

# POLICY ISSUE BRIEF

EN

## Internationalized Domain Names (IDNs)

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More information on topics discussed here can be found at:

- <http://icann.org/topics/idn> (ICANN IDN activities and related material)
- <http://ccnso.icann.org/> (ccNSO)
- <http://www.icann.org/topics/new-gtld-program.htm> (Introduction of new gTLDs)



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This is a basic introduction to *Internationalized Domain Names* (IDNs), an important area of Internet policy development that is being addressed currently by the ICANN community's bottom-up, consensus based, policymaking structure. It is designed to accommodate newcomers to ICANN, as well as ICANN issue veterans, who may be unfamiliar with IDNs. Whether a newcomer or veteran, we encourage you to go beyond this introduction and learn more about the work of the ICANN community. We have included URLs to additional information on IDNs, as well as other topics that we reference as we discuss the issue.

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International participation and collaboration are essential to the success and effectiveness of ICANN's policy development activities today, but success in the future will not be possible without the commitment of volunteers like you from around the world. Whether you represent the Internet interests of a nation, a group of individual Internet users, a company, or an organization that would like to become more involved in the issues, there is a place for you at ICANN where you can help shape the future of the Internet.

Thank you for your interest and participation.

# IDNs

## What are IDNs?

Today's Internet user is increasingly likely to be a non-English speaker who does not use Latin script characters in every day life. Therefore, it is important to depict domain names in non-Latin scripts, called Internationalized Domain Names (IDNs), to enhance the ability of all users to use the Internet in their own languages. This evolution is an important part of the continuing growth and advancement of the global Internet and represents an exciting new chapter in Internet history.

Domain names have been presented in Latin script since the beginning of the Internet, but this is changing. People who do not speak and write English or other Latin-based languages will in the near future register and use domain names with characters that reflect their preferred language of communication, such as Arabic or Chinese (to list just two examples). IDNs offer many potential new opportunities and benefits for Internet users of all languages around the world by allowing them to establish domains in their native languages and scripts.

IDNs already exist at the second-level of domains names, as described in the table below. Work is underway to extend that functionality to top-level domains (TLDs) as well – both for gTLDs (generic TLDs such as .com, .biz, .jobs), and ccTLDs (country code TLDs such as .de, .sa, .jp).

Domain Availability Today →	ASCII domain names (a, b,...z), (0,1,...9), (-)	domainname.TLD icann.org
	IDN second level	실례.TLD -under various existing TLDs
Future Addition →	IDN TLDs	실례.테스트

An internationalized top-level domain (IDN TLD) is a top-level domain with a label that contains at least one character that is not a basic Latin letter (a,b,...z). An IDN TLD can be a country code TLD associated with a territory that is listed in the *ISO 3166-1 two-letter codes* (an international standard from the International Organization for Standardization) or a generic TLD with a string of characters representing a generic term. The technical ability to now make these top-level domain names available for assignment is prompting significant discussion, study and demand within the ICANN community. Currently, related efforts are underway on three fronts:

- (1) Efforts to develop a comprehensive, long-term plan that ensures a stable process for all interested stakeholders;
- (2) Efforts to identify a “fast track” process to provide new domain opportunities to territories with immediate justifiable needs; and
- (3) Efforts to implement a process for the introduction of new gTLDs that can include IDN gTLDs.

Expanding the domain name structure of the Internet to accommodate IDN TLDs is a technically complex process. For example, the basic functionality, and hence usability, of IDNs relies on various *applications*. One such application is the browser – software on your computer that enables you to see pages of text, graphics, and links on a page on the Internet. It reads the information and places it on your computer screen. The browser that you have on your computer, or that you download, must contain the technical protocol that supports usability of IDNs. That technical protocol is currently under revision, taking advantage of the experience gained since its introduction in 2003. These revisions will

address security concerns and will enhance the protocol as a forward-looking compatible solution.

### **The source of the complexity – the character set**

The standard set of characters used in computing since 1960 works best for languages based on the Latin script. In addition, many countries use a modified version of ASCII (the American Standard Code for Information Interchange). ASCII includes country-specific symbols, such as accents, diacriticals and currency symbols. One way of transitioning from this standard set of characters to IDNs could have involved redesigning the domain name server (DNS) system, which maps IP addresses to domain names. Internet engineers considered this too risky. The challenge, therefore, was to try and find an easier way to solve the problem.

The Internet Engineering Task Force (IETF), which develops and promotes Internet standards) developed a technical standard called the *IDNA protocol*. Internationalizing Domain Names in Applications (IDNA) is a mechanism for handling domain names that contain non-ASCII characters, allowing domain names to use the full set of Unicode characters. It enables the application software (for example, the browser) to perform a conversion from local characters to ASCII, which the DNS then can understand and process. The local characters used in this standard are based on Unicode. Unicode is a commonly used character set that provides a unique number for each character across a wide variety of languages and scripts. The Unicode Tables hold the code points for each local character identified. These tables continue to expand as more and more characters are digitalized.

To support the IDNA protocol, early adopters among TLD registry operators and ICANN issued IDN Guidelines in June 2003. These guidelines provided

an approach to implementation for registries that wanted to deploy IDNs.

As IDNs were registered at the second level under various TLDs, application developers started to upgrade the software available to users to include the IDNA protocol. The latest versions of most browsers – including Mozilla Firefox, Microsoft Internet Explorer, Opera and Safari – now support IDNs, although they have implemented the IDNA protocol in different ways. This means that users will experience different warnings when using IDNs in the address bar of these browsers. Some will directly display the Unicode (local characters), some will display the corresponding ASCII version of the address (which in most cases is gibberish), and some will provide an option for the user to display the Unicode characters for user-selected languages and scripts. The reason for these different implementations is that the application developers believe that there is a need for protecting users against fraud. This is due to the expansion from using 37 characters to several thousand.

### **How do IDNs work?**

When you type a non-ASCII URL into a browser, IDNA (if implemented in the browser you are using) goes into action. It breaks a domain name down into its constituent parts, or labels. For example, `www.example.com`, consists of three labels: “www”, “example” and “com.” IDNA examines each label to see if it consists entirely of ASCII characters. If it does, the label is left unchanged.

If there are non-ASCII characters in a label, IDNA transforms it into an ASCII format. IDNA adds a four-character code prefix (xn--) followed by a string of ASCII characters that correspond to the Unicode label that was entered. The DNS can then look up the

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result and the site requested will be displayed to the user.

Internet users can try out domain names that are IDNs through the entire string (both the second-level and the top-level) by visiting <http://idn.icann.org> or via one of the localized addresses as found in the following diagram:

Script	Language	SLD, TLD U-labels	SLD A-label	TLDA-label
Arabic	Arabic	مثال, اختبار	xn--mgbh0fb	xn--kgbechtv
Arabic	Persian	مثال, آزمائشی	xn--mgbh0fb	xn--hgbk6aj7f53bba
Chinese, simplified	Chinese	例子, 测试	xn--fsqu00a	xn--0zwm56d
Chinese, traditional	Chinese	例子, 測試	xn--fsqu00a	xn--g6w251d
Cyrillic	Russian	пример, испытание	xn--e1afmkfd	xn--80akhbyknj4f
Devanagari	Hindi	उदाहरण, परीक्षा	xn--p1b6ci4b4b3a	xn--11b5bs3a9aj6g
Greek	Greek	παράδειγμα, δοκιμή	xn--hxajbheg2az3al	xn--jxalpdlp
Hangul	Korean	실례, 테스트	xn--9n2bp8q	xn--9t4b11yi5a
Hebrew	Yiddish	פּערשׂונע, פּערשׂונע	xn--fdbk5d8ap9b8a8d	xn--deba0ad
Kanji Hirigana, and Katakana	Japanese	例え, テスト	xn--r8jz45g	xn--zckzah
Tamil	Tamil	உதாரணம், பரீட்சை	xn--zkc6cc5bi7f6e	xn--hlcj6aya9esc7a

## How are security issues addressed?

The main challenge with IDNA is that there are several Unicode characters that appear identical, but in fact represent different codes. For example, Unicode character U+0430 – the Cyrillic small letter “a” – can look identical to Unicode character U+0061 – the Latin small letter “a.” In other words, to the user they look identical, but the computer sees them differently. This means that an address can be “spoofed,” and that raises a number of security issues. Browser developers, and others, are taking steps to mitigate this risk. ICANN is continuing to work with the Internet community to address IDN-related security issues.

## What’s next? ccTLDs and gTLDs in IDNs

In an attempt to provide additional security for users, the IDNA protocol is being revised. The revised version of the protocol will be used as ICANN works towards making IDN gTLDs and IDN ccTLDs

available for applications.

The potential for ICANN to make these domain names available for assignment is prompting significant discussion, study, and demand within the ICANN community – particularly for territories that want to make use of non-Latin characters. ICANN’s Country Code Name Supporting Organization (ccNSO), which focuses on developing global policies for ccTLDs, is working with other ICANN community stakeholders to advance the introduction of a limited number of IDN ccTLDs and develop IDN ccTLD policy. At the same time, the process for the introduction of new gTLDs developed by ICANN’s Generic Names Supporting Organization (GNSO), which develops global policies for gTLDs, awaits final approval by ICANN’s Board and implementation.

Many users are asking when they will be able to make IDN registrations – for example, a domain name that is entirely in Cyrillic characters (used in Russian and other languages). The answer depends on which kind of domain name they want – a generic TLD, or a country code TLD – and first requires that a registry operator apply for a Cyrillic gTLD or ccTLD. Availability, of course, also depends on how quickly an IDN TLD is able to launch and be available for registrations.

Furthermore, while we have given examples of IDNs being used as website addresses, the IETF also is developing technical standards that will enable IDNs to be used in email too.

## How is ICANN advancing the introduction of IDN ccTLDs?

An ICANN community working group, called the “IDNC WG,” is finalizing a report on how to enable the timely and efficient *Fast Track*

introduction of a limited number of IDN ccTLDs, while a long-term, global IDN ccTLD policy is being developed by the ccNSO. The working group is providing advice on issues that need to be considered in developing (1) a mechanism for the selection of the IDN ccTLD string, and (2) a mechanism to designate an IDN ccTLD manager. Their work is taking into account: the overarching requirements of stability and security; IDNA protocols and IDN guidelines; technical community input on IDN implementation; and current practices for the delegation of ccTLDs.

The purpose of the *Fast Track* process is to introduce a limited number of non-contentious IDN ccTLDs (associated with the ISO 3166-1 two-letter codes) in a short time frame to meet near term demand, while not pre-empting the outcome of the ccNSO long-term IDN policy development effort. The working group issued for public comment a draft Initial Report to canvass the global Internet community on the topics that needed to be covered, and a draft Interim Report to canvass on a methodology.

Based on the input received, the working group developed a number of general, guiding principles and overarching requirements, and described (at a high level) the activities, roles, and responsibilities of the actors involved in an IDN ccTLD *Fast Track* process. The working group expects that this will need to be further detailed by ICANN Staff as a matter of implementation. Their report notes that, in order to implement the recommended methodology, some of the current procedures and practices (for instance, the practices relating to the maintenance of the repository and requirements for an IDN table) may need to be changed.

Guiding principles developed by the IDNC WG, based on input received during the various comment periods, are summarized below:

- The *Fast Track* should be an ongoing process to enable a selected IDN ccTLD manager to enter when ready, but should end when the ICANN Board has adopted a global IDN ccTLD policy.
- The *Fast Track* should not pre-empt final IDN ccTLD policy, so it must be a simple, clear and limited solution.
- The *Fast Track* should only be available where there is a pressing demand in the territory (evidenced by readiness to meet the requirements).
- To avoid pre-empting the ccNSO's PDP, which will consider the possibility of IDN ccTLDs in Latin script, non-Latin script must be used in the *Fast Track*.
- The proposed string and delegation request should be non-contentious within the territory – this is evidenced by the support/endorsement of the relevant stakeholders in the territory for the selected string as a meaningful representation of the name of the territory, and for the selected delegate.
- The *Fast Track* is experimental in nature.
- The number of eligible IDN ccTLDs should be determined by criteria to select the IDN ccTLD string, and to designate the IDN ccTLD manager.

The working group's report will be discussed at ICANN's Paris meeting in June 2008, and is available online at <http://icann.org/en/announcements/announcement-3-13jun08-en.htm>.