Could telemedicine generate .med as top-level domain name?

Svetozar Zdravković

ABSTRACT

Institute of Oncology Sremska Kamenica, Serbia & Montenegro; Address correspondence to: Svetozar Zdravković, Institute of Oncology Sremska Kamenica, Institutski put 4, 21204 Sremska Kamenica, Serbia & Montenegro, E-mail: onkons@eunet.yu, The manuscript was received: 01.06.2004, Provisionally accepted: 07.06.2004, Accepted for publication: 07.06.2004

The article presents a consideration of top-level domain names and possibility that telemedicine generates top-level domain name for medicine itself. Using the United States of America domain, the article has tried to explain all the most important facts about top-level domain names. It has also presents a current situation about responsibility in this sector and the mode to adopt new top-level domains.
KEY WORDS: *Telemedicine; Internet; Computer Communication networks; Names*

Before answering the article's question, let's explain terms domain name, top-level domain (TLD) and domain name system (DNS) and who is in charge for them.

What are DNS and TLD?

The Domain Name System (DNS) and its abbreviation is widely used term but most of users do not really know its meaning. To make it worse, the term domain name is also not well understood. Let us make it easier for understanding. In short, domain name acts as a more friendly replacement for the IP (Internet Protocol) address, e.g. unique associative name of the computer represented with its IP address. IP address is 32-bit address for unique identification of computer (better to say its network adapter, but for simple understanding computer and network adapter will be equaled) in TCP/IP (Transmission Control Protocol/Internet Protocol) network. According to public documentation available on the IANA website (Internet Assigned Number Authority), ICANN website (Internet Corporation for Assigned Names and Numbers) and other similar websites, DNS provides for the translation between computer names (the "domain name") and IP addresses (every computer on the Internet has a unique address called its "IP address") (1,2).

Within the Internet, this means translating from a name such as "venera.isi.edu", to an IP address such as "128.9.0.32". The DNS is a set of protocols and databases: the protocols define the syntax and semantics for a query language to ask questions about information located by DNS-style names and the databases are distributed and replicated. There is no dependence on a single central server, and each part of the database is provided in at least two servers.

Each domain name is made up of a series of character strings (called "labels") separated by dots. The root of system is unnamed. The right-most label in a domain name is referred to as its "top-level domain" (TLD). The DNS forms a tree-like hierarchy. Each TLD includes many second-level domains (such as "icann" in "www.icann.org"); each second-level domain can include a number of third-level domains ("www" in "www.icann.org"), and so on. The responsibility for operating each TLD (including maintaining a registry of the second-level domains within the TLD) is delegated to a particular organization. These organi-

zations are referred to as "registry operators", "sponsors", or simply "delegees". There are two main groups of TLDs: TLDS with two letters and TLDs with three and more letters:

* TLDs with two letters (such as .DE, .YU, and .JP) have been established for over 240 countries and external territories and are referred to as "country-code" TLDs or "ccTLDs" according to country codes from ISO-3166 (3). They are delegated to designate managers who operate the ccTLDs according to local policies that are adapted to best meet the economic, cultural, linguistic, and legal circumstances of the country or territory involved.

* Most TLDs with three or more characters are referred to as "generic" TLDs, or "gTLDs". In the 1980s, seven gTLDs .COM, .EDU, .GOV, .INT, .MIL, .NET, and .ORG were created plus one special TLD, .ARPA, which is used for technical infrastructure purposes. Over the next twelve years, various discussions occurred concerning additional gTLDs, leading to the selection in November 2000 of seven new TLDs: .BIZ, .INFO, .NAME, .PRO, .AERO, .COOP, and .MUSEUM. All generic TLDs are shown in Table 1 (4,5).

Let's now explain the terms "sponsored TLDs" and "unsponsored TLDs". Generally speaking, an "unsponsored TLD" operates under policies established by the global Internet community directly through the ICANN process, while a "sponsored TLD" is a specialized TLD that has a sponsor representing the narrower community that is most affected by the TLD. The sponsor thus carries out delegated policy-formulation responsibilities over many matters concerning the TLD.

A "Sponsor" is an organization to which is delegated some defined ongoing policy-formulation authority regarding the manner in which a particular sponsored TLD is operated. The "sponsored TLD" has a Charter, which defines the purpose for which the "sponsored TLD" has been created and will be operated. The "Sponsor" is responsible for developing policies on the delegated topics so that the TLD is operated for the benefit of a defined group of stakeholders, known as the "Sponsored TLD Community", that are most directly interested in the operation of the TLD. The "Sponsor" also is responsible for selecting the registry operator and to varying degrees for establishing the roles played by registrars and their relationship with the registry operator (2).

Table 1. Top-level domain names

TLDs	Use	Special Rules & Regulations
	Generic	
.com	Businesses and commercial enterprises	No special rules & regulations
.net	Network-related organizations and enterprises (Internet providers,...)	No special rules & regulations
.org	Charitable or non-profit organizations	No special rules & regulations
.edu	Degree-granting educational institutions of higher education hat are accredited by state accrediting agencies or institutions	No special rules & regulations
.gov	Exclusively Government institutions (USA)	No special rules & regulations
.int	Organizations established by international treaties between governments.	No special rules & regulations
.mil	Exclusively Military institutions (USA)	No special rules & regulations
	New generic	
.aero	Air-transport industry	Sponsored, Aviation Community Membership ID Required to apply for domain registration.
.biz	Businesses Organizations	Commercial businesses
.coop	Cooperatives	Sponsored, Restricted to businesses and organizations acting as cooperatives and registered with a cooperative membership association
.info	Unrestricted use	No special rules & regulations
.museum	Museums	Sponsored, Accredited museum use only
.name	Individuals	Second-level names such as smith.name will be reserved and individuals will be able to register john.smith.name
.pro	Accountants, Lawyers, and Physicians	Individuals must prove their professional status before registering a pro domain name

Who is in charge for IP addresses and TLDs?

The assignment of the 32-bit IP addresses is a separate activity. IP addresses are delegated by the central Internet Registry to regional authorities such as Regional Internet Registries (RIR) that allocates addresses for a different area of the world namely: ARIN for North America, RIPE NCC for Europe, APNIC for Asia and the Pacific region, LACNIC for Latin America and the Caribbean region and AfriNIC for Africa, and further to Internet Service Providers (ISP). The organizations significant for Internet management, e.g. TLDs are already mentioned above: IANA and ICANN. The IANA delegates the allocation of IPv4 (Internet Protocol version 4 - uses 32-bit addresses, limiting it to 4,294,967,296 (4 x 109) unique addresses, many of which are dedicated to local networks; this limitation has helped stimulate the push towards IPv6, which is currently in the early stages of deployment, and is expected to eventually replace IPv4) and IPv6 (Internet Protocol version 6 - uses up to about 3.4 ◊ 1038 128-bit addresses; it is intended to replace the previous standard, IPv4; it is the second version of the Internet Protocol to be widely deployed, and is expected (as of 2001) to form the basis for future expansion of the Internet) addresses to RIRs and the RIRs then follow their own policies for address allocation, so they typically further delegate address assignment to ISPs. IANA is under the control of ICANN (1). The ICANN is an internationally organized, non-profit corporation that has responsibility for Internet Protocol (IP) address space allocation, protocol identifier assignment, generic (gTLD) and country code (ccTLD) Top-Level Domain name system management, and root server system management functions. These services were originally performed under U.S. Government contract by the Internet Assigned Numbers Authority (IANA) and other entities. ICANN now performs the IANA function. The ICANN is dedicated to preserving the operational stability of the Internet, to promoting competition, to achieving broad representation of global Internet com-

munities, and to developing policy appropriate to its mission through bottom-up, consensus-based processes (2).

Table 2. TTLD applications to ICANN

Applicant	Strings Requested
	General-Purpose TLDs
Abacus America, Inc.	.biz, .cool, .fam, .inc, .xxx
Affinity Internet, Inc.	.biz, .ebiz, .firm, .inc
Afilias, LLC	.info, .site, .web
Commercial Connect, LLC	.mall, .shop, .svc
Diebold Incorporated	.cash, .global, .secure
Dubai Technology, Electronic Commerce and Media Free Zone Authority	.dubai, .go
Eastern Communications Company Limited	.firm, .game, .inc, .info, .ltd, .news, .shop, .store, .tour
iDomains, Inc.	.biz, .ebiz, .ecom
Image Online Design, Inc. (dba Web Registry)	.web
JVTeam, LLC	.biz
KDD Internet Solutions Co., Ltd.	.biz, .home
Name.Space	.ads, .agency, .aids, .air, .antiques, .art, .artists, .auction, .audio, .bbs, .books, .café, .cam, .card, .cars, .center, .city, .channel, .church, .club, .commerce, .computers, .consulting, .design, .digital, .direct, .dtv, .dvd, .factory, .fashion, .festival, .fiction, .film, .films, .foundation, .free, .fun, .fund, .funds, .gallery, .games, .gay, .graphics, .group, .guide, .hotel, .help, .history, .index, .insurance, .jazz, .jobs, .lab, .mad, .mag, .magic, .mail, .market, .media, .men, .monitor, .movie, .music, .news, .now, .nyc, .one, .online, .opera, .page, .partners, .people, .planet, .politics, .power, .productions, .projects, .properties, .radio, .records, .school, .service, .sex, .shoes, .shop, .show, .security, .society, .sound, .shareware, .site, .software, .solutions, .soup, .space, .sports, .star, .studios, .sucks, .systems, .tech, .temple, .theatre, .time, .times, .toys, .trade, .travel, .voice, .war, .watch, .weather, .women, .world, .writer, .zine, .zone
NeuStar, Inc.	.dot, .info, .site, .spot, .surf, .web
Rathbawn Computers Limited	.africa, .llc, .sansansan.sex, .three33, .wap, .xxx
	Special-Purpose TLDs
Cooperative League of the USA (NCBA)	.co-op, .coop
International Confederation of Free Trade Unions (ICFTU)	.union
Internet Events International, Inc.	.event
Museum Domain Management Association (MDMA)	.museum
Société Internationale de Télécommunications Aéronautiques (SITA)	.air
Universal Postal Union	.post
World Health Organization (WHO)	.health
	New Services TLDs
Telephony-Related (3 applications)	.tel, .one
Message Routing	.mobile, .pid
Other	.geo, .dir, .yp

Therefore, the establishment of new top-level domains is managed by the ICANN. In past several years, a lot of applications for registering new TLDs are sent to ICANN. Table 2 shows these applications in 2000.

The US domain - the one example of TLD

The US Domain is an official top-level domain in the DNS of the Internet community. The domain administrators are Jon Postel and Ann Westine Cooper at the Information Sciences Institute of the University of Southern California (USC-ISI). US is the ISO-3166 2-letter country code for the United States and thus the US Domain is established as a top-level domain and registered with the InterNIC the same way other country domains are, according to TLDs and ISO-3166.

The US Domain hierarchy is based on political geography. The basic name space under US is the state name space, then the "locality" name space, (like a city, or county) then organization or computer name and so on. In addition to strictly geographically names, some special names are used, such as FED, STATE, AGENCY, DISTRICT, K12, LIB, CC, CITY, and COUNTY. Several new name spaces have been created, DNI, GEN, and TEC, and a minor change under the "locality" name space was made to the existing CITY and COUNTY subdomains by abbreviating them to CI and CO. A detailed description follows in Table 3 (6).

Table 3. Subdomains of the US domain

US domain	Use
.fed	For agencies of the federal government.
.dni	DISTRIBUTED NATIONAL INSTITUTES – For distributed national institutes; organizations that span state, regional, and other organizational boundaries; that are national in scope, and have distributed facilities
.ci	For city government agencies and is a subdomain under the "locality" name
.co	For county government agencies and is a subdomain under the "locality" name
.k12	For public school districts
.cc	COMMUNITY COLLEGES - For all statewide community colleges
.tec	TECHNICAL AND VOCATIONAL SCHOOLS - For technical and vocational schools and colleges
.lib	For libraries only
.state	For state government agencies
.gen	GENERAL INDEPENDENT ENTITY - For the things that don't fit easily into any other structure listed

This story about US domain is presented to give better image of DNS hierarchy scheme. It also, together with mentioned applications for new TLDs from the Table 2., show that no mentioning of medical institutions (except Medical School at Universities as educational institutions) or public health service institutions are present. Let's now return to the topic of the article and ask the question again and try to answer it.

Could telemedicine generate .med as top-level domain name?

A number of telemedicine websites has been increased, but not their influence on public health service policy. Except some scientific and operative projects in USA, Canada, Australia, and EU telemedicine services are still treated widely as exotic medical service reserved for privileged patients and physicians. However, raising influence of telemedicine equipment and services vendors on the market will probably give major significance to telemedicine services in general, maybe even to the point of asking for ICANN to register .med (read it as Dot Med) as TLD. This TLD name should be reserved only for health institutions regardless of practicing telemedicine directly or not. The public review on Internet forums could contribute making a state that .med is needful on the Internet.

The purpose of this article was to induce further consideration. At last but not least, health care is probably as important as other government and public services and institutions, which have their TLDs, isn't it?

Note that .med is just an example for TLD name for public health service. It could be also .phs, .pubhealth, .health or something else. It is not really important, but thinking about it could be.

Finally, is the answer Yes or No? Maybe the acceptance of application for registering .health for World Health Organization (WHO) will answer the question. According to all presented facts, the answer is definitely Yes, but the problem of who will manage the whole process of registering .med TLD still remains.

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