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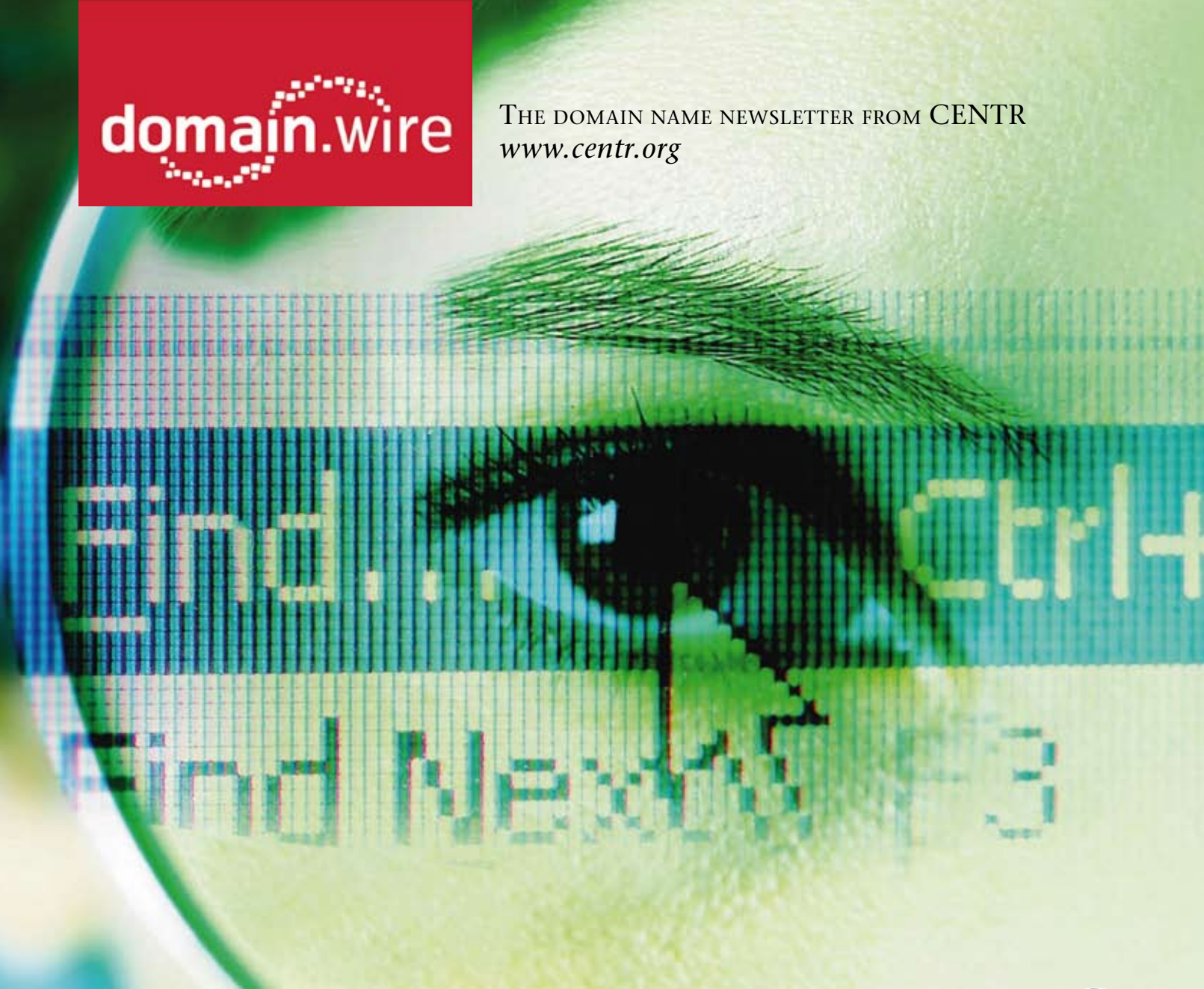

# DNS Explained

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# Welcome!

Dear Reader,

The Internet is growing at a staggering pace with hundreds of thousands of new domain names registered every week, better and more reliable internet connections available to the users, wireless hot spots becoming a common part of our environment and the ubiquitous availability of high speed internet access to our mobile phones.

Unfortunately there is a backside to the coin. The Internet is facing new types of attacks; spam and phishing are more and more common and sophisticated, “bot-nets” are offered for hire, Distributed Denial of Service attacks are executed from hundreds of thousands computers. Fortunately, our community proved that it is always a few steps ahead of those who want abuse the Internet to commit fraud. CENTR members are investing in reliable and redundant infrastructure and constantly increasing security, while sharing these best practices with their international counterparts. Our business is based on continuous innovations and continual improvement. Security is our top priority.

Our community is not only facing challenges in the field of security but also with regard to the multilingualisation of the Internet. More and more web pages are available in local languages. Unfortunately, localization of the content is not followed by localization of domain names. Our community managed to implement Internationalized Domain Names at the “second level”. Today DNS (Domain Name System) awaits implementation of Internationalized Domain Names at the root level and internationalization of e-mail addresses. This should be the joint effort of all stakeholders including ICANN, International Organization for Standardization, country code Top Level Domain name registries, governments, linguistic groups and Internet users.

We are looking forward to the challenges ahead of us!

I hope you enjoy this edition of Domain Wire.

*Andrzej Bartosiewicz, Chairman of CENTR*

# How the Domain Name System works

*by Dr Phil Adcock, Technical Director, Domicilium (IOM) Ltd*

If you have ever sent an email or accessed a web site via the internet then you have used the Domain Name System (DNS). In its simplest form, the DNS is an internet version of the telephone directory which represents services running on internet computers with human readable domain names. The DNS hides the underlying networking details of the internet by replacing difficult to remember numeric IP addresses, which are used by computer networking equipment to uniquely identify a computer or service worldwide. Imagine how difficult it would be to remember the address of your favourite web site if you had to enter the IP address 64.233.83.99 instead of the domain name www.google.com. Try and remember ten more web sites and you can quickly see why the DNS is an essential part of the internet fabric.

The fact that the DNS obscures the technicalities of computer networking makes the Internet flexible. Companies and individuals can seamlessly change Internet service providers even though this usually involves assigning a new IP address to their web site and email servers. They can develop resilient and geographically dispersed server farms to allow web sites to survive the failure of an individual web server and load balance traffic for improved performance. Another common use of the DNS is to allow numerous web sites with different domain names to be operated from the same web server.

Domains names are split into a number of parts separated by dots. The rightmost part identifies the top level domain which is either a two letter country specific code (for example .de, .uk, .im) or a generic code of three letters or more (for example .com, .net or .mobi). If you consider the domain names department1.iom.com and department2.iom.com, the part immediately to the left of the top level domain (iom) is called a second level domain and department1 / department2 which are to the left of the second level domain are called third level domains. The iom part is also a subdomain of com and department1 is a subdomain of iom. In theory, the DNS supports over 100 subdomains although it is rare to find many web sites operating much deeper than fourth level domains (for example www.advsys.co.uk). Fourth level domains for email addresses are more common, particularly in large structured organisations such as government departments which have email addresses similar to admin@office.department.gov.uk.

The DNS is often represented as a hierarchy (figure 1) and different parts of the hierarchy are usually managed by different organisations which are indicated by the dotted lines. At the top of the hierarchy is the root which is managed by the Internet Assigned Numbers Authority (IANA). Each generic and country specific top level domain is managed by an organisation known as a registry and the root delegates control of that part of the DNS hierarchy to them through configuration on the root name servers. For top level domains each organisation will generally run its own independent name server infrastructure to handle domain name queries for its part of the hierarchy.

When a domain is purchased it is delegated by the registry to the domain owner's name servers who can then control the configuration. The delegation process involves configuration on the registry's top level name servers. One consequence of this structure is that the same name or trademark can exist simultaneously under different parts of the domain hierarchy (for example google.com and google.im) which can sometimes lead to intellectual property disputes between local and international organisations. Most registries make domain names available through a network of private companies known as registrars which resell domain names. Examples of well known registrars include Enom, GoDaddy and Key Systems.

The ultimate point of the DNS is to map domain names to IP addresses and this is achieved through domain resource records. Resource records are stored on the name servers responsible for a domain name and are classified into types which perform different functions. A small selection of resource records are indicated in table 1.

Figure 1 – DNS Hierarchy

Figure 1 indicates the use of an "A" record to map www.iom.com to the IP address 217.23.165.13. A "MX" record is also present for the domain iom.com which indicates that the server mail.iom.com handles email for this domain. An additional "A" record exists to map mail.com to the IP address 217.23.163.138. The delegation process for the domain name jenny.im is also illustrated in figure 1. A "NS" record is inserted into the .im top level name servers indicating that the name server xyzserver.com is authoritative for the domain. The name server xyzserver.com contains a "SOA" record which indicates that resource records should be learnt from this server.

To illustrate how DNS works with a real example, we will assume that a user has entered the web site address http://jenny.im/blog into their web browser. The browser strips the /blog directory from the domain name www.jenny.im and uses a piece of software running in the background of your computer's operating system called a resolver to find the IP address of the site. The resolver firsts check its local cache (a temporary storage area) to see if the same query was performed recently. If the IP address is not in the cache then the resolver will then query your local DNS server. These servers will also maintain a cache of recent lookups and if the IP address is in the cache then it will return the information to the resolver. If the information is not in the cache then the server will perform a recursive query, starting at the root server "." and working through each server in the DNS hierarchy until it eventually locates the resource "A" record which maps www to an IP address for the domain name jenny.im. It is also worth noting the role of the TTL (time to live) value in the SOA record of jenny.im which tells name servers how long they can keep records in their caches, in this case 3600 seconds.

A number of important initiatives exist to extend the functionality of the DNS to meet new demands. These include DNSSEC (short for DNS Security Extensions) which is designed to add security to the Domain Name System by protecting against forged DNS data, and ENUM (TElephone NUmber Mapping) which is a suite of protocols designed to unify the traditional telephone numbering system with the DNS by allowing telephone numbers to be resolved to resources or services on the internet including voicemail and email addresses. Another ongoing and major development is IDNs (internationalised domain names) which supports the use of accented letters and scripts such as Cyrillic which are currently not permitted in domain names. Testing is currently taking place under the top level domain .test in Arabic, Persian, Chinese, Russian, Hindi, Greek, Korean, Yiddish, Japanese and Tamil.

## Table 1 – Common Resource Records

| A | address record | Maps a domain name to an IP address |
|---|---|---|
| MX | mail exchange record | Identifies the IP address of the mail server for this domain name. Several MX records may be provided in case a primary mail server has failed and the MX records are configured with a preference number to indicate an order of priority. |
| NS | name server record | Identifies which name servers hold the master copy of the domain information. |
| SOA | start of authority record | Administrative information stored on the name server to which a particular domain or subdomain is delegated (the *authoritative name server*). |

Further information on the DNS can be found at the following web sites:

| | |
|---|---|
| http://www.icann.org | A policy making body for the Internet. |
| http://www.iana.org | Body responsible for technical coordination of the Internet. |
| http://www.iana.org/root-whois/index.html | List of delegations for country specific top level domains. |
| ftp://ftp.rfc-editor.org/in-notes/rfc1035.txt | Technical specification of the DNS. |
| http://www.centr.org/news | Updates from the Council of European Top Level Registrars. |

# What is expected from a ccTLD manager ?

*Understanding the key services for contingency planning, by Mathieu Weill*

The Domain Name System (DNS) plays a vital role in the functioning of essential Internet applications such as e-mail and web. ccTLDs are top-level domains corresponding to country codes such as .es for Spain, .de for Germany or .fr for France. Among CENTR members, there are more than 50 ccTLD managers, of very diverse nature and status. What if one of them was to fail? Would mayhem spread all over the Internet? Would I notice anything at all?

Looking into the different services provided by ccTLD managers is an appropriate starting point before we assess the impact of a failure.

Most widely used, is the **domain name resolution service**. The ccTLD manager's infrastructure provides second level (i.e. afnic.fr) name server information in response to queries for domain names under the ccTLD in question. This service is required for any user or application relying on domain names: Web and e-mail mostly but almost all the other applications communicating over the Internet also request domain name resolution.

Queries must be answered within very short timeframes (typically less than 100 ms) from anywhere on the Internet. Therefore the service must be provided at a global level, with very high expectations on its availability. Integrity of the data provided in answer to the query is also essential: incorrect, truncated or missing records will mislead or prevent the communication.

Therefore the domain name resolution service can legitimately be considered as a fundamental part of the Internet infrastructure and be subject to special attention from all stakeholders.

A large part of a registry's activity lies in the operations applied to its database. **Registration services** are those operations on records within the registry itself: create, cancel, transfer, hold, update...

Depending on the ccTLD manager's policy, those services may be provided to registrars (who act themselves on behalf of end-users) or directly to end-users (companies, individuals, public authorities). Taking .fr's example, there are more than 30 000 "create" operations per month.

This type of service is very similar to traditional Business-to-Business transactions. Accordingly, the security needs are mainly authentication, and a level of availability which is deemed acceptable by customers. Some ccTLD managers offer 24x7 and near-real time services (hundreds of ms delays) while other process requests 5 days a week with delays ranging up to several days.

Some operations are sensitive, such as domain cancellation or transfer, and part of the data (essentially personal data) requests confidentiality, but only in rare cases would failure adversely affect security and stability of the Internet. Those services are however at the core of most ccTLD managers business models.

Most ccTLD managers, but not all them, provide information to the public related to domains delegated under their TLD: registrant information, different kinds of contacts for technical or administrative issues, etc. This **directory service** is usually known as "Whois". The information available as well as its display format varies among TLDs.

The users of these directory services range from registrants checking their own data to registrars for their business needs and from right holders fighting IP rights infringements to law enforcement authorities tracking illicit activities on the Internet.

Because these data may be used in investigations or law cases, accuracy and integrity are expected, but only to a certain extent, since online registration procedures often simply rely on declarative methods. Being a service accessible to the public, 100% availability is the target. But disruption of the service does not affect Internet applications. It will only cause delays in registrar activities or law enforcement investigations.

This description of the types of services provided by ccTLD registries shows that most are very similar to what can be found in any business organisation: BtoB transactions, billing, directory... ccTLD managers usually deliver very high levels of availability, confidentiality and integrity, not because it is a critical part of the Internet but because of their commitment to meeting their local Internet community's expectations.

The domain name resolution service, however, deserves special attention; because it plays a key role in the most widely spread Internet applications. It is arguably not as critical as connectivity since it would not function without it, but it is definitely a fundamental service infrastructure for the Internet.

Significant resources are dedicated year after year by the Internet community, among whom ccTLD managers often play a prominent role, in elaborating and sharing best practices, so as to confront existing and emerging threats to this infrastructure.

# The Internet Governance Forum - An experiment in soft global governance

*Markus Kummer, Executive Coordinator*
*Secretariat of the Internet Governance Forum (IGF)*

The Internet has evolved over the past two decades from being the preserve of a relatively closed, non-commercial, small research and academic community to a truly global phenomenon. Today, the Internet is the backbone of a globalized world. As part of this evolution, governments have shown increasing interest in how the Internet is being run. The World Summit on the Information Society (WSIS) brought this to the fore. It marked the beginning of a broad debate on how the Internet should be run and managed.

WSIS gave a thumbs up to the existing institutions that currently run the Internet. However, it also noted that there was room for improvement and called for 'enhanced cooperation' between them. WSIS affirmed some general principles, namely that Internet governance should be multilateral, transparent and democratic with the full and active involvement of all stakeholders. It also made it clear that the Internet's stability and security was of paramount importance: nothing should be done to endanger its coherence and reliability. And last but not least, it gave a mandate to the United Nations Secretary-General to convene a new forum for multi-stakeholder policy dialogue, the Internet Governance Forum (IGF).

The WSIS outcome is interpreted differently by different people. The WSIS principles – in particular multilateral, transparent and democratic – seem clear. But in reality there are different interpretations as regards their meaning. There are those who hold the view that 'multilateral' refers to traditional forms of intergovernmental cooperation and 'democratic' to a structure which gives all governments the same say, as it is the case in any Intergovernmental Organization. However, non-governmental stakeholders and also some governments have a different interpretation of those terms. For them, 'multilateral' refers to the involvement of all stakeholders at all levels and they point to the bottom-up collaboration the Internet community has developed over the years. Equally, 'democratic' to them means democracy at all levels. In their view, a governance model without a democratic debate at the national level, involving all stakeholders, cannot be called democratic.

The key innovation WSIS developed was the multi-stakeholder approach, best embodied in the IGF, where all stakeholders participate as equals. There is no model for this. It is a collective learning process that needs flexibility from all stakeholders: Governments need to learn to accept non-governmental actors as equals; Civil Society needs to learn to behave differently, if sitting in the same room and at the same table as equal partners; and the business and the Internet communities need to learn to be patient and to accept the slower pace of governments.

The IGF held its first meeting in Athens in 2006, which was generally seen to have been a success. This year's IGF meeting is being held in Rio de Janeiro on 12-15 November 2007.

While the IGF provides a space for discussion on the Internet, it can also be seen in the broader context of discussions on global governance. Governments are recognizing today that they are not anymore the only relevant actors, they cannot do the job alone; they reach out to business and civil society also in other areas, from health care to the environment.

The IGF is a platform for discussion, for exchanging experiences and best practices. The IGF has no decision-making power; at the most, the IGF can have power of persuasion, moral power or 'soft power'. It has the power of recognition, but not the power of redistribution. The IGF will only be able to develop this kind of 'soft power' if its discussions are seen as relevant and the speakers who express their opinions are respected as competent. This is the big challenge: the IGF will only gain any influence in the debate on Internet governance if it is accepted as relevant by all stakeholders.

# Internationalized Domain Names: The Long and Winding Road

*Benny Lipsicas, Doron Shikmoni – ISOC-IL*

***IDN: A Very Brief Introduction***

***Internationalized Domain Names (IDNs)*** are a hot topic these days. Prior to IDN, domain names could be made of characters from the Basic Latin script ('a'-'z','0'-'9' and '-', also known as LDH[1]). IDNs, in a nutshell, are domain names that are written in, or contain characters from, different scripts – such as various European scripts, Cyrillic, Chinese, Hebrew, Arabic etc.

An IDN may contain characters from scripts that are included in the Unicode standard. There is an overwhelming number of such scripts[2].

IDN technology is implemented in a manner that is transparent to the current Domain Name System (DNS). It does so by creating a translation layer between IDNs used in applications, and standard domain names. For example, when a user types an IDN such as "ביישפיל.טעסט" in her browser, this layer will encode the IDN into a special, standard LDH, domain name – in this case, *"xn--5dbqaap0c8a.xn--deba0ad"* [3]. This name is then queried for in the DNS.

By allowing the construction of domain names in practically all scripts currently used in written languages by mankind, IDN is aimed at outreaching to large portions of the world population who might not be using the Latin script or even be familiar with it.

***IDN Under Latin TLDs: 3 Script Categories, 3 Degrees of Challenge***

Currently, active Top Level Domains (TLDs) are constructed of LDH characters only.

Now, when it comes to challenges related to using IDN registrations under these TLDs, we can divide the numerous potential scripts for IDN into three distinct categories:

(1) Latin-based scripts, e.g. those used in languages like German and Spanish
(2) Non-Latin, Left-To-Right scripts, such as Greek and Cyrillic
(3) Non-Latin, Right-To-Left scripts, such as Hebrew and Arabic

(There are other writing systems, which are written in different directions, e.g. vertically. These are beyond the scope of this write-up).

**Latin-Based Scripts: The Simpler Case**

Latin-based scripts are based on the common Basic Latin script, with some additional characters – typically, accented Latin characters.

From the user's perspective, when IDNs containing Latin-based scripts are introduced, the change is relatively minor. Most of the characters in these scripts even have the shape of Latin characters, with the addition of unique accents (e.g. ñ, å and ü).

This makes the implementation of IDNs with those scripts relatively straightforward, in terms of users' acceptance and usability. Several European ccTLD registries have been supporting IDN registration for several years now. On the flip side, since the apparent change is indeed relatively minor, and since users realize that using local script in a name limits its global visibility somewhat, we can perhaps understand why figures indicate that demand for IDN in those scripts is not overwhelmingly high[4].

**Non-Latin, Left-To-Right Scripts: A Bit More Challenging**

The second category in order includes scripts that use primarily non-Latin glyphs and which are written from left to right, e.g., Cyrillic and Greek.

As long as the TLD remains Latin-only, IDNs using these scripts will be "Hybrid" domain names – like *"формула1bg1.bg"* – i.e., a combination of non-Latin script in the registered label (2nd or 3rd level domain) and Latin (LDH) at the TLD.

While not presenting any special technical challenges, Hybrid domain names don't deliver the IDNs objective in full, since the user is still bound to use the Latin script[5].

From the user's perspective, using Hybrid domain names is not entirely convenient. Typing a domain name such as "*www.формула1.ru*" requires two switches between the Latin and Cyrillic keyboard settings[6].

**Non-Latin, Right-To-Left Scripts: Barely Usable**

The third group in our categorization contains scripts that use non-Latin glyphs, and are written from right to left, e.g., Hebrew and Arabic.

With these scripts, registering an IDN within a Latin TLD would also create a Hybrid domain name. However, and more importantly, it would create a Bi-Directional (BiDi) domain name.

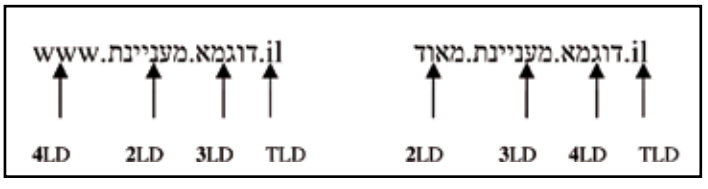
BiDi names have different labels (the parts separated by the dots in the name) written in different directions: IDN labels from right to left and Latin-only labels from left to right[7]. For example:

"דוגמה.מעניינת.מאוד.il" and "www.דוגמה.שניה.il".

BiDi names bring with them a whole new set of problems, having to do mainly with usability:

**1. Confusion of Label Order**

When a BiDi name contains more than one consecutive local script labels, the order of the labels changes in the visual rendering of that domain name. For example:




**2. Complex Typing**

The task of merely typing in a BiDi domain name is not always trivial. In some browsers (and other applications), URLs can be typed in either Right-To-Left reading order or Left-To-Right order. Typing a domain name like "*www.דוגמה.שניה.il*" in Left-To-Right order will require two switches of the typing direction[8]. Typing this domain name in Right-To-Left order will require three such switches.

**3. Ambiguity of the Visual Appearance of Different Domain Names**

The third problem is far more serious. Imagine you receive a business card, or read an ad in a printed newspaper, on which the following domain name appears: "החברה.שלי.il".

If your application (e.g. browser) is switched to working in Right-To-Left reading order, then in order to type a domain name that looks like the URL on the business card you would first type "il", then the dot, switch typing direction, and then type the rest of the labels in sequence.

On the other hand, if your application is currently set to Left-To-Right reading order, then in order to type the domain name you would probably first type the rightmost Hebrew label (!), then a dot, then the second (to the left!) Hebrew label, then another dot, and then the Latin part.

In both cases, what you will see in the URL bar is a domain name that looks identical to the domain name on the card. Yet, the first option will encode into: *"il.xn--5dbfbk0g.xn--eebf2b"* and the second into: *"xn--5dbfbk0g.xn--eebf2b.il"*. These are two totally different domain names – the first with ".il" in the 3rd level, the second with ".il" as the TLD.

So, which one is right? What URL was in fact meant on the business card? How can one be sure they typed the correct one? Short of heuristics, the answer is, unfortunately, that they can't[9].

Due to these reasons, implementing IDNs with RTL scripts within Latin TLDs is not very useful. To some, these problems are considered to be showstoppers. In the .il registry, it has been put on hold.

***.IDN in the root***

These days, ICANN is testing the operational impact of IDNs in the root zone (a.k.a IDN.IDN or .IDN). Assuming no unexpected surprises, these tests proving successful would indicate that IDNs can be inserted into the root zone.

Having an IDN TLD will allow domain names that are "purely" IDN, meaning, the entire name can be made of the same non-Latin script.

How will this affect each of the script categories defined above? Well, plainly put, it will solve (or improve on) most of the problems we described. IDNs in Latin-based scripts are seemingly already in pretty good shape even prior to .IDN. For the Non-Latin LTR scripts, it will eliminate the need for Hybrid names, and thus help to better achieve the main objective of IDN.

But for Right-To-Left scripts, it will be a real revolution. It will enable the creation of unidirectional RTL domain names, which will eliminate most of the ambiguities and usability issues described above. Essentially, it will make RTL IDNs usable[10].

***Challenges to Launching .IDN***

Yet, as in many other cases, the technical aspect is only a part of the story.

There is a whole set of issues that has to be properly addressed for .IDN to be successfully launched. To mention just a few (there are quite a few others):

**What will the corresponding .IDN of an existing, Latin TLD be?**

Assuming there will be IDN equivalents to existing TLDs, in what scripts will those be? How many scripts per TLD? What will the names be? How many names per script? Many countries have several languages used in their territory. gTLDs, by definition, are global – should they be allowed to have .IDN equivalents in all scripts? Some scripts? Any script?

**Should the .IDN be limited to a certain number of characters?**

For some communities, a two-character abbreviation doesn't mean anything that represents their territory for them. For example, in Israel, a combination like "יל." which might be considered by some as an equivalent to ".il", is practically meaningless.

**Will the ccTLD name space be unified?**

Centr

COUNCIL OF EUROPEAN NATIONAL TOP LEVEL DOMAIN REGISTRIES
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## INTERNET COUNTRY CODE TOP-LEVEL DOMAINS

THE CENTR MEMBERS
THE CENTR ASSOCIATE MEMBERS

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| .ac | Ascension Island | .be | Belgium | .cn | China | .fr | France | .ie | Ireland |
| .ad | Andorra | .bf | Burkina Faso | .co | Colombia | .ga | Gabon | .il | Israel |
| .ae | United Arab Emirates | .bg | Bulgaria | .cr | Costa Rica | .gb | United Kingdom (Great Britain) | .im | Isle of Man |
| .af | Afghanistan | .bh | Bahrain | .cu | Cuba | .gd | Grenada | .in | India |
| .ag | Antigua and Barbuda | .bi | Burundi | .cv | Cape Verde | .ge | Georgia | .io | British Indian Ocean Territory |
| .ai | Anguilla | .bj | Benin | .cx | Christmas Island | .gf | French Guiana | .iq | Iraq |
| .al | Albania | .bl | Saint Barthelemy | .cy | Cyprus | .gg | Guernsey | .ir | Iran |
| .am | Armenia | .bm | Bermuda | .cz | Czech Republic | .gh | Ghana | .is | Iceland |
| .an | Netherlands Antilles | .bn | Brunei Darussalam | .de | Germany | .gi | Gibraltar | .it | Italy |
| .ao | Angola | .bo | Bolivia | .dj | Djibouti | .gl | Greenland | .je | Jersey |
| .aq | Antarctica | .br | Brazil | .dk | Denmark | .gm | Gambia | .jm | Jamaica |
| .ar | Argentina | .bs | Bahamas | .dm | Dominica | .gn | Guinea | .jo | Jordan |
| .as | American Samoa | .bt | Bhutan | .do | Dominican Republic | .gp | Guadeloupe | .jp | Japan |
| .at | Austria | .bv | Bouvet Island | .dz | Algeria | .gq | Equatorial Guinea | .ke | Kenya |
| .au | Australia | .bw | Botswana | .ec | Ecuador | .gr | Greece | .kg | Kyrgyzstan |
| .aw | Aruba | .by | Belarus | .ee | Estonia | .gs | South Georgia & the South Sandwich Islands | .kh | Cambodia |
| .ax | Åland Islands | .bz | Belize | .eg | Egypt | .gt | Guatemala | .ki | Kiribati |
| .az | Azerbaijan | .ca | Canada | .eh | Western Sahara | .gu | Guam | .km | Comoros |
| .ba | Bosnia and Herzegovina | .cc | Cocos (Keeling) Islands | .er | Eritrea | .gw | Guinea-Bissau | .kn | Saint Kitts and Nevis |
| .bb | Barbados | .cd | Congo, The Democratic Republic of the | .es | Spain | .gy | Guyana | .kp | Korea, Democratic People's Republic |
| .bd | Bangladesh | .cf | Central African Republic | .et | Ethiopia | .hk | Hong Kong | .kr | Korea, Republic of |
| | | .cg | Congo, Republic of | .eu | European Union | .hm | Heard and McDonald Islands | .kw | Kuwait |
| | | .ch | Switzerland | .fi | Finland | .hn | Honduras | .ky | Cayman Islands |
| | | .ci | Cote d'Ivoire | .fj | Fiji | .hr | Croatia | .kz | Kazakhstan |
| | | .ck | Cook Islands | .fk | Falkland Islands (Malvinas) | .ht | Haiti | .la | Laos |
| | | .cl | Chile | .fm | Micronesia, Federated States of | .hu | Hungary | .lb | Lebanon |
| | | .cm | Cameroon | .fo | Faroe Islands | .id | Indonesia | .lc | Saint Lucia |

ARCTIC OCEAN
Russian Federation
.ru
Kazakhstan
.kz
China
.cn
Mongolia
.mn
India
.in
Tibet
Kashmir
Pakistan
.pk
Iran
.ir
Saudi Arabia
Sudan
.sd
Ethiopia
.et
Kenya
.ke
Nigeria
.ng
Indonesia
.id
Australia
.au
New Zealand
.nz
Papua New Guinea
.pg
Greenland
.gl
Alaska (US)
Aleutian Islands
Kuril Islands
Sakhalin
Severnaja Zem'la
Novaja Zem'la
Zem'la Francalosifa (Russia)
Ostrov Kotel'nyj
Svalbard & Jan Mayen Islands (Nor.)
.sj
Sweden
.se
Finland
.fi
.ax
Estonia
.ee
Latvia
.lv
Lithuania
.lt
Belarus
.by
Ukraine
.ua
Moldova
.md
Poland
.pl
Germany
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Czech Republic
.cz
Slovakia
.sk
Austria
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Slovenia
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Hungary
.hu
Romania
.ro
Bosnia & Herzegovina
.ba
Croatia
.hr
Serbia
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Montenegro
.me
Italy
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San Marino
.sm
Bulgaria
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Macedonia
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Azerbaijan
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Caspian Sea
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Mediterranean Sea
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Cyprus
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Israel
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Palestine
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Jordan
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Namibia
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Botswana
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South Africa
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Lesotho
.ls
Swaziland
.sz
Angola
.ao
Democratic Republic of the Congo
.cd
Republic of Congo
.cg
Cameroon
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C. African R.
.cf
Nigeria
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Benin
Togo
.tg
Ghana
Burkina Faso
Mali
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Mauritania
Senegal
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Gambia
Guinea-Bissau
Guinea
Sierra Leone
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Liberia
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Côte d'Ivoire
Niger
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Algeria
Western Sahara
Morocco
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Spain
Portugal
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France
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Andorra
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Monaco
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Belgium
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Netherlands
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Luxembourg
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Switzerland
.ch
Liechtenstein
.li
Ireland
.ie
United Kingdom
.uk
Iceland
.is
Faroe Islands
Denmark
.dk
Norway
.no
Sweden
.se
Finland
.fi

### *The Need for a Unified ccTLD Name Space – Users' Perspective*

Clearly, the #1 goal of IDNs (and domain names in general) is to serve the Internet users' community. Now, assume an IDN TLD (one or more) that is allocated for a community currently served by a Latin ccTLD (ISO-3166). If the namespace under this IDN TLD is disjoint from the namespace of the original TLD, we will immediately see confusion ensue. Clearly, in both namespaces, people will register Latin-only domain names, as well as Hybrid domain names. Now, a local script label might be registered in both namespaces, by two different registrants, obviously leading to two different zones and application entities. In other words, "<name>.ccTLD" and "<name>.ccIDNTLD", which the user perceives as two equivalent representations of the same domain name and entity, will actually be two different domain names. Similarly, a Latin label might show up in both namespaces, leading to a similar confusion.

For registries, this might spell additional revenue. For the users, however, this spells major confusion. Which of the local-script labels registered in the different ccTLD namespaces, is the one I'm looking for?

Conversely, if there is a single namespace, these questions and confusions do not arise. Whether you look for (or auto-complete) the label in the local script TLD or in the Latin script TLD, you will end up at the same DNS zone – and hence, at the same application target, be it WWW, SMTP or otherwise.

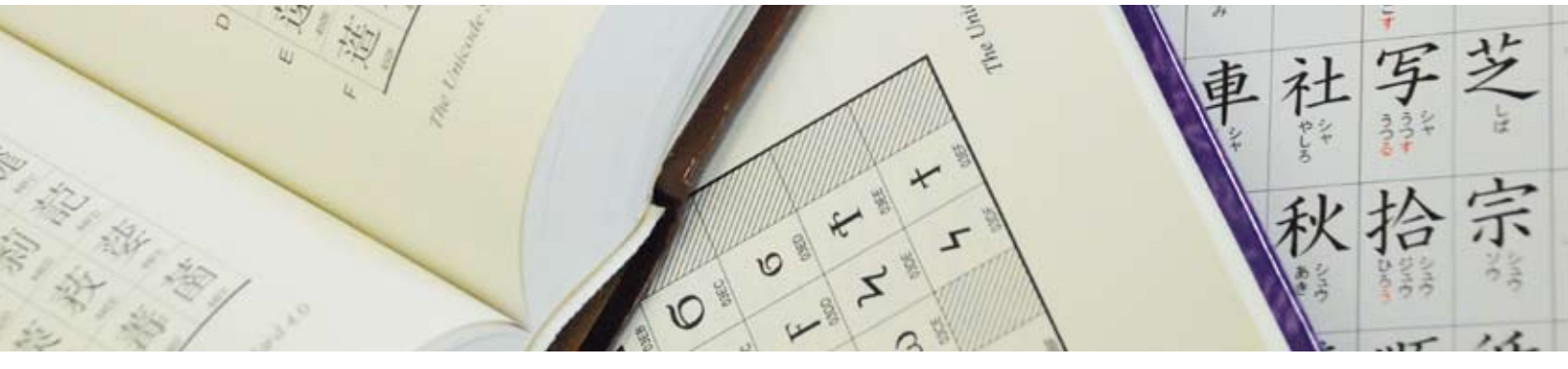
From the users' perspective, the TLD namespace needs to be unified: the Latin-only TLD and the corresponding IDN TLD(s) must point to the same namespace.

We believe that a namespace equivalence technique, such as using DNAME[11] RRs (or registry-driven namespace equivalence), should the way to move forward[12]; any other way would lead to namespace fragmentation and to confusion within the users community.

### *Conclusion*

IDNs still have some way to go before they can be fully deployed in a usable and convenient way. With some scripts, IDNs under Latin-only TLDs do not really solve a problem, and, at times, might be very confusing. Fundamental decisions, yet to be taken, will determine to what extent IDNs will improve accessibility and outreach, or create fragmentation of the Internet and confusion amongst users.

Will IDNs become the new generation of domain names? Only time will tell. Will they be helpful and usable to users of all scripts and languages? The approach taken for placing IDNs in the root will play a considerable part in determining that.



1 As recommended by RFC1035
2 See: http://www.unicode.org/charts/
3 Although not very readable to humans, this domain name contains only ASCII (actually, LDH) characters and is a perfectly valid name in DNS.
4 376,534 IDN domains out of 11,335,201 .de domains, as of September 2007 – about 3.3%. DENIC has been supporting IDNs since 2004, and allows registration of 92 characters from different European scripts, including German.
105,008 IDN domains out of 787,198 .at domains, on October 21, 2007 – about 13.3%. This surprisingly high number is the result of the "IDN for free" campaign ran by NIC.AT. The number of IDNs under .at is expected to drop sharply after most of the IDNs registered as a result of the campaign have not been renewed. Currently suspended, they are expected be revoked by the end of the year. NIC.AT has been supporting IDNs since 2004, and allows registration of 34 characters in addition to Latin.
5 Efforts have been made to find ways to make it easier to users to type such names, like auto completion of the TLD etc. Registration of Hybrid Names is fully supported today under some TLDs, e.g, .com, .pl etc.
6 More information can be found in this presentation by the Russian Registry's IDN working group: http://gac.icann.org/web/meetings/mtg18/docs/cyrillic_IDN.ppt . Cyrillic scripts bring unique challenges of their own, caused by the fact that some Cyrillic characters are visually identical to Latin characters (a.k.a Homographs).
7 More information can be found in this presentation by the Russian Registry's IDN working group: http://gac.icann.org/web/meetings/mtg18/docs/cyrillic_IDN.ppt . Cyrillic scripts bring unique challenges of their own, caused by the fact that some Cyrillic characters are visually identical to Latin characters (a.k.a Homographs).
8 Using, for example, the combination Alt+Shift in Windows (when support in RTL scripts is installed).
9 The protocol part in a URL, e.g. "http://", if included, can sometimes help in figuring out heads and tails of a BiDi domain name; that being said, its being Latin-only adds to the BiDi domain name challenge.
10 Latin-only protocol names remain an issue; and on the other hand (pun unintended), there are Latin URNs.
11 RFC2672, see also draft-RFC2672bis
12 RFC4185 proposes a different point of view on DNAME and mentions a few issues with it; hopefully work underway can address these issues

# About CENTR

*Peter Van Roste, General Manager, CENTR*

CENTR is an association of Internet Country Code Top Level Domain Registries such as .uk in the United Kingdom and .es in Spain. Full Membership is open to organisations managing an ISO 3166-1 country code top-level domain (ccTLD) registry.

The organisation has a European focus, but there are no geographical restrictions to membership. In addition to more than forty of the countries in the European region, CENTR is very pleased to have as members the country-code registries from a number of countries outside of Europe (such as Iran, Japan, Mexico, New Zealand and Canada). At the time of writing, CENTR has 55 members representing more than 38 Million domain names.

CENTR fulfils three distinct functions: it provides a forum to exchange know-how and best practices and to discuss matters of policy affecting ccTLD registries, secondly it acts as a channel of communication to Internet governing bodies and other organisations involved with the Internet and thirdly it reaches out to registries from developing Internet Communities and other regional organizations.

### Exchanging Information

Through a dozen in person meetings per year, active mailing lists and a vast online library, CENTR members have access to a wide range of information that helps them in keeping on top of the best practices in the industry and sharing their experiences with the registry community.

Meetings range from general assemblies covering broad themes such as security or marketing to specialized meeting such as technical meetings on IPv6 or Legal meetings on online fraud.

On a regular basis, CENTR organises surveys amongst its membership, together with statistical information produced by the CENTR secretariat, these surveys provide a factual basis for development and innovation in the Domain Name System.

### Building Relations

CENTR provides its members with reports from and a communication channel to organizations such as the European Commission, ICANN and the Internet Governance Forum.

### Reaching out

Whether by sponsoring attendance to CENTR meetings or providing information to non-members, over the years CENTR has consistently invested in reaching out to registries from developing Internet communities.

Together with the other regional organization (APTLD for the Asian-Pacific region, AFTLD for Africa and LACTLD for Latin America and the Caribbean), CENTR also contributes to the global network were registries benefit from continuing dialogue and share best practices on issues such as .IDNs.

### CENTR secretariat

The CENTR secretariat is based in Brussels and consists of Eveline De Waele (Office Manager), Wim Degezelle (Communications Manager) and Peter Van Roste (General Manager). For further information on CENTR's mission or membership, you can contact us at secretariat@centr.org.

*Peter Van Roste (General Manager)*

*Eveline De Waele (Office Manager)*

*Wim Degezelle (Communications Manager)*

# CENTR workshops

## CENTR Legal and Regulatory workshop

*Stephan Welzel, General Counsel DENIC (.de) & Chair of the CENTR L&R Group*

CENTR's Legal and Regulatory ("L&R") Group was set up eight years ago when CENTR members realized that most issues being of interest to ccTLDs come with (or, as some might say, are overshadowed by) legal implications. In February 2008, the group will hold its 25th meeting and, with that, celebrate a little silver jubilee.

Since its inception, the L&R Group has dealt with a broad variety of issues, covering core registry affairs such as dispute resolution policies, the introduction of IDNs, and data protection and Whois, but also not shying away from the legal aspects of highly political issues like the ccTLDs' relationship with ICANN (for a more detailed overview, cf. the agendas of previous meetings at https://www.centr.org/meetings/).

Many of these issues continue to be relevant and will, without doubt, return to the agenda regularly as the Internet and its legal environment ever evolve. In the near future, the group plans to look into such diverse issues as the legal side of The Internet Evil (phishing et al.), legal issues of DNSSEC, and registry terms and conditions.

In all of this, the L&R Group accompanies the CENTR members' general agenda with legal analysis and advice. At the same time, it constitutes an invaluable forum for information exchange and debate between registry lawyers, providing them with new insights and, consequently, greatly contributing to their work for their respective registries.

In this instance, CENTR's L&R Group functions a little bit like the IGF.

## CENTR Technical workshop

*Marcos Sanz, Chair, CENTR Technical Working Group*

Technical staff from ccTLD registries has been meeting since the very first day of CENTR's existence. The first CENTR Technical workshop met in June 1998.

The 17th CENTR Technical meeting was held in October at the excellent facilities of Amsterdam's Crown Plaza hotel. Connectivity during the workshop, and the irresistible possibility of non-stop mail-reading with a notebook, did not hold the participants back from engaging in heated discussions about DNSSEC, Whois and IPv6.

How are you going to implement your incremental zone transfer in the advent of DNSSEC? How should you analyze the logs of your Whois to find out if it is being abused? And what are the effects of IPv6 deployment in the DNS answers of your TLD servers? These are some of the bizarre (from the point of view of an external observer) questions that were dealt with at the workshop. Was it worth working on Sunday for that? Yes.
Did any of the 37 attendants convince the rest that he or she has the ultimate answer to a question? I don't think so. But you know what? That is the real value of CENTR: Getting in touch with people that work in organizations like yours, but in a different country, and discussing with them about the technical issues that one confronts in the day-to-day business back home. It is an incredibly enriching mind-broadening exercise.

From here I would like to thank in public all the people that over the past years have been contributing to the technical working group with content, whether in form of presentations for our workshops or just by answering questions of other colleagues in our dear mailing list. And I further want to thank CENTR for organizing and sponsoring the lovely dinner that followed the meeting!

The next Technical workshop will take place in Cologne on 4th May 2008.

# CENTR workshops

## CENTR Administrative workshop

*Wim Degezelle, Chair of the CENTR Administrative workshop*

CENTR's Administrative workshop was formed in December 2002 to bring together the operational staff from registries to discuss best practice in the day-to-day operation of a registry.
Most of the participants to the Administrative meetings have in their day jobs frequent and direct contacts with the registry's customers, registrars and domain holders.

Involving registrars in policy development and measuring their satisfaction with the registry's performance are recurring topics on the agenda. This year registries set together to analyse their customer satisfaction surveys and after some streamlining of questionnaires it was possible to compare and benchmark results on an international level.

CENTR's Administrative workshop is an opportunity to discuss with colleagues new services and projects long before they are to be launched, listen to suggestions and learn from experiences with similar initiatives.

Most presentations and discussions at an Administrative meeting deal with very practical questions like structuring and linking the information in the database; verifying old registration data and cleaning up wrong and outdated records; making the registration procedure shorter and more user-friendly; developing automated web clients; introducing EPP; establishing a registrar code of conduct, ...

CENTR members take up their responsibility towards the internet community by for example starting up projects to teach school children how to build a website and use the internet wisely or by conducting public awareness campaigns. Listening to the presentations at the workshop is for many a source of inspiration for projects in their own country.

The recent Administrative workshop in Paris (October 2007) welcomed a record number of over 65 participants form about 30 different registries. Now we are already looking forward to the next meeting in Vienna on 20 February 2008.
A full day event on Marketing and Public Relations is under preparation for the first half of 2008.

Thank you to everyone who prepared presentations and actively participated in the workshops. These people make a meeting a success!

# Investing in the Internet community

## nic.at – IPA – Netidee:

Domain administration and Internet promotion in Austria

**Structure of the Austrian domain administration**

„nic.at Internet Verwaltungs- und Betriebsgesellschaft m.b.H." is the official registry for all domains ending with „.at". Its 100% owner is the non-profit Internet Private Foundation Austria (IPA), which was founded by the association of Internet Services Providers Austria (ISPA) in the year 2000.

The central role of the Austrian domain administration is taken by the Domain Name Council, which acts as an advisory body for the IPA and defines all basic issues of the delegation policy – e.g. arbitration office, introduction of IDN – as well as general policy issues regarding the domain administration. It is appointed by the IPA's Foundation Council, whereas much emphasis has been put on the broad integration of the LIC (local Internet community). The DNC consists of representatives from the government, the regulator, user groups, justice, registrars, as well as of an international expert. Thus, all interest groups of the local community have the possibility to participate and exercise control.

The profits from the domain administration business are used by the IPA for supporting projects and activities that are aimed at the development and further spread of the Internet and at the introduction of different areas of its use in Austria. The selection of promoted projects and institutions is made by an objective team of experts – the Sponsorship Council.

**Netidee: A promotion project for Internet-related ideas**

In the year 2006, "Netidee" was launched, which has been the largest promotion campaign for Internet-related ideas in Austria. Within the scope of the first call, a total of 500,000 Euro were donated to 29 projects, which had been chosen out of 102 applications.

In 2007, the project was continued in a second call. There was another total sponsorship volume of 500,000 Euro available. The second call was again arousing great interest, with a total of 104 applications. 24 projects were chosen and donated with up to 50,000 Euro each.

**Project selection by an objective team of experts**

The selection and assessment of the applications are accomplished by the IPA Sponsorship Council, which puts much emphasis on the actual feasibility of the projects, as well as on their practical benefit for the Internet in Austria. In 2007, there was a special focus on projects that were dealing with the issue of "Internet security" and that are being developed and realised in cooperation with companies (co-financing). The sponsoring of projects is entirely transparent, and all results are published on the Internet – they are "public domain".

nic at
the austrian registry

## .SE (The Internet Infrastructure Foundation)

is a Swedish independent public organization, active in two areas: Domain name operations and the development of the Internet. .SE's core business is the registration of domain names and the administration and technical operation of the national domain name registry. The surplus from the registration of .se domain names goes to projects that contribute to the development of the Internet in Sweden.

Supporting the development of the Internet is a prerequisite for .SE's operations, set down in the foundation's records and charters. .SE has established the long-term objective that as of 2009, the annual support for research and development shall total SEK 25 million (3,899,304 US Dollar). It is .SE's intention is to supplement the efforts already under way in traditional research environments. These enhanced efforts will also benefit domain registrants.

**.SE´s projects supporting the development of the Internet**

.SE supports a number projects in key areas for the development of the Internet, for example IPv6, anti-spam, Internet in the school, Internet for the disabled, DNSSEC based applications and Internet statistics. As already in 2001 .SE introduced TPTEST, a free way of testing your broadband speed, and this year a more user-friendly version was launched in co-operation with the Swedish Consumer Agency and the National Post and Telecom Agency.

In 2003 it became possible to register IDN .se domains with the characters å, ä, ö, é and ü. As the first top level domain in the world, .SE introduced its DNSSEC service in February 2007. The annual Internetdagarna conference, which takes place in November, has been growing for seven years now to become a natural meeting place for anyone working with the Internet in Sweden.

**.SE´s Internet Fund is supporting independent projects**

.SE's Internet Fund is supporting independent projects both inside and outside the academic world. The budget for .SE's Internet Fund is set annually by .SE's Board of Directors. The Internet Fund was established in 2004. In 2007, .SE's Internet Fund will grant SEK 4 million (623,889 US Dollar). In total, since 2004, .SE's Internet Fund has awarded SEK 8 million ( 1,247,778 US Dollar) to the funding of around 50 Internet development projects. Among those awarded grants were organizations, private individuals and academic institutions.

.se

# Investing in the Internet community

## The SWITCH Junior Web Award

*The SWITCH Junior Web Award is giving school children the opportunity to learn how to handle the virtual world*

**In Switzerland, more than 100 classes created their own websites for the first Junior Web Award, ensuring a highly positive echo and learning effect. The competition for the 2007/08 school year has been launched on 17 October 2007**

The Junior Web Award set up by SWITCH was held for the first time in 2007. The idea that school classes should compile their own website and publish it received a wide echo in Switzerland, with more than 100 classes, accounting for some 2000 pupils, creating 119 websites. The pupils learned a great deal about how the internet works and about programs and language. A survey conducted amongst teachers showed that more than 80 percent of those consulted are recommending the Junior Web Award to others. The Award will be presented on 16 November 2007 in Zurich.

The deadline for submissions is on 17 March 2008. Participation is free of charge, and the subject matter can be chosen at will. From 20 March until 7 April 2008, the general public will have the opportunity to nominate their favourite website in an open vote. A team of jurors, made up of members of the "Best of Swiss Web" jury, will conduct the definitive assessment.

The prizes will be awarded in June 2008 – so that they are optimally coordinated with the school year. By entering for the Award, teachers will benefit from the opportunity to incorporate state-of-the-art communication and information technology in their lessons on a practical basis. Students at vocational schools can also profit from the award: planning and implementing a project within a specified time limit is a skill that is particularly sought-after in the world of work today.

**See www.juniorwebaward.ch for further information and previous submissions.**
**The website is available in German, French and Italian**.

The SWITCH Foundation has operated the Swiss Education & Research Network since 1987, guaranteeing the universities access to the information society. This high-performance network connects users in Switzerland with each other, with Europe and with overseas. Operating this network provides SWITCH with the necessary know-how and technological foundation for running the registry for domain names ending in .ch and .li.

SWITCH
Serving Swiss Universities

# Investing in the Internet community

## Become a Web Wizard...

*Yolaine d'Udekem, DNS BE*

As part of its mission DNS BE provides schools with information about the Internet and .be domain names. At the end of 2006 DNS BE and "Hypothèse" (an association based in Belgium's French-speaking part), launched a project via the www.CrackduWeb.be website for French-speaking schools in Belgium.
The project was based on the www.WordWebWonder.be project, which started in 2005, and aims at making youngsters familiar with the internet and showing them the way to find information on the Web. www.WordWebWonder.be was launched in the Dutch-speaking part of Belgium in a partnership with "RVO Society", an organisation which promotes science in schools.
The WordWebWonder.be project stimulates pupils to publish the work and the projects they are realising in school on the web. The best websites get rewarded.
The first results were very encouraging and therefore DNS BE decided to look for a partner set up a similar project for French-speaking schools and found this partner in "Hypothèse".

"Hypothèse" helps primary school teachers with science and technology projects and believes that children, already at a young age, can acquire the skills they need to use the Internet in an intelligent way. Young children (primary school) should be given the desire, methods and resources to use the web wisely as a means of getting across valuable and targeted information.

Through the Crack du Web program, "Hypothèse" and DNS BE want children, to gain technical knowledge about creating a website, to understand the way in which information is organised on the Web, as well as to understand how the information is carried over the Internet and what technical implications are involved in providing fast communication.
The project offers guidance and supervision for teachers who want to publicise a science project that has been conducted in class. The Crack du Web website provides children aged 8 to 12 with a tool to design and create an Internet website for the science project presented by their teacher. In this way, the science project can be disseminated and presented to the outside world.

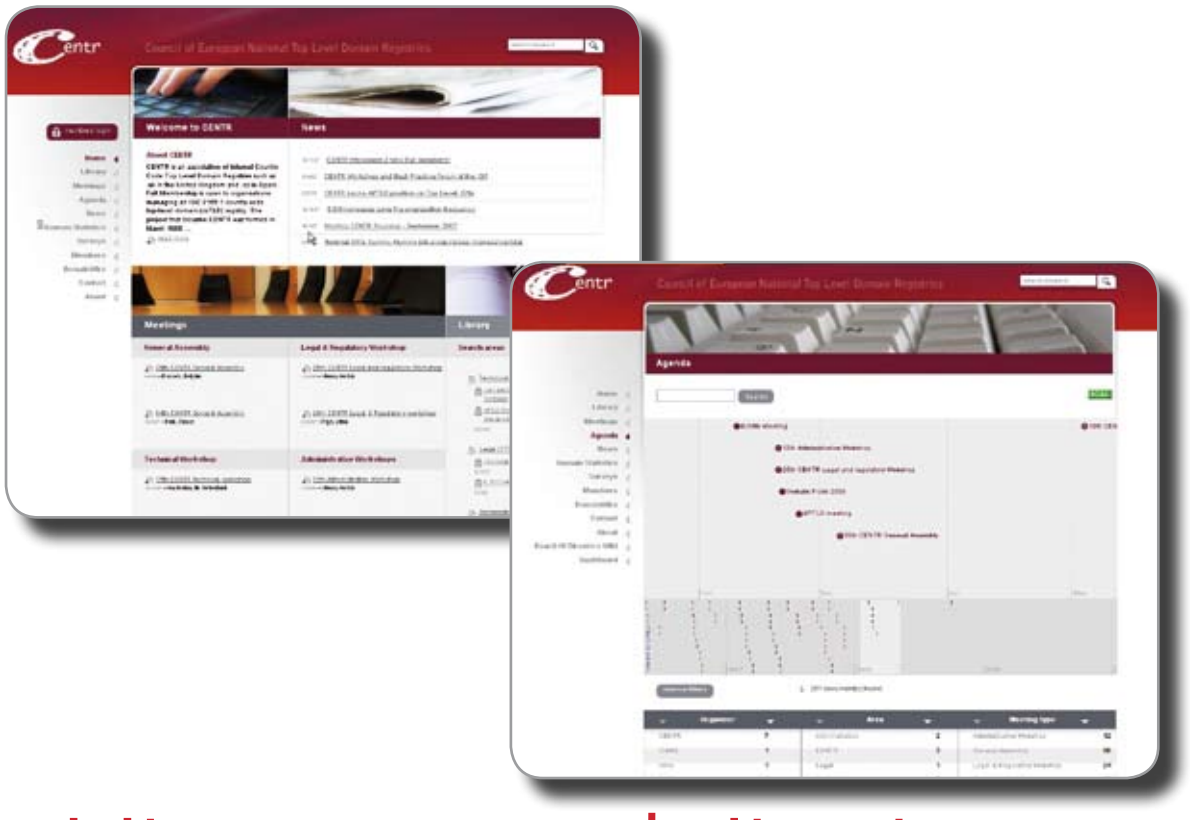
The second edition of Crack du Web and the third edition of Word Web Wonder have just been launched in October. Both projects are now targeting youngsters aged 8 to 18 years old, as well at school as in so-called mini-enterprises.

All websites enter in a competition and make a chance on one of the beautiful prizes offered by the sponsoring .be registrars.

1 "Mini-enterprises" are small companies selling a real product, set up and run by pupils as a school project. Setting up a website is an important aspect in the commercial presentation of the mini enterprise.

# Forthcoming Meetings

| | | |
|---|---|---|
| 12 – 15 | Nov 2007 | Internet Governance Forum, *Rio de Janeiro, Brazil* |
| 2 – 7 | Dec 2007 | IETF 70, Vancouver, *Canada* |
| 10 – 15 | Feb 2008 | ICANN Meeting, *Asia Pacific* |
| 20 | Feb 2008 | 25th CENTR Legal and Regulatory workshop, *Vienna, Austria* |
| 20 | Feb 2008 | 12th CENTR Administrative workshop, *Vienna, Austria* |
| 21 – 22 | Feb 2008 | Domain pulse 2008, *Vienna, Austria* |
| 5 | March 2008 | CENTR workshop, *Brussels, Belgium* |
| 6 – 7 | March 2008 | 35th CENTR General Assembly, *Brussels, Belgium* |
| 9 – 14 | March 2008, | IETF 71, Philadelphia, USA |
| 1st week of June 2008 | | CENTR workshop, *Crete* |
| 1st week of June 2008 | | 36th CENTR General Assembly, *Crete* |
| 22 – 27 | June 2008 | ICANN Meeting, *Paris, France* |
| 27 July – 1 August | | IETF 72, Europe (tbc) |
| 4 | May 2008 | 18th CENTR Technical workshop, *Cologne, Germany (TBD)* |
| 5 – 9 | May 2008 | RIPE 56, *Cologne, Germany* |
| 1st | Oct 2008 | CENTR workshop, *Pisa, Italy* |
| 2 – 3 | Oct 2008 | 37th CENTR General Assembly, *Pisa, Italy* |
| 26 | Oct 2008 | 19th CENTR Technical *workshop (TBC)* |
| 26 – 30 | Oct 2008 | RIPE 57, Dubai, *United Arabic Emirates* |
| 2 – 7 | Nov 2008 | ICANN Meeting, *Africa* |
| 16 – 21 | Nov 2008 | IETF 73, *Minneapolis, USA* |
| | Nov 2008 | Internet Governance Forum, *India* |



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