs		
One to nine	No discount	249
10-19	10	224
20-29	15	211
30-49	20	199
50-70	25	186
More than 70	Negotiable	

1. The Netname fees are in addition to the registrar prices. Some package pricing is available for groups of countries.

Source: Netnames http://www.netnamesusa.com/pricing.html

Table 13. Apple Computer TLDs and gTLDs

Registrar	Apple Computer Domain Name Registrations	Price for 3 Years (exc. tax) (US$)
Australia	apple.com.au	139
Austria	N/A	180
Belgium	apple.be	376
Canada	apple.ca	121
Czech Republic	apple.cz	0
Denmark	apple.dk	115
Finland	apple.fi	144
France	apple.fr	426
Germany	apple.de	870
Greece	N/A	0
Hungary(1)	hdsys.hu	0
Iceland	apple.is	919
Ireland	N/A	474
Italy	apple.it	0
Japan	apple.co.jp	114
Korea	N/A	0
Luxembourg	N/A	273
Mexico	apple.com.mx	150
Netherlands	N/A	189
New Zealand	apple.co.nz	113
Norway	apple.no	87
Poland	apple.com.pl	99
Portugal	N/A	184
Spain	apple.es	226
Sweden	apple.se	0
Switzerland	apple.ch	108
Turkey	N/A	140
UK	apple.co.uk	248
US	N/A	0
gTLDs	apple.com (and 73 others)	11100
Total Cost to Apple in OECD area		15829

1. TLD of the host computer for Apple's site in Hungary.
2. Shaded countries are not included in the total cost.
3. These data were calculated by converting local currency to US$ expressed in 1995 purchasing power parity.

Source: OECD

Table 14. Domain Name Pricing in France

Registrar	Registration/ 1st Year (US$)	Subsequent Years (US$) (2)	Note
NIC France	74	0 (1998 N/A)	NIC price for Member IAPs (without technical support). Membership costs US$ 4559.
NIC France	128	0 (1998 N/A)	NIC price for Member IAPs (with technical support). Membership costs US$ 4559.
NIC France	426	0 (1998 N/A)	NIC price for the public.
Internet Access Providers (IAPs) charges to the public for undertaking **.fr** registration			
@SI	532	0	1998 subsequent year price not available.
Easynet	365	152	1998 subsequent year price not available.
Francenet	456	0	1998 subsequent year price not available.
Magic	456	0	1998 subsequent year price not available.
Nice	228	729	1998 subsequent year price not available.
Netbenefit	228	0	1998 subsequent year price not available.
Internet Access Providers (IAPs) charges to the public for undertaking **.com** registration			
@SI	228	228	Including InterNIC fee.
Francenet	456	0	Plus US$50 per annum to InterNIC.
Easynet	456	228	Including InterNIC fee.
Magic	75	75	Plus US$50 per annum to InterNIC.
Nice	729	729	Including InterNIC fee.
Netbenefit	137	137	Plus US$50 per annum to InterNIC.

1. All prices exclude tax.
2. NIC France envisages annual fees will be introduced in 1998 but the new fee structure has not been announced at the time of writing.
3. These data were calculated by converting local currency to US$ expressed in 1995 purchasing power parity.

Source: OECD

DISCUSSION OF POLICY ISSUES

A growing number of issues are emerging for government consideration as the Internet community introduces reform to cope with the rapid expansion of access to the network and proliferation of services. At the same time, to date, most OECD governments have not played a leading role in Internet governance. In large part this is because 'rights of governance' have been inherited from the Internet's historical origins in the academic community and not from law makers in the same way as many other communication services in the recent past (e.g. authority to regulate telecommunication or broadcasting). At a time when governments are liberalising communication infrastructure and services there is little desire on their part to assume such a mantle. In this they are correct. Indeed policy makers are also conscious of the fact that premature regulation by government may impede the development of a dynamic part of global information infrastructure. This does not mean, however, that governments should not look toward the reforms being introduced by others to see if they are consistent with national and international communication policy objectives. For example policy makers would not wish to see new monopolies created without giving thought to intervention to introduce competition or regulatory safeguards. The granting and management of domain names should comply with the principle of non-discrimination. At the same time governments are users of the domain name system, and some may want to reserve certain second level domains, under national TLDs, for official use for their existing entities in appropriate linguistic terms. Moreover governments will be mindful of how these reforms might impact on wider concerns in areas as diverse as law enforcement, taxation, intellectual property rights, electronic commerce and consumer protection.

One of the most pressing issues in relation to the Internet's transition to a fully commercial communication network is DNS reform. Governments are increasingly being asked to take positions on gTLD reform and TLD reform. Most current initiatives, launched from within the Internet community, focus on reform to the registration of domains under gTLDs. Indeed proponents of such reforms, such as the IAHC and others, appear to have forgone an opportunity to comment on TLD reform (perhaps pragmatically given the challenges in reaching international consensus on gTLD reform). Instead, the IAHC notes that it recognises the national interests of sovereign nations in setting policies for TLDs. Similarly the eDNS proposal for the new administration and creation system for gTLDs explicitly states that two letter TLDs are reserved for countries.

A growing number of key policy questions face OECD governments in respect to proposed DNS reform. Some of these issues might be categorised as being very similar to issues that have arisen as governments have reformed their communication polices over the past several years. For example the degree of liberalisation which should be introduced into DNS administration has obvious parallels in other communication markets. There is far greater experience amongst communication policy makers in dealing with these issues than in some of the other emerging issues. Other issues relate to new ways of conducting economic and social activities made possible by the Internet in which the DNS system is a critical component of identification. Anthony Rutkowski, past Executive Director of the Internet Society, has been one of the few people to highlight the importance of the DNS in this respect. According to Mr Rutkowski:

> "Knowledge of identifier registrants, as well as authentication of the associated responsible individuals or legal persons, is critical to the maintenance of a reasonably secure Internet infrastructure, to the detection and control of harmful, abusive, or illegal conduct, and to achieving a level of acceptable trust for commercial transactions and deployment of mobile agent applications and services. The last arises because domain names are part of the construct that identifies mobile agent objects and places. As the Internet and related electronic commerce grows in importance and scale, security considerations will become ever more important, and maintaining desired levels of security more difficult. Stability and security in the conduct of registration activities is a critical component of addressing these and other national security concerns and needs."[79]

It is, therefore, incumbent on governments to examine closely the reform proposals being made for gTLDs and to review national policies in respect to TLD registrars. The most pressing issues arise in consideration of market structure as well as how closely registrar policies align with the other government objectives noted above.

Competition between registries

In one sense competition can be said to exist between gTLD and TLD registrars because for some users their services are substitutable. For many business users, however, this is not the case. The examples the domain names registered by Mercedes-Benz and by Apple Computer show that firms engaged in electronic commerce are using domain names in ways that go beyond needing a single domain from a single registrar. As such, the available evidence indicates that in the transition to a commercial Internet market, entities have emerged with monopoly power over the DNS -- a key building block of information infrastructure and electronic commerce. There is already evidence of questionable pricing from monopoly providers of DNS services in a number of OECD countries. Additional questions are being raised where downstream suppliers set policies for registrars which do not always appear to be in the best interest of users.

Important competition questions may arise over ownership of key parts of the DNS infrastructure. To date most of the controversy regarding domain names and intellectual property rights has been in regard to second level domain names. For example if there was a dispute over **oecd.org,** and another entity challenged the OECD's right to use that name, then the ownership claim would be in relation to the letters '**oecd'** rather than '.**org'**. However a more recent development is the suggestion by some entities that they own the intellectual property rights to top level domain names. This raises questions of whether competing registrars will have, or should have, equal rights to existing or proposed gTLDs. In respect to generic and top level domain names, absent of trademark right, all claims in strings of letters are arguably quite spurious. Generally users of second level domain names have acquired a right to use it for a certain period of time for a certain purpose and no more. The practice in some national TLD registries of requiring a one-off fee for perpetual rights to use a second level domain name is generally being phased out in favour of annual fees. In respect to second level domain names an analogy with telephone numbers and street addresses merits discussion. Consequently many feel, including the European Commission, that every effort should be made by the DNS administration and by public authorities to restrict DNS registration by those other than the final user and to discourage the hoarding of second level domain names. In respect to the ownership of DNS databases, the Clinton Administration has taken the position that the US government should, if necessary and in accordance with the provisions

in the co-operative agreement with NSI, receive a copy and documentation of any and all software and data generated by NSI under the co-operative agreement in such a form and sufficient detail as to permit shared registration in the .com space.[80]

The existing global DNS root-level name servers, deploying the IANA authorised domain names, are also key infrastructures. If the owners of these DNS servers do not enable them to accept routing for addresses registered with alternative infrastructure providers these root server system operators would be at a distinct disadvantage relative to IANA authorised registrars. Alternative root server system operators have requested recognition from the operators of global root-level name servers using the IANA address system.[81] In May 1997 the IANA responded with a statement, saying that any future decisions on new gTLDs should be taken via the entities charged with implementing the IAHC proposal.[82] This raises the question of whether this situation is akin to interconnection debates in telecommunication. Reciprocal recognition between these DNS servers and alternative infrastructure providers would enable a much more level playing field. Due to the fact that governments are in some cases the ultimate owners or provide funding (i.e. public universities) for these global root-level name servers, a proactive competition policy would be to direct those operators which are public funded to accept address updates from new registrars.

Further competition issues are likely to arise as registrars enter into commercial agreements with suppliers of 'value added DNS services'. For example, in March 1997, Network Solutions and VeriSign announced the availability of 'one-stop registration' for organisations wanting to establish authenticated sites.[83] This agreement enables customers to enrol for VeriSign's service at the same time they register a domain name. VeriSign provides customers with certificate and digital ID services.[84] The VeriSign service aims to provide the client's customers with the confidence that they are receiving information from, or making transactions with, an authentic website. The VeriSign service is priced at US$290 per initial server authenticated followed by an annual fee of US$75. The main advantage for VeriSign is that they have direct access to Network Solutions' customers (currently running at 80 000 new registrations per month) and its database of existing customers. This raises the question of whether other companies wanting to provide authentication services would be able to negotiate the same access. The potential commercial benefits of such an alliance may well prompt a race amongst authentication services to sign up TLD registrars around the world.

If a TLD registrar, with a monopoly, entered into an agreement with a firm such as VeriSign, experience in other communication markets indicates there will either have to be safeguards or liberalisation to protect competition in the value added DNS service market. Similar issues may arise as a result of agreements between registrars and Internet access providers. In March 1997 Network Solutions announced that it had signed an agreement with a number of leading IAPs to provide them with a 'premier domain registration service'. In announcing the agreement Network Solutions stated their "...offering is the only domain registration service guaranteeing all new registrations and modification updates within one business day, global updates within two business days and around the clock account services."[85] According to Network Solutions this will mean registration will be quicker via participating Internet access providers than any other method (i.e. direct registration or other non participating intermediary).

OECD governments have a range of policy options available in respect to market structures for registration under a gTLD and TLD. For gTLDs registration these range from supporting the immediate opening of markets (along the lines proposed by alternative root server system operators) to the more measured, but still vigorous approach, proposed by the IAHC. No proposal has been made for retention of gTLD registration in the hands of a single supplier. Far less discussion has occurred in respect to TLD reforms. One notable exception to this is that RIPE has convened a working group, currently discussing terms of reference, to study TLD reform (Box 11).

Industry initiated reforms and self regulation are preferable and should be regarded as a "first best" option for governments. At the same time drawing on experience in other communication markets where there is monopoly provision of service, several options are available to governments if self regulation by monopoly TLD registries emerges as a barrier to the development of electronic commerce or other public policy goals: Drawing on experience in other communication markets several options suggest themselves:

a) In the absence of choice in the market, publication of international pricing comparisons, using a harmonised methodology across the OECD area, would give one indication of the reasonableness of prices to policy makers and consumers. An annual comparison, using the methodology described in this report, could be incorporated into the OECD's set of communication indicators.

b) Encouraging the publication of the accounts of registrars, including separate itemisation of the major areas of expenditure, would give some indication of efficiency in the absence of competitors.

c) In the absence of competition a further option would be for governments to introduce price supervision or controls. These could range from the need to consult with a regulator prior to setting fees (as occurred in Switzerland) through to regulatory participation in pricing decisions (underway in Denmark).

d) The introduction of an open market for gTLDs and national TDSs. For gTLDs this could be achieved by supporting one or another of the market reforms currently proposed from within the Internet community. For TLDs governments could either encourage a fully open market or, for example, by encouraging gTLD registrars to also undertake TLD registrations.

In relation to the introduction of competition between registrars government oversight and action may be required to ensure 'interconnection and equal access' to infrastructure. For example, it may be necessary to ensure the existing global root-level name servers are programmed to recognise new TLDs. In a competitive market it could also be necessary for governments to ensure that the necessary co-operation needed between registrars, in respect to databases, occurs in an efficient manner. In the absence of competition it would also be necessary to ensure value added service suppliers have equal access to databases and that registrars do not compete unfairly in the value added DNS market. The IAHC has proposed,

> "If multiple registrars share a registry and they have a fully co-operative relationship, the repository for the registry can be maintained using fully distributed data base technology. If the registrars for a registry have a mutually suspicious relationship -- as is typical in competitive business circumstances -- then the repository for that registry needs to be operated by a trusted, independent third party, with simple rules of access. Particularly appropriate rules include fair use and assigning precedence for competing requests on a first come, first served basis. A steward has oversight responsibility for a registry, ensuring that it is operated in the public trust. If the registry is a monopoly, the steward, the registrar, and the operator of the repository are typically one and the same. When multiple, competing registrars exist for a registry, it is appropriate to have independent stewardship. This ensures operation of the registry in the public trust. It assesses performance of the repository and the registrars, enacting changes as necessary".[86]

Other competition issues may be raised by registrar policies. For example if an industry association controlled registrar, with a monopoly, creates a policy which states that customers can only apply for domain names via a Member of that association it raises several concerns. One is that the association members might act to register potentially valuable names in advance of customers in an effort to lock customers into their service. Additional problems may arise if Members of the association, who are downstream suppliers of DNS registration, set a price differential between themselves and the public price for direct access to the registrar service. If the margin is sufficiently large to make it prohibitive for customers to deal directly with a registrar then the same impact might be achieved.

Another registration policy which may raise competition issues is the prohibition in some TLD registries of taking applications from individuals. In practice this would mean an individual would have the name of a particular IAP inserted in their domain name. This would be important in terms of portability of addresses for individuals should they choose to switch Internet Access Providers. For example if an individual wanted to register their name in a country such as Hungary they would have to approach an IAP. In Hungary, their domain name would be **personname.iapname.hu** and if they created a world wide web page or used e-mail their addresses would include this information. If they then changed IAP their address would be **personname.newiapname.hu**. This raises the question of whether individual consumers should have the same rights of portability as companies and organisations who are able to register directly (i.e. **companyname.hu**) and therefore do not have to change their domain address if they change IAPs. Some may raise technical reasons for preferring that individuals are not permitted to register directly. If these reasons have merit they need to be assessed alongside policies of registrars which accept applications from individuals.

Naming, identification and location

The question of location and identification in relation to Internet use is rapidly emerging as a major issue for governments. A great deal of existing legal and regulatory frameworks are based on some notion of the location of an individual, organisation or corporation. These definitions are being seriously challenged by new communication capabilities made possible by the Internet. Tax policy, for example, needs to be reviewed in light of new ways of conducting electronic commerce as well as what the implications might be for compliance. As the US Department of the Treasury Office of Tax Policy has pointed out current definitions of location or presence, which are fundamental to all parties concerned in understanding their rights and obligations, are being very much challenged by the Internet (Box 6).[87] Developments in respect to 'Intelligent Agents' promise to exacerbate the need for reviews of definitions of location and presence (Box 7). A related set of issues are raised in consideration of questions of identification in terms of user responsibility. These matters have much wider implications for governments than taxation. For example they go to the heart of a set of issues emerging in relation to illegal or harmful content and how identification of the responsibility might be made. Similarly identification is important for electronic commerce in relation to authentication and consumer protection, as well as any potential that might exist to redress fault or fraud.

Consideration of these matters goes well beyond the traditional concerns of communication policy. What can be highlighted here are the issues raised by the US Treasury Office of Tax Policy in relation to the domain name system. These include the points that there is a 'weak correspondence between computer domain name and reality' and 'a lack of central control over registration'. In terms of correspondence between the location of a host and a domain name it is true that there is not necessarily a correlation between a TLD and a certain country. A host computer with the address **.lu** is not necessarily located in Luxembourg and there is no reason that this should be the case. However it is also true that the

policies applied by registrars over who can apply, what information they need to provide with applications, and whether that information is readily available in an accessible form, provide the only current line of information and possible assignment of responsibility available.

The introduction of maintenance payments for domain names dictates the need for registrars to have accurate information and billing systems. To the extent that this may be of assistance in the prevention of illegal and harmful content, taxation compliance issues etc. it is highly important for governments to focus on the domain name system and reforms that may be necessary. For example what is the penalty, if any, for knowingly providing false and misleading information during registration of a domain name. Moreover governments may need to review if existing laws are adequate in relation to individuals or organisations 'hacking' into some part of the DNS, for the purpose of redirecting requests for address resolution or other malevolent reasons. At the same time if governments have certain information and access requirements these need to be clearly defined and made known to registrars. If, as appears likely, there are to be multiple registrars some form of licensing system may be required to ensure compliance with these requirements.

The other question that arises is whether domain names should be further differentiated for purposes of industry self regulation. At the moment a number of reform proposals have been made to expand the number of gTLDs to improve customer choice and perhaps mitigate trademark disputes (see below). Approaching this reform from a different perspective it might be asked whether there would be merit in having certain gTLDs devoted to emerging codes of industry self regulation. For example, gTLDs such as **.adult** or **.guns** might be used by companies marketing legal products on web sites that parents may not wish minors to access. This idea has similarities with the numbering system used by France Telecom for management of certain Minitel services. It would be a relatively simple process for parents to disable a browser from accepting material from a **.adult** or **.guns** site. This could, of course, also occur with second level domain names (e.g. **adult.be** or **adult.com**) but only if registrars created such categories for multiple applications.

At the moment products giving rise to certain concerns are almost invariably under **.com**. One US trademark dispute highlights potential difficulties with the present system. In this case Hasbro Inc., a maker of children's toys had registered the trademark 'Candy Land' in 1951.[88] Another party registered the domain name **candyland.com** for the purpose of placing sexually explicit material on the world wide web site. If a more appropriate gTLD had been available not only might the trademark dispute have been avoided but potential confusion and discomfiture for parents and children. Such a system, if the idea is welcomed by business users for systems of industry self regulation, might augment software screens (e.g. Net Nanny, Cyberpatrol etc.) or rating systems such as the Platform for Internet Content Selection (better know as PICS).[89]

. It is difficult to foresee all the potential problems with introducing gTLDs such as **.adult**. The first objection is that decisions about DNS issues should primarily be made on what is in the best interests of the efficient working of the system, and therefore not be linked with 'content and conduct issues'. The second caveat is that the system could only function with widespread voluntary support, particularly amongst those users that would have to bear the cost of changing their domain name. The main consideration here may well be the time and effort invested in promoting an existing URL. Nevertheless some 'adult' industry associations, and many people making submissions to the US Department of Commerce's NOI, continue to call for such a system to be put in place.[90] Clearly a major concern of some service providers would be that even though such a system was first introduced on a voluntary basis if would eventually become required by law makers. Different actors in the communication sector (e.g. registrars and IAPs) may also be concerned that they may be asked to police such a system. Other pitfalls that are raised concern the difficulty in categorisation for some service providers, particularly if there were

multiple gTLDs of this nature. Similar problems may arise due to the different linguistic names that might be applied around the world. In addition filtering software would have to be able to block not only nominated gTLDs such as **.adult** but also the underlying IP Number. In other words the system would not be workable if it could be defeated simply by inserting an IP number instead of a URL.

At the same time a plethora of new questions are raised with the creation of more specific gTLDs. Alter NIC and eDNS proposals, have gone much further down the path of creating function orientated gTLDs than the IAHC. The new names suggested by the IAHC are still of a general nature rather than referring to specific professions or business activities. By way of contrast Alter NIC has **.med** as one of its gTLDs for medical related domains and **.tour** for tourism and travel. If, as seems likely in future, the number of specific gTLDs increases, governments may need to be mindful of how consumers might interpret such names in terms of any legitimisation or authentication they may confer. Obviously some relationships are built much more on long standing trust than identification tags. A consumer is not likely to sign up for an on-line financial service just because the domain name used is **.bank**. On the other hand if the development of communication technologies continues apace it is not difficult to envisage that in future people might use the DNS to locate a service just as readily as the 'yellow pages' of a telephone book today. That being said, there is widespread opposition to the DNS being developed as a directory service. Most agree a much better approach is to continue to encourage the development search engines to provide such services.

This raises the question of how industry or government regulation might adapt. For example, if the medical profession decided to employ **.medic** and agreed that this should be limited to registered medical practitioners would DNS registrars and governments support such an endeavour. If so it raises the question of what might be the costs and benefits. At the same time if certain professions or business associations set the rules in relation to specific generic domains what issues might that give rise to in the future. Further issues may be raised by the creation of new gTLDs in relation to language. All of the new gTLDs proposed in the IHAC plan are derived from English or French, although some of them exist as words, parts of words or closely resemble words in other languages. The main point here is not to comment on the particular choices but to note that such decisions (beyond the actual number created) are not technical but in the realm of international public and commercial policy issues. If the Internet community adopts a system of determination of gTLDs by a central authority, as opposed to registries introducing their own 'branded' gTLDs, many will want this authority's processes to be inclusive of different languages. At the same time it should be noted that second level domain names in appropriate linguistic terms can be created under national TLDs.

Trademark issues

The issue that has attracted the most attention in relation to the DNS is the conflicts that have arisen between different parties wanting the same domain name. It is a fundamental characteristic of the DNS system that there can be only one registration for each 'user friendly' domain name overlaying a numeric IP address. If Apple Computer has registered **apple.com** or **apple.be** then Apple Records can not register the same names and vice versa.

For some companies with the same, or similar names, there are obvious alternatives. Apple Records has, for example, registered **applecorp.com**, **thebeatles.com** and **yellowsubmarine.com** among others. If the proposals for gTLDs are implemented the choice for companies with the same, or similar names, will be increased. For example, if Apple Records so chose it might register **apple.arts** following the IAHC proposal or **apple.biz** under the eDNS proposal. The potential downside of creating more gTLDs is that some companies might feel compelled to register their name under every domain germane

to their business. This issue is well recognised in discussions of DNS reform but on balance the IAHC concluded the potential benefits (i.e. greater choice and increased competition) outweigh the potential risks (i.e. immediate duplications). Interestingly the IAHC has also proposed that TLD registrars give consideration to expanding from one to multiple TLDs. In other words a user might have a choice between **.be** or **.belg** and so forth issued from a TLD registrar.

Despite the widespread attention they command disputed domain names make up only a very small part of the total number of registrations. At the end of 1996 InterNIC had processed 715 disputes which made up 0.09 per cent of the total number of registered domains. The number of disputes being taken into the courts is only a fraction of that number. In the case of InterNIC just 18 disputes have led to law suits naming NSI as partner -- the equivalent of 0.002 of total domain names registered.[91] Of these legal proceedings 11 suits were filed by trademark owners (4 dismissed, 2 not served, 5 pending) and 7 suits filed by domain name registrants (4 dismissed, 2 stayed, 1 pending).[92]

These data are not highlighted to diminish the importance of trademark issues and the DNS. In themselves they indicate that some individuals and companies view their preferred names and trademarks as critical assets. They also indicate that registrars could face large legal costs even with only a relatively small number of disputes being taken to court. Rather the data are highlighted to put trademark disputes and the DNS into perspective. In a similar manner INTA, while being very concerned with protecting trademarks, have also placed this issue in perspective relative to other trademark problems such as counterfeiting (refer Box 4). Indeed INTA's recommended approach is for registrars to abstain from intervening in disputes and instead focus on improving registration procedures. Furthermore INTA recommends that these improved procedures and policies be harmonised across registrars.

The policies of gTLD and TLD registrars could not be said to be harmonious at present across the OECD area. Examples of such policies, in some registrars, include not accepting applications from individuals; only accepting names closely related to company names (i.e. precluding brandnames and subsidiary names); only accepting registrations from companies or organisations registered in that country; limiting registrations to one per applicant; and so on. By way of contrast other registrars have policies which are exactly the opposite. If there are sound reasons for a certain policy direction it raises the question of why the differences between registrars are so stark. To the extent that policies are driven by some registrars seeking to shield themselves from trademark disputes it seems to have resulted in vast policy differences. Moreover it is not clear how some decisions were taken nor from where the authority to set such policies is derived. WIPO has undertaken activities with respect to trademark issues on the Internet, especially the question of the relationship between trademarks and Internet domain names. A meeting of consultants on trademarks and Internet domain names was held on 12 to 14 February, 1997 to examine certain possibilities for addressing problems in this area. WIPO further discussed issues such as domain names registration systems, dispute settlement procedures and registration of domain names as trademarks at the first consultative meeting on trademarks and Internet domain names from 26 to 30h May, 1997.

Some issues on which there were general agreement at the WIPO meeting, in May 1997, included the desirability of early publication of new domain names, in a manner which is quickly and easily searchable, and which includes appropriate contact information.[93] It was also felt worthwhile for WIPO to gather, compile and distribute information concerning current policies of national and regional trademark offices concerning trademark registration of domain names. It is also planned that WIPO will convene meetings involving national and regional trademark offices and national domain name registries, to discuss issues relating to trademarks and Internet domain names in the context of the ISO 3166 country-code TLDs. One of the tasks envisaged is that WIPO will undertake discussions toward harmonisation of national law on relevant issues of trademarks and Internet domain names. A further meeting was held by

WIPO on these issues 1 and 2 of September 1997. One of the items under discussion was the appropriate issues to be included in such discussions on harmonisation. Another item was further discussion of the proposed administrative challenge panels proposed under the gTLD-MoU. Further information on WIPO activities is available at http://www.wipo.org/eng/internet/domains/index.htm

Box 6: Extract from "Selected Tax Policy Implications of Global Electronic Commerce", Department of Treasury Office of Tax Policy"[94] (November 1996) *Emphasis added*.

6.3.1. Radically decentralised; no central control. The Internet has no physical location. Users of the Internet have no control and in general no knowledge of the path travelled by the information they seek or publish. Many participants in the system are administrators or intermediaries who have no control over what type of information travels over their computers; rather they offer interconnectivity which enables the system to operate. In practical terms, it would therefore be difficult to monitor or prevent transmissions of information or electronic cash across the Internet. From a technical perspective, in principle and generally in practice, it makes no difference whether the information or electronic money sought to be transmitted are within one jurisdiction or between several, as the Internet pays little or no regard to national boundaries.

6.3.2. Disintermediation. In general, tax compliance is facilitated by identifying key "taxing points:" for example, reporting requirements can be imposed on financial institutions which are easy to identify. In contrast, one of the great commercial advantages of electronic commerce is that it often eliminates the need for intermediating institutions.

6.3.3. Weak correspondence between computer domain name and reality. The pieces of an Internet address (or "domain-style name") tell you who is responsible for maintaining that name. It may not tell you anything about the computer corresponding to the actual Internet address, or even where that machine is located. Even if an e-mail address is clearly associated with a certain person and computer, that person and his computer could be located anywhere in the world. This makes it difficult to determine a person's location and identity, which is often important for tax purposes.

6.3.4. Lack of central control / Registration. It is not difficult to introduce a new computer to the Internet. Registration requirements are not difficult to satisfy, and there is little to prevent transfer of the site to new controllers. In general, proof of identity requirements for Internet use are very weak.

6.3.5. Auditability / Remote control. Untraceable use of an Internet site, with the permission of the site's controllers, is quite easy to arrange. For example, if Anne, who lives in Australia, is running a commercial site on the Internet for U.S. customers, using a computer located in Canada, Anne can control the Canadian computer from Australia through a series of computer programs which can be configured to leave no audit trail. Moreover, if the need arises, operations can be shifted to somewhere else on the Internet.

6.3.6. Detection of contents. Since all electronic communication consists of streams of binary digits, it is difficult, if not impossible, to determine the contents until converted. At present, a personal letter appears indistinguishable from a message transmitting electronic money. Even if the nature of the contents is determined, the use of encryption could preclude comprehension.

Box 7: Intelligent Agents, Identification and Location

A full discussion of intelligent agents, sometimes called autonomous agents, is beyond the scope of this paper.[95] Intelligent agents is the term applied to software that will search the world wide web for information and retrieve data its programming leads it to believe is relevant. An example of a company creating and selling intelligent agents is Autonomy (**http://www.agentware.com/),** based in the UK**,** which claims to have distributed more than 750 000 such agents. While autonomous agents work much like a search engine the main purported advantage is that they can 'learn' about a user's preferences. For example an agent might return certain data resulting from a search and then ask the user if individual items are of interest. The user then answers in the affirmative or negative. Hence, it is claimed, that agents over time become more effective search and retrieval tools.

One example of an application for an intelligent agent is to compile a daily news summary on items of personal interest to the user. The information collected might come from a variety of sources on the Internet. An additional service proposed by Autonomy is for an agent to search the world wide web for art with the aim of building a user's personal electronic gallery. Other purported applications include prioritising e-mails and acting as screens for undesirable content.

One of the most intriguing aspects of intelligent agents is that they can perform searches off-line if a server elsewhere is appropriately equipped. In other words, by employing an intelligent agent a user could receive a pre-assembled personal newspaper, or the results of some other search and retrieval exercise, immediately after they go on-line. To the degree that such a technology works effectively the advantages are obvious. A user of such a technology might save both their own time, and Internet access and telecommunication charges, as well as having an electronic research assistant.

The main interest, however, in briefly discussing intelligent agents in this context is to highlight the implications they may have for defining a user's location in relation to the Internet. If an agent, acting on behalf of a user, works from a server located anywhere on the Internet how does that impact on 'location based definitions' of an Internet user? Additional questions may be raised if intelligent agents exchange information. One feature of the Autonomy system is the ability of agents to exchange information. For example if a user trained their agent to retrieve information on a certain subject on the web, the agent could exchange this interest with another agent programmed with the same interests. While the developments noted above hold out promise of tremendous benefits for users the technology is still clearly in the early stages of development. Indeed Autonomy, in commenting on the media treatment of Intelligent agents, has stated, "A future is envisioned of agents as the interface that we use in our dealings with computers and the Internet. Many such claims reside firmly in the land of science fiction: agents that talk to you in the middle of a negotiation or that take your credit card details out to buy the best value used Ferrari."[96] At the same time is it too fanciful to imagine a future Internet world in which intelligent agents, empowered by their owners with micro payment systems, could complete microfinancing transactions to build Autonomy's personal newspaper or art gallery? At the very least the idea that in future it might be possible to instruct an agent to purchase a CD, for example, at the best price from a defined list of 'trusted' vendors and undertake its on-line retrieval is an interesting talking point. [97] Other questions might be raised in relation to a users responsibility for their agent's actions.

Box 8: Network Solutions Proposal for DNS Reform
(Source: Extract from NSI's Secure Internet Administration and Competition in Domain Naming Services, http://www.netsol.com/)

Five guiding principles of NSI's plan:

1. Limit regulation

Domain name registration should be driven by the marketplace and commercial interests; it should not be unduly regulated. It has been demonstrated time and again that an unregulated or limited regulatory approach is the most cost effective and eliminates the need for publicly-funded or artificially-funded regulatory structures. No other approach will encourage investment in registration and ancillary services with the same intensity. Under this approach, the customer, not a governmental bureaucracy, is king, ensuring the highest levels of service and service offerings. Customer demand creates a built-in incentive to generate improvements in service, the development of additional services, and the most creative solutions to evolving problems. The non-regulatory approach also offers the only possible funding model through which the level of service can expect to meet the level of demand.

2. Limit bureaucracy

Domain name registration is not, and should not be, a "public trust" managed by newly created bureaucracies. The notion that TLDs or second-level domain names are a "public trust" is based on a number of misconceptions. It is assumed that second-level domain names are a limited commodity which, unless somehow regulated, will run out. This assumption is unfounded, as the number of second-level domains in each TLD is, for all practical purposes, limitless (37 to the power 26). Even the number of short domain names is significant. There are more than 25 000 000 second-level domain names of a length of 12 characters or less in each "generic" TLD for each person on earth (approximately 4 billion). We should not confuse the potential domain name space with such concepts as "radio spectrum", with its inherent physical limitations. What we are actually discussing are appealing monikers, which have the powers of brand identification and, in certain instances, have legal trademark implications.

Under our vision, TLDs (and second-level domains) will be developed as brands by competitors entering the Internet. Internet entrepreneurs and Internet end users must be allowed to decide the selection of TLDs. There is no need to limit the number of TLDs or to pre-select the TLDs themselves. In fact, market forces, not committees, should determine the most desirable brands. TLD branding and ownership, not bureaucracies, will foster increased choice by Internet consumers and increased investment by TLD providers.

3. Minimise requirements

Any requirements for competition for the administration of TLDs (and second-level domains) should be minimised. All who meet minimum technical and financial criteria should be allowed to become a registrar. Random drawings, "lotteries", or restrictions on the number of registrars allowed to administer TLDs is bureaucratic, overly regulatory, and contrary to market competition. While such a proposal may appear "fair", it will not generate what is best for Internet end users. Allow anyone with the minimum capabilities to apply to become a registrar. Those who wish to compete should present their qualifications, become a registrar, and allow the market, not a lottery, to select the most capable or cost competitive providers. The Internet should benefit from, not repeat, the lessons of history. As demonstrated in the now abandoned lottery process which created huge arbitrage windfalls for cellular franchise winners, these schemes are unfair.

Box 8: Network Solutions Proposal for DNS Reform (continued)

4. Protect critical functions

The administration of the "dot", its associated servers and the allocation of IP addresses create the present stability of the Internet. In contrast to the registration of domain names, these critical administrative functions must be managed in an integrated and co-operative manner.

The "dot":

The root of the Internet, referred to as the "dot", and the root servers connect domain names and IP numbers on the Internet. Together, the "dot" and its root servers represent the means by which a registrar of one TLD locates and connects with a registrar of another TLD, thus enabling the global Domain Name System to function. For the Internet to be connected and to function, there can be only one "dot" and one set of root servers. (Future technology advances may change this, but not in the foreseeable future.) The "dot" and root servers must be managed in a neutral, co-operative, and integrated manner. The management of the "dot" and its associated servers must respond to the needs of its constituency, namely all the registrars for the various TLDs around the world.

IP Number and Internet identifier assignment:

IP address space is limited and consequently must be allocated on an as-needed basis. Unlike domain names, IP addresses are exactly analogous to "radio spectrum". Further, because of the technical realities of routing over the Internet, allocation must be carried out in a manner that preserves the "route-ability" of allocated addresses. This process is highly technical and is governed by policies and procedures that consider the actual architecture of the Internet at any given point in time. IP allocation also must be managed in a co-operative manner. Correspondingly, the management of IP address space must respond to its constituency, namely the Regional IP Registries, Internet Service Providers (ISPs), and Internet Access Providers (IAPs), as well as other major commercial users of IP address space.

5. Establish legal sponsorship

The administration of "dot" and its root servers and the allocation of IP numbers and Internet identifiers need to be anchored in a sponsoring legal authority which provides both legal protection and stability. It is no longer appropriate for these functions to be performed by volunteers. The current, growing crisis of authority in Internet administration needs to be faced squarely. For some years, the Internet Assigned Numbers Authority (IANA) has supplied leadership in this area. The source of the authority of the IANA is poorly understood. Perhaps the best way to explain the role of IANA is to say that the IANA has "historical authority" in matters related to the Domain Name System and IP number assignment on the Internet. The growth of commercial interests in the Internet and the flurry of recent lawsuits threaten to destabilise, if not dismantle, the present structure. The functions of IANA must be transferred and firmly anchored in an official, and impartial, granting and sponsoring authority. Any viable proposal for the Internet must address this issue.

Box 9: Statements Related to the gTLD-MoU Signed by Intergovernmental Organisations

"The Secretary-General of the International Telecommunication Union (ITU) hereby agrees to act as the Depository of the gTLD-MoU and to carry out the roles included therein."

Signed: May 1, 1997 by Dr. Pekka Tarjanne, Secretary-General, International Telecommunication Union.

"The Director General of the World Intellectual Property Organization (WIPO) hereby declares that the WIPO Arbitration and Mediation Center is available for administering procedures for the settlement of disputes concerning second level domain names in the gTLDs covered by the gTLD-MoU."

Signed: May 1, 1997 by Dr. Arpad Bogsch, Director General, World Intellectual Property Organization.

"The Universal Postal Union (UPU), with its headquarters in Berne, Switzerland, is the Specialised Agency of the United Nations that regulates world-wide postal services. The postal services of our 189 member countries and 210 Postal Enterprises form the largest physical distribution network in the world. Some 6.1 million postal employees working in over 700,000 Post Offices all over the world handle an annual total of 450 billion correspondences. On behalf of our member Postal Enterprises, the UPU hereby officially signs this letter as a "Related Statement" to the gTLD-MoU to support the attempts to balance the management of the Internet Domain Name System (DNS). On behalf of our member Postal Enterprises, the UPU hereby requests your acceptance of this letter as an explicit recognition of the need to formalise the consultative policy framework for continued evolution of the Internet DNS, and as an explicit statement of our support . We are prepared to offer our support to the development of an international governance framework in which policies for the administration and enhancement of the Internet's global Domain Name System are developed and deployed."

Signed: June 6, 1997 by Thomas E. Leavey, Director General, Universal Postal Union.

Box 10: Proposed Role of ITU and WIPO under IAHC Plan
(Source: Extract from IAHC gTLD-MoU: http://www.gtld-mou.org/gTLD-MoU.html)

[Role of ITU]

Requests that the Secretary-General of the ITU, circulate the gTLD-MoU to the relevant public and private sector entities with an invitation to sign, if they so wish; act as the Depository of the gTLD-MoU and publish periodically an updated list of signatories; facilitate further co-operation in the implementation of the gTLD-MoU, and; strongly encourages, the relevant public and private sector entities to sign the gTLD-MoU; the Signatories to participate actively in its full implementation. (*Preamble*)

[Role of WIPO]

The procedures for creating the panels and for bringing challenges before the panels shall be defined in the CORE-MoU; in particular, the CORE-MoU shall stipulate that Registrars shall be obligated to honour all decisions of ACPs. The procedures for creating the panels and for bringing challenges before the panels shall be administered by the World Intellectual Property Organization (WIPO) Arbitration and Mediation Center (Geneva, Switzerland). WIPO staff shall not be members of any panel (*Section 8 (b)*).

Box 10 (continued)

Section 6. - gTLD Policy Oversight Committee (POC)

a. A committee will be established to conduct oversight of CORE and CORE-gTLDs and to set policies for CORE and its Registrars consistent with this MoU, to be comprised of individuals and experts who are recognised as collectively knowledgeable and expert in the related issues in order to provide the necessary policy oversight functions.

b. This committee is the gTLD Policy Oversight Committee (POC) and follows practices and norms applying to those serving a public trust function.

c. No decisions of the POC shall be made unless a quorum of at least 67 per cent of members are available or represented by proxy; decisions of the POC shall require a majority of not less than 67 per cent of the total votes cast.

d. The instrument used to conduct oversight of CORE and CORE-gTLDs and to set policies consistent with this MoU is the CORE-MoU which is signed by POC and all CORE-gTLD Registrars.

e. POC defines the initial entry into force of the CORE-MoU by signing the CORE-MoU and no amendments may take effect until signed by POC.

f. The POC shall consult the PAB and CORE in carrying out its responsibilities.

g. Members of the Policy Oversight Committee (POC) will be appointed in the following numbers by each of the following groups and organisations; appointees are not necessarily members of the appointing groups or organisations.
   i. Internet Assigned Numbers Authority (IANA) - 2
   ii. Internet Society (ISOC) - 2
   iii. Representative of the Depository of this MoU - 1 [Proposed that ITU be depository as per above]
   iv. Internet Architecture Board (IAB) - 2
   v. Council of Registrars (CORE) - 2
   vi. International Telecommunication Union (ITU) - 1
   vii. World Intellectual Property Organization (WIPO) - 1
   viii. International Trademark Association (INTA) - 1

   Pending the creation of CORE, an interim Policy Oversight Committee (iPOC) shall consist of the regular (non ex-officio) members of the International Ad Hoc Committee (IAHC) which have been appointed by IANA, ISOC, IAB, ITU, WIPO and INTA. The iPOC shall dissolve when CORE appoints its representatives at its first plenary meeting at which time the groups and organisations listed above are invited to appoint their representatives.

h. The regular term of membership in the Policy Oversight Committee shall be three years, provided, however, that the initial terms of membership will be as follows so as to achieve staggered terms:
   1 year initial term - CORE, IAB, IANA, ISOC (one representative of each)
   2 year initial term - Representative of the MoU Depository, **ITU, WIPO**, INTA
   3 year initial term - CORE, IAB, IANA, ISOC (one representative of each).

   The above groups or organisations which have two representatives shall determine which of their representatives shall be appointed for which (1 year or 3 year) term of office. In addition, each group or organisation shall endeavour to appoint its representative(s) with an intent to achieving equitable geographical distribution.

Box 11: RIPE TLD Working Group -- Draft Terms of Reference, September 1997

Aim Of The Working Group

The aim of the TLD Working Group is to initiate and enhance co-ordination of national TLDs within the RIPE geographical area. This increased co-ordination should lead to increased stability, effectiveness and uniformity of procedures within top level domain environs. Co-ordination will be done by means of discussion, consensus building regarding action points, and the monitoring of any actions carried out.

Who Can Participate In The Working Group?

In accordance with RIPE principles the Working Group is open to all parties administering national TLDs or wide area IP networks within the RIPE area, and those who have an interest in such matters. There is no formal membership of RIPE or of the TLD Working Group. Specifically it is desired that all RIPE area national TLD administrators actively participate in the Working Group.

How To Participate In The Working Group.

The working group will communicate by means of an open mailing list <tld-wg@ripe.net>. This list is managed by majordomo@ripe.net. In addition the Working Group will physically meet three times a year at the RIPE meetings. These meetings will be open to all RIPE meeting attendees not just Working Group members. They will be chaired by the TLD-Working Group chair and minutes will be published on the RIPE NCC web site <http://www.ripe.net/>.

Relationships With Key Organisations

The Working Group needs to develop and/or maintain relationships with all key TLD related organisations. These include but are not limited to IANA, RIPE NCC, ITU, CORE, POC, PAB, and any pertinent governmental regulatory bodies. The exact form these relationships would take on are a discussion point for the Working Group.

TLD Co-ordination Project Activity

The Working Group should discuss, form, and direct a TLD co-ordination project. The location, size, and scope of the project is to be decided. The aims of this project would be to:

- carry out the actions decided upon by the Working Group
- act as a focus point for relational contacts
- give regular updates of actions undertaken
- give regular reports of developments in the TLD arena.

Policies Of The Working Group

Here follows a framework of policies for the Working Group. Policy details can be found in the Working Group workplan.

- To promote harmonization of registration policies and practices by publishing recommendations.
- To give input to actions carried out by TLD co-ordination project.
- To design a framework for physical representation of the Working Group to relevant organisations and at important TLD meetings.
- To provide a forum for the sharing of experiences.
- To promote the independence and stability of relevant organisations necessary to the stability of the root domain and of the DNS as a whole, and to look at ways to improve the present situation.
- To clarify and harmonise RIPE area conflict settlement procedures.

STATISTICAL ANNEX

This section contains some statistical information referenced in the text. Table 15 provides an update of the number of Internet Hosts in OECD countries from the Network Wizards' survey. This is currently the best available measure on the minimum size of the public Internet. Hosts found in gTLDs are recorded under the US because that is where they are registered and in practice most would in fact be located in the US. Table 16 shows the number of hosts weighted by population. Table 17 displays data for RIPE Internet host survey for European members of the OECD. Whereas Network Wizards undertake their survey every six months the RIPE survey is available on a monthly basis. Essentially both surveys work by interrogating DNS records with a view to providing data on the number of Internet hosts. However the surveys are also valuable as an indicator of the number of top level domain names that have been registered. While the numbers of registrations may not exactly match data reported by registrars with published figures RIPE says the correlation should be fairly close. It is also interesting to compare the results of both surveys when they are done at around the same time. Table 17 shows there is an average correlation of 99 per cent between the domains counted by Network Wizards and RIPE. Some variation may be due to the different times when the surveys are conducted during which time changes may occur (e.g. Denmark between January-February 1997 as noted in text). It is not known why other differences may exist particularly if they show a decline between surveys. The domain data from Network Wizards is displayed in Table 18 and comparison weighted by population made in Table 19. How rankings have changed over time is shown in Table 20.

Table 15. Internet Hosts in the OECD Area

First NSFNET Connection		Jul-91	Jul-92	Jul-93	Jul-94	Jul-95	Jul-96	Jan-97
May-89	Australia	21 774	48 639	82 157	127 514	207 426	397 460	514 760
Jun-90	Austria	2 148	6 489	11 741	20 130	40 696	71 090	91 938
May-90	Belgium	343	1 532	4 361	12 107	23 706	43 311	64 607
Jul-88	Canada	18 582	38 929	70 977	127 516	262 644	424 356	603 325
Nov-91	Czech Rep.	N/A	N/A	2 734	5 639	14 842	32 219	41 164
Nov-88	Denmark	1 559	2 733	6 160	12 107	36 964	76 955	106 476
Nov-88	Finland	8 761	15 718	27 033	49 598	111 861	277 207	283 526
Jul-88	France	9 290	19 192	39 860	71 899	113 974	189 786	245 501
Sep-89	Germany	21 109	43 907	91 987	149 193	350 707	548 168	721 847
Jul-90	Greece	216	616	1 317	2 958	5 575	12 689	15 925
Nov-91	Hungary	0	74	1 403	5 390	11 298	25 109	29 919
Nov-88	Iceland	194	400	1 259	3 268	6 800	10 810	11 667
Jul-90	Ireland	100	624	1 728	3 308	9 941	21 464	27 059
Aug-89	Italy	1 656	5 147	14 746	23 616	46 143	113 776	149 595
Aug-89	Japan	6 657	15 757	35 639	72 409	159 776	496 427	734 406
Apr-90	Korea	800	2 902	5 625	12 109	23 791	47 973	66 262
Apr-92	Luxembourg	0	80	186	420	1 516	2 877	3 506
Feb-89	Mexico	220	789	2 093	5 164	8 382	20 253	29 840
Jan-89	Netherlands	7 382	21 105	35 629	59 729	135 462	214 704	270 521
Apr-89	NZ	1 193	1 831	3 165	14 830	43 863	77 886	84 532
Nov-88	Norway	8 264	14 354	25 151	38 759	66 608	120 780	171 686
Nov-91	Poland	0	631	3 511	7 392	15 692	38 432	54 455
Oct-91	Portugal	0	1 318	1 956	4 518	8 748	17 573	26 077
Jul-90	Spain	979	3 603	8 773	21 147	39 919	62 447	110 041
Nov-88	Sweden	11 800	21 021	31 449	53 294	106 725	186 312	232 955
Mar-90	Switzerland	9 918	17 188	30 697	47 401	63 795	102 691	129 114
Jan-93	Turkey	0	0	415	1 204	2 790	7 743	13 194
Apr-89	UK	6 990	37 776	89 788	155 706	291258	579 492	591 624
Jul-88	US (1)	427 817	733 117	1 257 408	2 044 716	4 268 648	8 224 279	10 110 908
	OECD Total	567 752	1 055 472	1 888 948	3 153 041	6 479 550	12 444 269	15 536 430

1. US data includes hosts registered under gTLDs. The US data in the first column represents the date Merit began managing the NSFNET Backbone.

Source: Network Wizards/OECD

Table 16. Internet Hosts per 1 000 Inhabitants

(Ranked by January 1997)

	Jul-91	Jul-92	Jul-93	Jul-94	Jul-95	Jul-96	Jan-97
Finland	1.7	3.1	5.3	9.8	22.0	54.3	55.5
Iceland	0.7	1.5	4.8	12.6	25.5	40.5	43.7
Norway	1.9	3.3	5.8	9.0	15.4	27.7	39.4
US (1)	1.7	2.9	4.9	7.9	16.4	31.3	38.4
Australia	1.2	2.8	4.7	7.2	11.6	22.0	28.5
Sweden	1.4	2.4	3.6	6.1	12.2	21.1	26.4
NZ	0.3	0.5	0.9	4.3	12.4	21.8	23.6
Canada	0.7	1.4	2.5	4.4	9.0	14.3	20.4
Denmark	0.3	0.5	1.2	2.3	7.1	14.7	20.4
Switzerland	1.4	2.5	4.4	6.8	9.1	14.5	18.2
Netherlands	0.5	1.4	2.3	3.9	8.8	13.9	17.5
Austria	0.3	0.8	1.5	2.5	5.1	8.8	11.4
UK	0.1	0.7	1.6	2.7	5.0	9.9	10.1
Germany	0.3	0.5	1.1	1.8	4.3	6.7	8.8
Luxembourg	0.0	0.2	0.5	1.1	3.8	7.0	8.5
Ireland	0.0	0.2	0.5	0.9	2.8	6.0	7.6
Belgium	0.0	0.2	0.4	1.2	2.3	4.3	6.4
Japan	0.1	0.1	0.3	0.6	1.3	4.0	5.9
France	0.2	0.3	0.7	1.2	2.0	3.3	4.2
Czech Rep.	0.0	0.0	0.3	0.5	1.4	3.1	4.0
Hungary	0.0	0.0	0.1	0.5	1.1	2.5	2.9
Spain	0.0	0.1	0.2	0.5	1.0	1.6	2.8
Portugal	0.0	0.1	0.2	0.5	0.9	1.8	2.6
Italy	0.0	0.1	0.3	0.4	0.8	2.0	2.6
Greece	0.0	0.1	0.1	0.3	0.5	1.2	1.5
Korea	0.0	0.1	0.1	0.3	0.5	1.1	1.5
Poland	0.0	0.0	0.1	0.2	0.4	1.0	1.4
Mexico	0.0	0.0	0.0	0.1	0.1	0.2	0.3
Turkey	0.0	0.0	0.0	0.0	0.0	0.1	0.2

1. US data includes hosts registered under gTLDs

Source: Network Wizards/OECD

Table 17. Domain Name Surveys (RIPE and Network Wizards)

	SOAs in RIPE Survey					Network Wizards Domains Queried/Missed	Alignment of RIPE and NW (%) - Jan 97
	Jan-95	Jan-96	Dec-96	Jan-97	Feb-97	Jan-97	
Austria	552	1 349	4 098	4 413	5 080	4 444	99
Belgium	310	1 321	3 693	3 980	4 251	4 074	98
Czech Republic	195	442	1 794	1 931	2 195	1 970	98
Denmark	299	922	5 167	11 151	13 158	6 235	179
Finland	618	1 499	3 783	3 999	4 243	3 981	100
France	1 181	2 490	6 099	6 675	7 270	6 837	98
Germany	2 779	6 623	26 271	28 872	32 692	29 079	99
Greece	193	398	783	735	911	897	82
Hungary	116	388	962	1 080	1 169	1 076	100
Iceland	82	150	318	347	371	338	103
Ireland	96	108	1456	1 580	1 929	1 576	100
Italy	936	2 877	8 097	8 997	10 295	9 162	98
Luxembourg	41	100	336	364	397	504	72
Netherlands	741	1 880	10 252	10 962	12 048	10 692	103
Norway	831	1 835	5 979	6 494	7 053	6 652	98
Poland	453	834	2 194	2 397	2 741	2 523	95
Portugal	130	411	944	1 012	1 034	1 494	68
Spain	477	1 301	3 445	3 763	4088	3 900	96
Sweden	1 024	3 191	11 490	12 243	13 490	12 369	99
Switzerland	359	1 404	7 284	7 844	8 862	7 935	99
Turkey	70	185	1 007	1 057	1 060	1 704	62
UK	2 846	10 286	36 875	40 772	43 348	33 307	122
Total OECD Europe (1)	14 329	39 994	142 327	160 668	17 7685	150 749	99

1. Simple rather than weighted average

Source: OECD/RIPE/Network Wizards

Table 18. Domains Queried/Missed by Network

	Jan-95	Jul-95	Jan-96	Jul-96	Jan-97
Australia	1 847	2 831	5 960	10 557	17 876
Austria	588	860	1 280	2 327	4 444
Belgium	327	650	1 352	2 450	4 074
Canada	2 859	4 219	6 642	11 085	16 445
Czech Republic	199	277	397	895	1 970
Denmark	309	613	907	2 038	6 235
Finland	630	916	1 451	2 381	3 981
France	1 256	1 797	2 592	4 234	6 837
Germany	2 883	3 946	6 695	15 143	29 079
Greece	203	283	420	575	897
Hungary	117	161	381	665	1 076
Iceland	82	122	151	213	338
Ireland	100	197	392	977	1 576
Italy	1 000	1 740	2 844	5 550	9 162
Japan	4 223	5 717	8 043	12 992	20 485
Korea	301	484	828	1 736	3 289
Luxembourg	46	79	107	235	504
Mexico	335	317	675	1 640	3 603
Netherlands	793	1 092	1 928	6 644	10 692
New Zealand	247	419	845	2 213	6 864
Norway	840	1 238	2 099	3 642	6 652
Poland	498	683	899	1 527	2 523
Portugal	135	255	415	798	1 494
Spain	546	777	1 304	2 450	3 900
Sweden	1 077	1 701	3 289	6 815	12 369
Switzerland	371	687	1 453	3 925	7 935
Turkey	89	119	235	326	1 704
United Kingdom	3 006	5 716	11 902	26 966	33 307
United States	2 462	3 862	6 564	11 559	20 375
COM	37 986	75 963	241 582	401 717	733 502
EDU	8 498	9 516	10 914	12 561	14 282
NET	2 648	5 771	11 873	20 467	39 577
GOV	1 515	1 873	2 234	2 430	2 195
ORG	3 705	7 670	15 435	30 027	34 339
MIL (US)	762	869	1 023	1 203	1 352
OECD	82 483	143 420	355 111	610 963	1 064 933
TLD Total	27 369	41 758	72 050	142 558	239 686
gTLD Total	55 114	101 662	283 061	468 405	825 247
TLD%	33	29	20	23	23
gTLD%	67	71	80	77	77

Source: Network Wizards/OECD

Table 19. Domain Queried/Missed by Network Wizards Survey per 10 000 Inhabitants

	Jan-95	Jul-95	Jan-96	Jul-96	Jan-97
Australia	1.0	1.6	3.3	5.8	9.9
Austria	0.7	1.1	1.6	2.9	5.5
Belgium	0.3	0.6	1.3	2.4	4.0
Canada	1.0	1.4	2.2	3.7	5.6
Czech Republic	0.2	0.3	0.4	0.9	1.9
Denmark	0.6	1.2	1.7	3.9	11.9
Finland	1.2	1.8	2.8	4.7	7.8
France	0.2	0.3	0.4	0.7	1.2
Germany	0.4	0.5	0.8	1.9	3.6
Greece	0.2	0.3	0.4	0.5	0.9
Hungary	0.1	0.2	0.4	0.7	1.1
Iceland	3.1	4.6	5.7	8.0	12.7
Ireland	0.3	0.6	1.1	2.7	4.4
Italy	0.2	0.3	0.5	1.0	1.6
Japan	0.3	0.5	0.6	1.0	1.6
Korea	0.1	0.1	0.2	0.4	0.7
Luxembourg	1.1	1.9	2.6	5.7	12.2
Mexico	0.0	0.0	0.1	0.2	0.4
Netherlands	0.5	0.7	1.2	4.3	6.9
New Zealand	0.7	1.2	2.4	6.2	19.2
Norway	1.9	2.8	4.8	8.4	15.3
Poland	0.1	0.2	0.2	0.4	0.7
Portugal	0.1	0.3	0.4	0.8	1.5
Spain	0.1	0.2	0.3	0.6	1.0
Sweden	1.2	1.9	3.7	7.7	14.0
Switzerland	0.5	1.0	2.1	5.5	11.2
Turkey	0.0	0.0	0.0	0.1	0.3
United Kingdom	0.5	1.0	2.0	4.6	5.7
United States (+gTLD)	2.2	4.0	11.0	18.2	32.9

Source: Network Wizards/OECD

Table 20. Ranking Domain Queried/Missed by Network Wizards Per 10 000 Inhabitants

Jan-95	Jul-95	Jan-96	Jul-96	Jan-97	Jan-97
Iceland	Iceland	**US (+TLD)**	**US (+gTLD)**	**US (+gTLD)**	32.9
US (+gTLD)	**US (+gTLD)**	Iceland	Norway	New Zealand	19.2
Norway	Norway	Norway	Iceland	Norway	15.3
Finland	Sweden	Sweden	Sweden	Sweden	14.0
Sweden	Luxembourg	Australia	New Zealand	Iceland	12.7
Luxembourg	Finland	Finland	Australia	Luxembourg	12.2
Australia	Australia	Luxembourg	Luxembourg	Denmark	11.9
Canada	Canada	New Zealand	Switzerland	Switzerland	11.2
Austria	Denmark	Canada	Finland	Australia	9.9
New Zealand	New Zealand	Switzerland	UK	Finland	7.8
Denmark	Austria	UK	Netherlands	Netherlands	6.9
Switzerland	UK	Denmark	Denmark	UK	5.7
Netherlands	Switzerland	Austria	Canada	Canada	5.6
UK	Netherlands	Belgium	Austria	Austria	5.5
Germany	Belgium	Netherlands	Ireland	Ireland	4.4
Japan	Ireland	Ireland	Belgium	Belgium	4.0
Belgium	Germany	Germany	Germany	Germany	3.6
Ireland	Japan	Japan	Japan	Czech Rep.	1.9
France	France	Italy	Italy	Japan	1.6
Greece	Italy	France	Czech Rep.	Italy	1.6
Czech Republic	Greece	Portugal	Portugal	Portugal	1.5
Italy	Czech Rep.	Greece	France	France	1.2
Spain	Portugal	Czech Rep.	Hungary	Hungary	1.1
Portugal	Spain	Hungary	Spain	Spain	1.0
Poland	Poland	Spain	Greece	Greece	0.9
Hungary	Hungary	Poland	Poland	Korea	0.7
Korea	Korea	Korea	Korea	Poland	0.7
Mexico	Mexico	Mexico	Mexico	Mexico	0.4
Turkey	Turkey	Turkey	Turkey	Turkey	0.3

Source: Network Wizards/OECD

GLOSSARY

The following glossary is taken from Network Wizards (http://www.nw.com/zone/WWW/defs.html)

Domain Name: A domain name is any name representing any record that exists within the Domain Name System. ie. com, nw.com, www.nw.com

Domain: A domain is a domain name that has name server (NS) records associated with it. In other words, there may be subdomains or hosts under it. ie. com, nw.com

Domain Server: A domain server is a system that hold all the records associated with a particular domain, and answers queries about those names.

Domains queried/domains missed: Domains queried refers to how many domains we could query by connecting to the domain server and asking it for a dump of the domain. Domains missed is the number of domains that we could not query, because we could not connect to the appropriate server or the server refused the query.

Domain (top-level): A top-level domain name is either an ISO country code or one of the generic domains (com/org/net/etc). It should be noted that there is not necessarily any correlation between a country code and where a host is actually located.

Host: A host is a domain name that has an IP address record associated with it. This would be any computer system connected to the Internet (via full or part-time, direct or dialup connections). ie. nw.com, www.nw.com

Host Name (or firstname): A host name is the first part (before the first dot) of a hosts' domain name. ie. www

Network Numbers (class a/b/c): A network number is the first part of an IP address that identifies what network the hosts numbered in the rest of the address are connected to. The Class A/B/C system is no longer used and the data is presented only for historical reasons. It is no longer possible to tell how many network numbers are in use by looking at IP addresses, since the netmask can not be determined from the number. Also, note that domains do not map directly to particular network numbers and no correlation between them can be inferred.

Other terms used in this report:

Domain Name System: The DNS maps Internet addresses and is a necessary element enabling communication routing to function. The Domain Name System is a distributed database. DNS uses a hierarchical scheme for establishing names.

AlterNIC: A gTLD registrar operating outside the IANA system
APNIC: Asia/Pacific regional registry
Autonomy: Intelligent agent software company
CORE: IAHC proposed Council of Registrars
CIX: Commercial Internet Exchange
eDNS: Enhanced Domain Name System

FIL or *Foreningen af Internetleverandører*: Danish the industry association managing the **.dk** registery
FNC: US Federal Network Council
GII-GIS: Global Information Infrastructure - Global Information Society
gTLD: generic top level domain names (e.g. **.com**, **.org**, **.net**)
IAHC: Internet International Ad Hoc Committee
INTA: International Trademark Association
IAP: Internet Access Provider (also referred to as ISP - Internet Service Provider)
IAB: Internet Architecture Board
IANA: Internet Assignment Number Authority
ISOC: Internet Society
ITU: International Telecommunications Union

NetNames USA: Company which acts as an intermediary for registration
NSF: National Science Foundation
NSI: Network Solutions Inc.: manages InterNIC.
RIPE: Reseaux IP Européens: a European regional registry

SLD: Second Level Domain name
TLD : Top Level Domain Names
URL: Universal Resource Locator

VeriSign : Software company developing authentication technologies
WIPO: World Intellectual Property Organization
WTO: World Trade Organisation

'Whois' : search engine which enables a user to not only tell whether a domain name is in use but who administers a particular site and a list of a site's name servers.

NOTES

1. Ministerial Declaration, “European Ministerial Conference”, Bonn 6-8 July 1997. Refer particularly tp point 12.

2. This represented 96 per cent of the Internet hosts in the world. Survey Source: Network Wizards.

3. Network Wizards definitions are available at http://www.nw.com/zone/WWW/defs.html

4. Anthony Rutkowski, “Internet Domain names and Other Identifiers: A Roadmap Among Issues and Initiatives”. November 1996. http://www.wia.org/pub/identifiers/issues-roadmap.html

5. Commercial Internet Exchange, “CIX Comments on IAHC Proposal”, 17 January 1997. http://www.cix.org/iahccomm.html

6. Refer: http://www.interactivehq.org/oic/ and http://www.domain-name.org/

7. Refer http://www.ntia.doc.gov/ntiahome/domainname/domainname.htm

8. IAHC information is available at http://www.iahc.org/ This includes “Final Report of the International Ad Hoc Committee: Recommendations for Administration and Management of gTLDs”, 4 February, 1997

9. Anthony Rutkowski, “The Internet: Governance for Grabs?”, 26 February 1997, http://www.wia.org/pub/forgrabs.html. The Domain Name Rights Coalition’s comments on the draft report are at http://www.domain-name.org/

10. Refer http://www.gtld-mou.org/

11. Pekka Tarjanne, ITU Secretary-General, “Internet Governance: Towards Voluntary Multilateralism”, Keynote address at Internet Domain Names: Information Session, Meeting of Signatories and Potential Signatories of the Generic Top Level Domain Memorandum of Understanding (gTLD-MoU) ITU, Geneva April 29 - May 1, 1997 http://www.itu.int/PPI/projects/dns-meet/KeynoteAddress.html

12. Refer http://www.euroispa.org/

13. Refer PSINet Position Paper on the Global Top Level Domain Name Proposal by the International Ad Hoc Committee (IAHC), http://www.psi.net/iahcpositionpaper/

14. ITU, “Council Endorses ITU Role in Internet Top Level Domain Names” Press Release, ITU/97-11, 27 June 1997,. http://www.itu.int/PPI/press/releases/1997/itu-11.html

15. Full details of the IAHC proposals are at **http://www.iahc.org/** and the eDNS proposals at **http://www.edns.net. and NSI at http://www.netsol.com**

16. Refer Lanminds “How does the Domain System Work” http://www.lanminds.com/dns/tld.html

17. Refer to the Annex for a discussion of domain registration statistics.

18. Allowance has not been made for 'false registrations' where a name is registered but a user does not intend to pay.

19. http://rs.internic.net/announcements/mil.html

20. Batista, Op.cit.

21. Testimony of Larry Irving, Assistant Secretary for Communications and Information before the US House Committee on Science Subcommittee on Basic research. 25 September, 1997.

22. Refer http://namespace.pgmedia.net/law

23. Refer NSI proposal, http://www.netsol.com/

24. Most recently this question has been posed by Gordon Cook, "Internet Governance at the Cross Roads" Published as a *Cook Report* Special at: http://www.cookreport.com/integov.shtml

25. Refer IANA home page at http://www.isi.edu:80/div7/infra/iana.html

26. A description of the Internet Society is available at http://www.isoc.org/whatis/what-is-isoc.html

27. Refer FNC charter at gopher://nsipo.arc.nasa.gov:70/00/FNCAC/Admin_docs/fnc_charter

28. Anthony Rutkowski has described the history of IANA at http://www.wia.org/pub/iana.html

29. Refer David Maher "Trademarks on the Internet: Who's in Charge?", CIX/ISOC Workshop, 1996. http://aldea.com/cix/maher.html and Robert Shaw, Internet Domain Names: Whose Domain Is This?, http://www.itu.ch/intreg/dns.html#fn11

30. One AlterNIC registered company is taking legal action against the IANA over ownership rights to **.web**. Refer http://www.webtld.com/

31. Refer http://www.thk.fi:80/yleista/englanti/internet.htm

32. Some government Ministries and regulators have co-ordinated with registrars in respect to the creation of government domain names under country codes as in France: http://www.nic.fr/presentation/cc/cc-960214.html and in respect to the introduction of pricing in Switzerland. Shaw, Internet Domain Names: Whose Domain Is This?, Op.cit.

33. The possible exception is Finland but the industry decided to vest control with government rather than vice versa. Even here it is probable that there is no legal reason why another entity could not start a registrar.

34. Information on RIPE is taken from their home page: http://www.ripe.net

35. Refer "RIPE NCC Activities & Expenditure 1997", http://www.ripe.net/docs/ripe-144.html

36. Refer http://www.ripe.net/docs/ripe-152.html

37. *Ibid.*

38. *Ibid.*

39. Jon Postel, “New Registries and the delegation of International Top level Domains”, Internet Draft (Status -Work in Progress, June 1996).

40. A list of root server operators is at: http://nic.mil/DNS/root-server.html

41. Michael Stutz, “Domain Names May Change without Your Knowing”, Wired News, 26.Jun.97. http://www.wired.com/news/news/technology/story/4715.html

42. Michael Stutz, “InterNIC Who”, 16 July 1997. http://www.wired.com/news/news/technology/story/5232.html

43. Todd Spangler, IETF Moves to Secure Domain Name System”, *WebWeek*, 11 August, 1997. http://www.webweek.com/current/infrastructure/19970811-secure.html

44. Rebecca Vesely, ” InterNIC-AlterNIC Dispute Settled”, *Wired News*, 5.Aug.97. http://www.wired.com/news/news/politics/story/5783.html

45. Refer http://www.ar.com/lists/newdom/1214.html

46. Stutz, ‘InterNIC Who?’, *Op.cit*.

47. Ibid.

48. Spangler, *Op.cit.* Refer also Ken Cukier “Black out: The day the Internet went down”, Communications Week International, Issue 189, Monday, 11 August 1997.

49. Refer “RSA Data Security To Provide Software To Secure Internet” Press Release. http://www.rsa.com/pressbox/html/971006.html

50. Janet Kornblum, “Net rights advocates target spam”, 10 October, 1997, http://www.news.com/News/Item/0,4,15139,00.html

51. Janet Kornblum, “Domain deletion called forgery’, *NewsCom*, July 16, 1997. http://www.news.com/News/Item/0,4,12510,00.html

52. Gabe Battista, CEO, Network Solutions Inc., issued the following statement on recent events affecting the Internet. 24th July, 1997. http://www.netsol.com/

53. Refer http://rs.internic.net/announcements/iif-update.html

54. George Leopold, “House Raids Domain Account to fund Future Internet”, 10 October 1997. http://www.techweb.com:80/wire/news/1997/10/1010futurenet.html

55. Refer http://www.alternic.net/

56. Margie Wylie, “Rogue domains revolt”, CNET, 4 March 1997. Estimate is attributed to Karl Denninger, founder of the eDNS consortium.

57. Refer eDNS document at http://www.edns.net/why.html

58. Refer eDNS press release at http://www.edns.net/press/release1.html

59. Refer http://www.iperdome.com/

60. See for example, comments by head of IAHC in Julie Crysler's "Maverick Registries Threaten an Internet Monopoly", Village Voice, Jan 14, 1997. http://mediafilter.org/ZK/Conf/Conf_Email/January.21.1997.00.20.03

61. Refer, NSI's, "Secure Internet Administration and Competition in Domain Naming Services", 29 April, 1997, at http://www.netsol.com/

62. Refer Written Testimony of Donald M. Heath, President and CEO, "Internet Society to the US House of Representatives Committee on Science", 30 September 1997. http://www.house.gov/science/hearing.htm#Basic_Research

63. Ibid.

64. For additional information refer, "An open letter from WIPO to the Internet Community Concerning Domain Name Disputes Resolution Procedures under the gTLD-MoU", 18 June, 1997 http://www.wipo.int/eng/internet/domains/openlet.htm

65. "WIPO Member States Approve That Preparations Are Being Undertaken For Internet Domain Name Dispute Resolution Aactivities", iPOC Press Release, 6th October 1997. http://www.gtld-mou.org/press/poc-1.html

66. Testimony of Larry Irving, Op.cit.

67. Barbara Dooley, CIX, Presentation to the OECD's Working Party on Telecommunication and Information Services Policies. 10-11 April, 1997.

68. Statement of Barbara Doooley, Executive Director of the Commercial Internet Exchange before the Basic Research Subcommittee House Science Committee, 25 September, 1997 http://www.house.gov/science/hearing.htm# Refer also the testimony of Anthony Rutkowski and Andrew L. Sernovitz, President, Association for Interactive Media (AIM).

69. Testimony of Larry Irving, Op.cit

70. OECD "Information Infrastructure Convergence and Pricing: The Internet", OCDE/GD(96)73 refer http://www.oecd.org/dsti/sti_ict.html

71. Mark Radcliffe, "Domain Names versus Trademarks -- Who Decides", Refer http://www.govtech.net:80/1996/gt/dec/december1996-justice&techn/december1996-justice&techn.shtm

72. For a discussion of this issue see Stephen J. Davidson and Nicole A. Engisch "Applying the Trademark Misuse doctrine to Domain Name Disputes", http://cla.org/TM_MIS/T-MISUSE.htm

73. NSI's policy on dispute resolution is available at: http://rs.internic.net/domain-info/internic-domain-6.html

74. IAHC Final Report, Op.cit.

75. http://rs.internic.net/tools/whois.html

76. The registrar for **.us** recommends that if sub-authorities wish to charge they can do so at the rate of US$ 10.

77. The information on the Californian DMV is taken from their web site http://www.dmv.ca.gov/Profile/Profile_TOC.html#Profile_TOC and the Californian Governor's budget summary http://www.dof.ca.gov/html/budgt6-7/BT&H.htm

78. Other major DMV functions include: (1) Recording ownership (certificate of title) of the vehicles DMV registers (2) Maintaining driving records (accidents and convictions) of licensed drivers, (3) Issuing identification cards for individuals (4) Registering and recording ownership of vessels, (5) Licensing and regulating driving and traffic violator schools and their instructors (6) Licensing and regulating vehicle manufacturers, transporters, dealers, distributors, vehicle salespeople, and dismantlers (7) Administering the Financial Responsibility Law (8) Investigating consumer complaints (9) Maintaining records in accordance with the law.

79. Rutkowski, Op.cit.

80. Testimony of Larry Irving, Op.cit

81. OECD interview with eDNS, 13 March 1997.

82. Jon Postel, "Statement on Generic Top Level Domains (gTLDs)", 28 May, 1997. http://www.isi.edu/div7/iana/gtld.html

83. VeriSign News Release, "Network Solutions and VeriSign launch combined Internet Name and Certification Registration', 10 March, 1997.

84. http://www.verisig.com/

85. http://rs.internic.net/announcements/premier.html

86. IAHC, Final report Op.cit.

87. US Treasury Office of Tax Policy "Selected Tax Policy Implications of Global Electronic Commerce", Department of Treasury Office of Tax Policy" (November 1996). Refer http://www.ustreas.gov/treasury/tax/internet.html or non-official site http://jya.com/taxpolicy.htm#N_5_

88. Hasbro's site is at: http://www.hasbrotoys.com/hasbro/index.html. A summary of the case is available at http://www.lectlaw.com//files/cas86

89. http://www.w3.org/pub/WWW/PICS/

90. Reid Kanaley, "Internet red-light districts seeing plenty of green", The Philadelphia Inquirer, 22 June, 1997. Proposal made by Mark Tiarra, director of United Adult Sites (UAS).

91. Don Telage, InterNIC Presentation to DC-ISOC Meeting December 3, 1996. Refer http://rs.internic.net/presentations/

92. If .fam or .per gTDLs are introduced it raises the question of whether more disputes will emerge because of the greater number of people with the same family names than companies with the same name.

93. WIPO, Chairman's Summary of "Consultative Meeting on Trademarks and Internet Domain names", First Session, Geneva, 26 - 30 May 1997.

94. US Treasury Office of Tax Policy, Op.cit

95. Refer to IBM's intelligent agent page at http://www.networking.ibm.com/iag/iaghome.html#new for a discussion of intelligent agents. For a directory of intelligent agents and related organisations refer http://www.agent.org/

96. Refer http://www.agentware.com/intro.htm

97. For a discussion of how ‘agent’ based transactions have been regarded by courts in relation to location, prior to Internet, see Zak Muscovitch “Taxation and Internet Commerce” Osgoode Hall Law School, 26 April 1996. http://www2.magmacom.com/~dbell/tax.htm. Muscovitch sites a case in which “...the court in Grainger & Son v. Gough (Surveyor of Taxes) grappled with the problem of when business will be considered to be carried out in the United Kingdom for the purposes of income tax assessment. The Grainger case involved a French wine merchant who had sales agents in Britain. The role of the agents was to transmit orders for acceptance to the merchant in France. It was found that because the contracts were made not in England but in France, and because delivery to the purchaser was made in France, the wine merchant was not liable for taxation as a non-resident carrying on business in Britain.” Intelligent agents housed in servers located anywhere on the Internet would add an additional complexity to such questions.