20 April 2009

SAC 037: Display and usage of Internationalized Registration Data: Support for characters from local languages or scripts

The Internet user experience is evolving. Internet applications and the Internet's domain name system continue to internationalize. Users may eventually, perhaps *routinely*, encounter Internet content published in languages they do not read, audio streams broadcast in languages they do not understand, and conversations conducted in languages they do not speak. Support for characters from local languages in domain name registration submission and display is an issue that affects many ICANN stakeholders, including the GNSO, CCNSO, ALAC and GAC. Collaboration across this large, diverse community is vital to defining a suitable, scalable solution.

Many Internet applications today support characters from local languages, alphabets or scripts. Support for characters from local languages, alphabets or scripts affects how information is displayed to Internet users and how users submit information to applications via data entry methods including command lines and web forms.

Domain names are poised to fully support this emerging and much-needed "internationalization" as well. "Internationalizing" domain name composition offers a user the opportunity to use characters from local scripts when he composes labels of a domain name. It is only natural that users will want to use characters from local scripts when they submit and view Registration Data[1] associated with a domain name.

This document examines how the use of characters from local scripts affects the Internet user experience with respect to domain name registration data submission, usage, and display. The paper presents examples of what users may encounter today when they access Registration Rata via WHOIS or via the web. The document examines the issues related to supporting characters from local scripts in the context of current and future applications that various parties (e.g., registrars, registries, third parties) provide for the submission, usage and display of domain names and Registration Data.

[1] In this document, we use the term *Registration Data* to refer to elements of a domain registration record for which no standard format is prescribed. This includes contact information, host names for domain name servers, sponsoring registrar, status of domain name, etc. but excludes the registered domain name, for which standard formats are defined.

Background

Internet users have been able to compose host names from a restricted set of Latin characters, consisting of letters, digits, and hyphens from the US-ASCII character set. The DNS community refers to this restricted set as "LDH" since the inception of the host name concept itself. An inevitable and positive consequence of broad, international Internet adoption is that Internet applications evolved to accommodate users who utilize characters from local languages, alphabets and scripts. It is only natural that these users would want to compose fully qualified domain names using characters from local scripts. Thus, standards for "internationalized" domain names (IDN) were and continue to be developed to satisfy the need and desire to accommodate the use of characters from local languages or scripts in domain names as well as Internet applications.

Domain name composition today

IDN labels can be composed and registered at the second and lower level in many TLDs[2]. Specifically, users are not restricted to using only LDH characters when they compose a *second or lower level* label for a domain name in many generic and country-code TLDs but can also use characters from their local language or script to compose such labels. For example, users can choose the ä, ö, and ü from the German character table when composing a domain name in COM, NET, INFO and DE, or they can choose Kanji, Hiragana and Katakana characters when composing domain name labels in COM, NET, INFO, JP, etc. Internet users will soon be able to use domain names compose entirely of characters from their local script. Thus, users will encounter domain names like テスト. 例え, проверка.пример, or اختبار. المثال.

Domain name composition in the IDN era

In the IDN era, users may compose entire domain labels containing characters from local languages, alphabets, or scripts. Ideally, the user should also always be able to submit and view the same characters when they use such domain names in various applications. These local characters are not used by the Domain Name System (DNS) protocol; instead, a corresponding string consisting of ASCII characters only is stored by and used in the DNS. These transformed strings, called A-labels[3], are distinguished from LDH-only labels by prepending the string "`xn--`" to the transformed string. Today, for example, one can encounter IDN labels such as 日本レジストリサービス.JP (the string “JPRS” in Japanese). This domain name is transformed for use by the DNS protocol as `xn--vckfdb7e3c7hma3m9657c16c.jp`.

[2] As of November 2008, ~703,000 of 78 million plus registered domain names in COM zone contained IDN second level labels. Approximately 44,000 of the ~850,000 registered domains in the SE zone contained IDN second level labels.

[3] This document uses terminology from documents the IETF IDNAbis working group is actively studying, see http://*www.ietf.org/html.charters/idnabis-charter.html*

The ultimate intent of the IDN effort is to permit users to submit and view domain names using characters from local languages or scripts in all Internet applications; however, many applications today use A-labels *or* Unicode encodings of local characters (U-label) as a means of representing domain names in Internet applications.

For example, to visit the JPRS web site, an Internet user may type the URL using the A-label

```
http://xn--vckfdb7e3c7hma3m9657c16c.jp/
```

or the user may type the U-label in IDN-aware versions of web browsers, e.g.,

```
http://日本レジストリサービス.jp/
```

During a registration process, it thus becomes important for registries and registrars to make clear to registrants what it is that they are registering: the A-label, the U-label, or the name in the local language.

Applications that make use of domain registration data

The preceding section discussed the encodings associated with domain name labels. How contact and other domain name registration information is submitted to, used and displayed by Internet applications is not covered by IDN standards. For example, RFC 4690, IDN Next Steps, mentions WHOIS in Section 5.4., Databases of Registered Names:

```
"In addition to their presence in the DNS, IDNs introduce issues in
other contexts in which domain names are used.  In particular, the
design and content of databases that bind registered names to
information about the registrant (commonly described as "WHOIS"
databases) will require review and updating.  For example, the WHOIS
protocol itself [RFC3912] has no standard capability for handling non-
ASCII text: one cannot search consistently for, or report, either a DNS
name or contact information that is not in ASCII characters.  This may
provide some additional impetus for a switch to IRIS  [RFC3981]
[RFC3982] but also raises a number of other questions about what
information, and in what languages and scripts, should be included or
permitted in such databases."
```

The situation regarding WHOIS applications today is summarized as follows. Internet users might attempt to submit A-labels or U-labels to query WHOIS services over Port 43 using OS command line programs and WHOIS client applications. They might attempt to submit A-labels or U-labels as input to web-based WHOIS query and domain name registration submission forms. WHOIS operators might return or display domain labels in A-label encoding in their responses, or they might return or display domain labels using characters from the local script used by the registrant.

Registrars may choose encodings that best represent the languages and scripts of the domain registration contact data: for example, a registrar that wished to accommodate Danish-speaking Internet users could offer registration facilities using a set of letters common to Danish, including æ, ä, å, é, ö, ø and ü in pages and submission forms

associated with registering domain names. The character sets containing Danish and other language specific letters and symbols are encoded using the *Unicode (UTF-8 and UTF-16) encoding* standards, or ISO-8859-1 (also backwards compatible with UTF-8). UTF-8 and ASCII are compatible: when strings are entirely composed using 7-bit characters, the encoding is the same for ASCII as for UTF-8. A third character-related standard is also relevant to this discussion. To display language-specific letters and symbols as characters on web pages, *HTML escape character reference sequences* are used; for example, the HTML escape character reference for a Latin small letter a with dieresis (ä) `&#228; or &auml;`.

Recognizable display of Registration Data is application dependent. WHOIS and text processing applications that are not capable of processing UTF-8 encoded characters may display contact information incorrectly. For example, an application may not be able to display the Kanji character 例 (re-i, meaning "example") and the user would only see an ASCII characters representing "unprintable" (often, the ASCII hexadecimal 7F or is displayed in these circumstances).

In some circumstances, protocols such as EPP or agreements between TLD operators and registrars assure that registries receive registration information in a certain encoding. Registrars may store registration information locally, along with billing information, in any format they choose. Record and Key Type WHOIS queries present other interesting scenarios.

The following submission, display, and storage combinations appear possible, depending on the registrar, registry, or 3rd party WHOIS service the Internet user queries and the application the user employs:

Registration information query –Web User Interface		
User can compose query, submits domain name via Web UI in	Name may be stored using	Service might return information other than domain name in
US-ASCII (LDH)	US-ASCII (LDH)	US-ASCII , Unicode, ISO 8859-1†, Unicode HTML††
UTF-8	U-label, A-label other (proprietary)	US-ASCII, Unicode, ISO 8859-1†, Unicode HTML†† or returns an Input Type Error
A-label (domain name only)	A-label, U-label other (proprietary)	US-ASCII, Unicode, ISO 8859-1†, Unicode HTML†† or returns an Input Type Error
HTML Esc char reference*	A-label, U-label other (proprietary)	US-ASCII, Unicode, ISO 8859-1†, Unicode HTML†† or returns an Input Type Error

Registration information query – WHOIS Port 43		
User composes query, submits domain name via WHOIS application in	Name stored using	Service returns information other than domain name in
US-ASCII (LDH)	US-ASCII (LDH)	US-ASCII, Unicode, ISO 8859-1†, Unicode HTML††
UTF-8	U-label, A-label other (proprietary)	US-ASCII, Unicode, ISO 8859-1†, Unicode HTML†† or returns an Input Type Error
A-label	A-label, U-label other (proprietary)	US-ASCII, Unicode, ISO 8859-1†, Unicode HTML†† or returns an Input Type Error
HTML Esc char reference*	A-label, U-label other (proprietary)	US-ASCII, Unicode, ISO 8859-1†, Unicode HTML†† or returns an Input Type Error

† The DE registry returns ISO 8859-1 if selected in query for the domain name, see Example 5.
†† The INFO registry returns Unicode HTML for the domain name, see Example 6.
* Escape character references are used for outputting multilingual characters. It is reasonable to assume that HTML tags might exist in registration records. This would depend on whether HTML tags are accepted (or simply not rejected as invalid input) in a registrar's submission form and whether the tag is not rejected during any subsequent registrar or registry processing.

Questions to consider

The current WHOIS is mostly US-ASCII domain name labels, and mostly US-ASCII registration records. While this is already changing in locales where US-ASCII is not dominant, the change to internationalized registration records is likely to accelerate when a domain label or FQDN is represented in a local language. This may surprise users of current US-ASCII only WHOIS services when they encounter non-ASCII registration data, regardless of whether the domain name is an IDN name or an US-ASCII name. The adoption of multiple languages, alphabets, and scripts by Internet users is inevitable *and* desirable. SSAC is concerned that the issue of internationalized registration contact data, while acknowledged in RFC 4690, has been left for future study for too long. We ask ICANN staff and the Internet community that are involved IDN, WHOIS, and studies on a possible successor to WHOIS[4] to consider the following questions:

Applications/User Experience Issues

1. What features will Internet users find most beneficial in applications that bind registered domain names to Registration Data when the Internet user experience becomes more diverse with respect to languages and scripts? In particular, what features could application providers incorporate into user interfaces to improve

[4] See SAC027, SSAC Comment to GNSO regarding WHOIS studies http://www.icann.org/committees/security/sac027.pdf and SAC033, Domain Name Registration Records and Directory Services, http://www.icann.org/committees/security/sac033.pdf

accessibility for Internet users who make regular use of Registration Data?

2. If applications that bind registered domain names to Registration Data[5] return (display) some or all information using non US-ASCII characters, will the utility of Registration Data queries be diminished or improved? What steps, if any, need to be taken to alleviate such a reduction in functionality?

3. What user experience should application developers consider acceptable and appropriate when as they design ways for users to submit and display domain registration records that contain non US-ASCII characters?

4. Are there any general principles that registry operators and registrars could adopt to minimize the "Babel effect" on Registration Data query services and to ensure some uniformity of information display?

Data Reliability, Accuracy & Operational Issues

1. Are there operational issues related to the submission and display of Registration Data in Unicode in non-Web mediums, or is this only a matter of application evolution?

2. What effect has the use of non US-ASCII characters in Registration Data already had on domain registration data accuracy programs? What experiences can be shared and what remedies or accommodations have been tested or applied?

3. How are law enforcement agencies, intellectual property counsel, interveners and other interested parties affected in circumstances where Registration Data queries return some or all non US-ASCII characters in its output?

Security & Standardization Issues

1. What information, and in what languages and scripts, should be included or permitted when collecting and displaying data about the registrant and associated contacts and hostnames for a given domain name or set of domain names (collectively, Registration Data)? This question is raised in RFC 4690 and is as yet unanswered.

2. Do sufficient submission and display practices exist for applications that bind registered domain names to information about Registration Data?

3. Should the maintenance and display of certain contact information be required in US-ASCII, e.g., the sponsoring registrar, irrespective of the characters from the script the registrant uses to submit his contact information, ensuring a uniform lowest common denominator for core information display?

[5] Examples of such applications are WHOIS servers and clients, and in the future might be Internet directory (e.g., IRIS) clients and servers. Other examples include web applications that serve up Registration Data and applications developed for popular Operating Systems that query port 43.

Relationship to Recommendations in SAC027, SAC033

In two prior SSAC documents, we recommended a transition from the existing WHOIS protocol based services toward a more comprehensive, standard, Internet directory system.

In SAC 027, SSAC recommended to the GNSO:

1. Study the applicability of the Internet Registry Information Service (IRIS) protocol [RFCs 3981-3983] as a successor to the outdated WHOIS model.

2. ICANN to work with registry operators to develop a transition from the current WHOIS service to a successor directory service.

In SAC033, SSAC added that several common features of Directory Services should be considered in a successor service to the WHOIS. Further, SSAC clarified that the directory service features and services beneficial for the community are not exclusive to IRIS, although it is complete and available for review.

SAC037 (this document) focuses on the issue of how to submit and display Registration Data using characters from local languages and scripts. The recommendations in this document do not replace or weaken the advice provided in SAC027 and SAC033. SSAC maintains that WHOIS must be replaced with a more modern protocol. We recognize that the installed base of WHOIS services is considerable and that a deployment of a successor to WHOIS is a substantial investment and effort. While we strongly encourage the defining requirements and planning for a successor to WHOIS, we realize that consideration of internationalized Registration Data may be impractical until that successor is defined, adopted, and deployed.

Recommendations

The Internet user experience is evolving. Support for character sets from local languages and scripts continues to grow among Internet applications and the Internet's domain name system must follow suit. Users may eventually, perhaps *routinely*, encounter Internet content published in languages they do not read, audio streams broadcast in languages they do not understand, and conversations conducted in languages they do not speak. Support for characters from local languages in registration record submission and display is an issue that affects many ICANN stakeholders, including the GNSO, CCNSO, ALAC and GAC. The issues also affect stakeholders beyond those commonly involved in ICANN processes, in particular, some TLD operators and domain name registrants. Collaboration across this large, diverse community, however, is vital to defining a suitable, scalable solution.

SSAC recommends that

1) ICANN's Board of Directors task the GNSO, SSAC to form an Internationalized Registration Data Working Group to study the feasibility and suitability of introducing display specifications or standards to deal with the internationalization of Registration Data. Representation from ccTLD operators and consultation with the CCNSO should be a part of the Working Group's charter.

2) ICANN host a workshop on the internationalization of Registration Data during the next ICANN meeting (June 2009, Sydney).

    a) We note that an Asia-Pacific venue offers an opportunity to engage participants from several countries that would benefit significantly from support of characters from local languages in Registration Data.

    b) Potential agenda topics would include existing deployment experience, current and proposed methods of supporting characters from local languages, application software, business, security, registry, registrar, technical and user considerations related to this issue. Planning for this workshop, including a call for papers, should begin as quickly as possible.

    c) We suggest the "Questions to consider" section above be considered while framing the Terms of Reference of the proposed Working Group.

3) ICANN should consider the feasibility of having applications that query Registration data services incorporate "standard" internationalization functionality. For example, an application that binds registered domain names to Registration Data could be required to

    a. accept A-label and U-label domain names as input,
    b. return A-label and U-label domain names as output,
    c. store contact information in XML,
    d. retain Unicode encoding of local characters in stored contact information,
    e. accept Record and Key Type data queries in Unicode, and
    f. return responses to record and key type data queries in Unicode,
    g. return responses including character or word variants bundled with each Registration Data query

    Please note that these suggestions are provided solely as examples, and are not intended to be a definitive list.

Sample WHOIS Port 43 queries and responses (courtesy of JPRS)

Example 1: IDN input, Japanese output

```
% WHOIS -h WHOIS.jprs.jp 日本レジストリサービス.jp
[Querying WHOIS.jprs.jp]
[WHOIS.jprs.jp]
[JPRS database provides information on network administration.]
[Its use is restricted to network administration purposes.    ]
[For further information, use 'WHOIS -h WHOIS.jprs.jp help'.  ]
[To suppress Japanese output, add'/e' at the end of command,  ]
[e.g. 'WHOIS -h WHOIS.jprs.jp xxx/e'.                         ]

Domain Information: [ドメイン情報]
[ドメイン名]                    日本レジストリサービス.JP
[Domain Name]                   XN--VCKFDB7E3C7HMA3M9657C16C.JP

[登録者名]                      株式会社日本レジストリサービス
[Registrant]                    Japan Registry Services Co.,Ltd.

[Name Server]                   ns01.jprs.co.jp
[Name Server]                   ns02.jprs.co.jp

[登録年月日]                    2001/08/09
[有効期限]                      2008/08/31
[状態]                          Active
[最終更新]                      2007/09/01 01:05:05 (JST)

Contact Information: [公開連絡窓口]
[名前]                          株式会社日本レジストリサービス
[Name]                          Japan Registry Services Co.,Ltd.
[Email]                         dom-admin@jprs.co.jp
[Web Page]
[郵便番号]                      101-0065
[住所]                          東京都千代田区西神田三丁目 8 番 1 号
                                千代田ファーストビル東館 13F
[Postal Address]                Chiyoda First Bldg. East 13F,
                                3-8-1 Nishi-Kanda Chiyoda-ku,
                                Tokyo 101-0065, JAPAN
[電話番号]                      03-5215-8451
[FAX 番号]                      03-5215-8452
```

Example 2: IDN input, English output

```
% WHOIS -h WHOIS.jprs.jp 日本レジストリサービス.jp/e
[Querying WHOIS.jprs.jp]
[WHOIS.jprs.jp]
[JPRS database provides information on network administration.]
[Its use is restricted to network administration purposes.    ]
[For further information, use 'WHOIS -h WHOIS.jprs.jp help'.  ]
[To suppress Japanese output, add'/e' at the end of command,  ]
[e.g. 'WHOIS -h WHOIS.jprs.jp xxx/e'.                         ]

Domain Information:
[Domain Name]                   XN--VCKFDB7E3C7HMA3M9657C16C.JP

[Registrant]                    Japan Registry Services Co.,Ltd.

[Name Server]                   ns01.jprs.co.jp
[Name Server]                   ns02.jprs.co.jp

[Created on]                    2001/08/09
[Expires on]                    2008/08/31
[Status]                        Active
[Last Updated]                  2007/09/01 01:05:05 (JST)

Contact Information:
[Name]                          Japan Registry Services Co.,Ltd.
[Email]                         dom-admin@jprs.co.jp
[Web Page]
[Postal code]                   101-0065
[Postal Address]                Chiyoda First Bldg. East 13F,
                                3-8-1 Nishi-Kanda Chiyoda-ku,
                                Tokyo 101-0065, JAPAN
[Phone]                         03-5215-8451
[Fax]                           03-5215-8452
```

Example 3: A-label input, Japanese output

```
% WHOIS -h WHOIS.jprs.jp XN--VCKFDB7E3C7HMA3M9657C16C.JP
[Querying WHOIS.jprs.jp]
[WHOIS.jprs.jp]
[JPRS database provides information on network administration.]
[Its use is restricted to network administration purposes.    ]
[For further information, use 'WHOIS -h WHOIS.jprs.jp help'.  ]
[To suppress Japanese output, add'/e' at the end of command,  ]
[e.g. 'WHOIS -h WHOIS.jprs.jp xxx/e'.                         ]

Domain Information: [ドメイン情報]
[ドメイン名]                    日本レジストリサービス.JP
[Domain Name]                   XN--VCKFDB7E3C7HMA3M9657C16C.JP

[登録者名]                      株式会社日本レジストリサービス
[Registrant]                    Japan Registry Services Co.,Ltd.

[Name Server]                   ns01.jprs.co.jp
[Name Server]                   ns02.jprs.co.jp

[登録年月日]                    2001/08/09
[有効期限]                      2008/08/31
[状態]                          Active
[最終更新]                      2007/09/01 01:05:05 (JST)

Contact Information: [公開連絡窓口]
[名前]                          株式会社日本レジストリサービス
[Name]                          Japan Registry Services Co.,Ltd.
[Email]                         dom-admin@jprs.co.jp
[Web Page]
[郵便番号]                      101-0065
[住所]                          東京都千代田区西神田三丁目 8 番 1 号
                                千代田ファーストビル東館 13F
[Postal Address]                Chiyoda First Bldg. East 13F,
                                3-8-1 Nishi-Kanda Chiyoda-ku,
                                Tokyo 101-0065, JAPAN
[電話番号]                      03-5215-8451
[FAX 番号]                      03-5215-8452
```

Example 4: A-label input, English output

```
% WHOIS -h WHOIS.jprs.jp XN--VCKFDB7E3C7HMA3M9657C16C.JP/e
[Querying WHOIS.jprs.jp]
[WHOIS.jprs.jp]
[JPRS database provides information on network administration.]
[Its use is restricted to network administration purposes.    ]
[For further information, use 'WHOIS -h WHOIS.jprs.jp help'.  ]
[To suppress Japanese output, add'/e' at the end of command,  ]
[e.g. 'WHOIS -h WHOIS.jprs.jp xxx/e'.                         ]

Domain Information:
[Domain Name]                   XN--VCKFDB7E3C7HMA3M9657C16C.JP

[Registrant]                    Japan Registry Services Co.,Ltd.

[Name Server]                   ns01.jprs.co.jp
[Name Server]                   ns02.jprs.co.jp

[Created on]                    2001/08/09
[Expires on]                    2008/08/31
[Status]                        Active
[Last Updated]                  2007/09/01 01:05:05 (JST)

Contact Information:
[Name]                          Japan Registry Services Co.,Ltd.
[Email]                         dom-admin@jprs.co.jp
[Web Page]
[Postal code]                   101-0065
[Postal Address]                Chiyoda First Bldg. East 13F,
                                3-8-1 Nishi-Kanda Chiyoda-ku,
                                Tokyo 101-0065, JAPAN
[Phone]                         03-5215-8451
[Fax]                           03-5215-8452
```

Example 5: A-label input, UTF-8 Output (Partial, Courtesy of DENIC WHOIS-server)

WHOIS -h WHOIS.denic.de -T ace,dn xn--dnic-loa.de

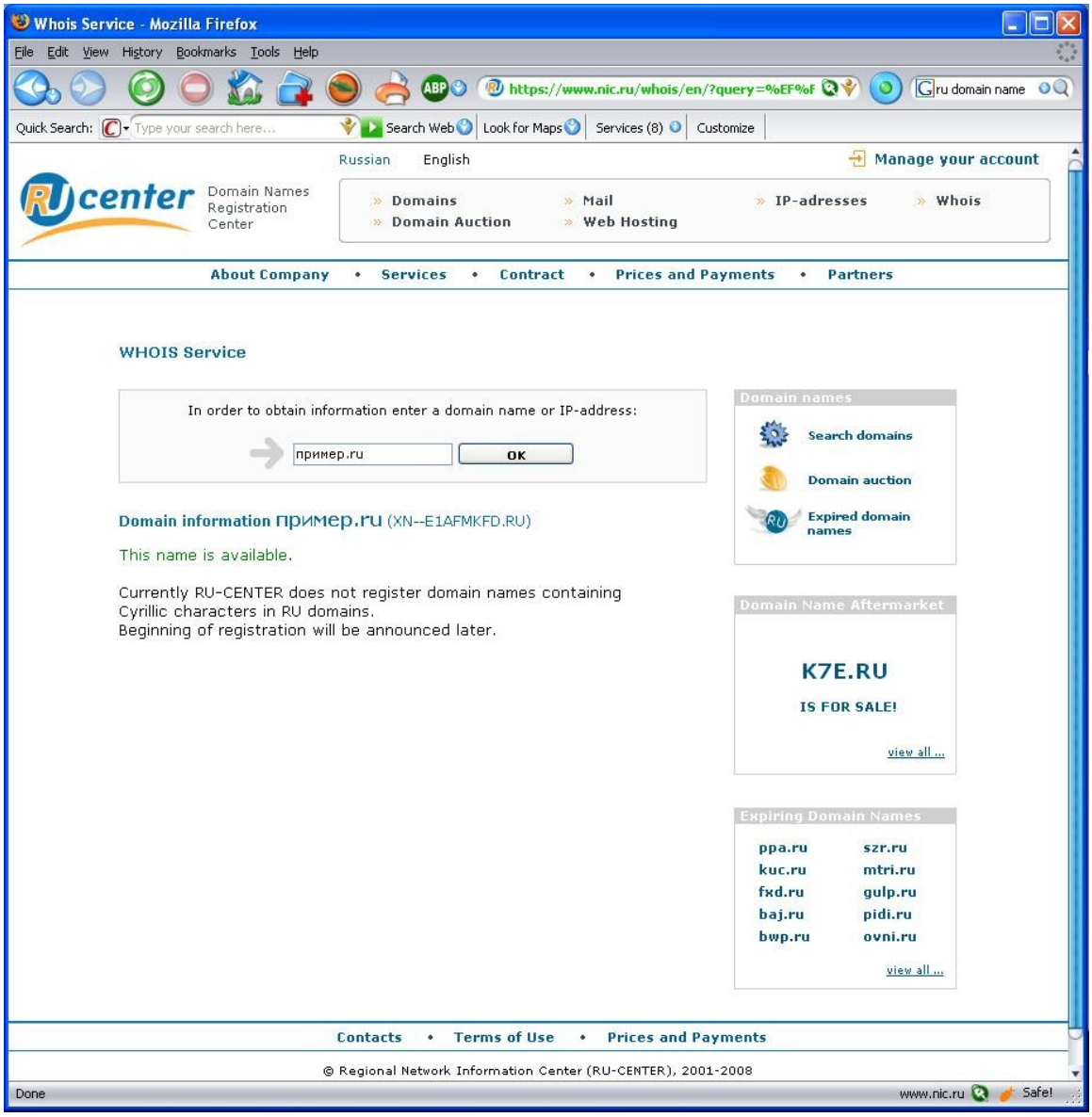
```
Domain: đäñîċ-ţåŝťďómãĵņ.de
Domain-Ace: xn---m-tiabg6cwb7nmbo91bygqa21a4c2c.de
Descr: DENIC eG
Descr: Kaiserstraße 75-77
Descr: 60329 Frankfurt
Descr: Germany
Nserver: dns3.denic.de 81.91.161.2
Nserver: dns10.denic.de 193.171.255.36
Nserver: dns13.denic.de 66.35.208.43
Nserver: dns14.denic.net
Nserver: dns15.denic.net
Status: connect
Changed: 2005-11-18T07:53:29+01:00

[Admin-C]
Type: PERSON
Name: Sabine Dolderer
Address: DENIC eG
Address: Kaiserstraße 75-77
Pcode: 60329
City: Frankfurt
Country: DE
Phone: +49 69 27235-0
Fax: +49 69 27235-235
Email: dolderer@denic.de
Disclose: Name,Address,City,Pcode,Country,Type,Remarks
Changed: 2001-09-12T22:49:58+02:00

[Tech-C]
Type: ROLE
Name: DENICoperations
Organisation: DENIC eG
Address: Kaiserstraße 75-77
Pcode: 60329
City: Frankfurt
Country: DE
Phone: +49 69 27235-272
Fax: +49 69 27235-234
Email: ops@denic.de
Sip: sip:272@denic.de
Disclose: Name,Address,City,Pcode,Country,Phone,Fax,Email,Type,Remarks
Remarks: Information: http://www.denic.de
Remarks: Questions: mailto:ops@denic.de
Remarks: DENICoperations at the
Remarks: German Network Information Center (DENIC)
Remarks: Top Level Domain for Germany (.de)
Changed: 2005-06-13T08:03:07+02:00
```

Example 6: A-label Input, Multi-Output (Partial, via .INFO WHOIS/43)

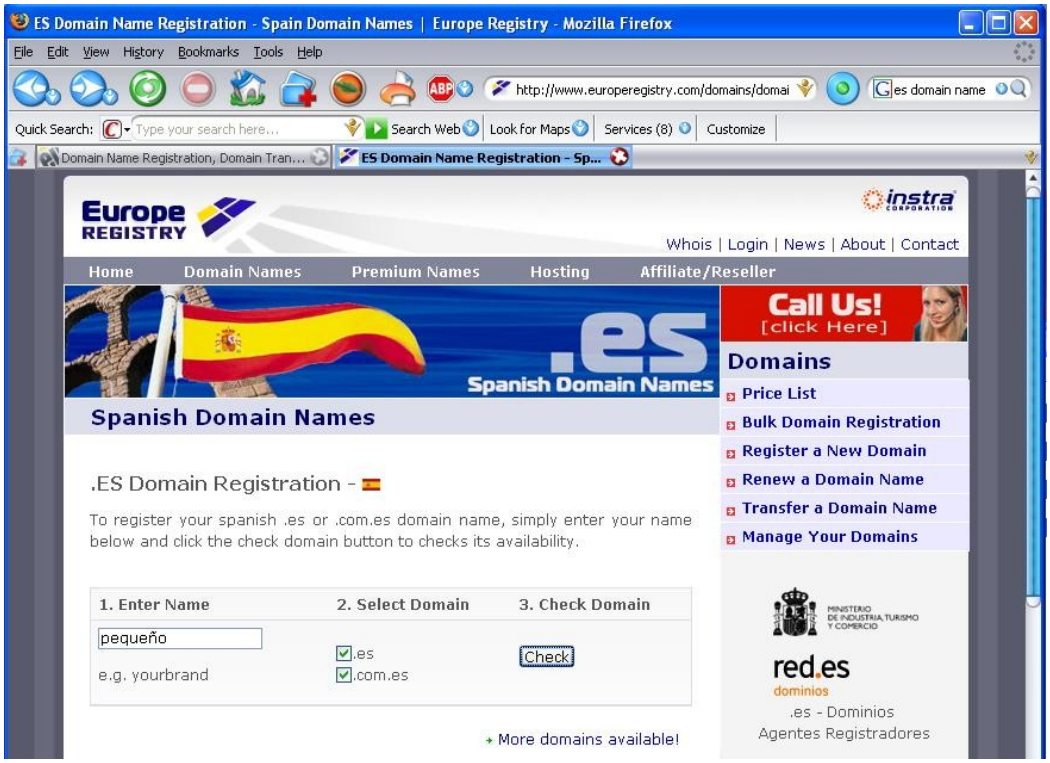
```
WHOIS XN--SVENSKAKOMMUNFRBUNDET-UEC.INFO
Domain ID:D13949844-LRMS
Domain Name:XN--SVENSKAKOMMUNFRBUNDET-UEC.INFO
Created On:30-Jun-2006 09:13:03 UTC
Last Updated On:08-Feb-2008 11:08:41 UTC
Expiration Date:30-Jun-2010 09:13:03 UTC
Sponsoring Registrar:Domaininfo AB aka domaininfo.com (R105-LRMS)
Status:CLIENT DELETE PROHIBITED
Status:CLIENT RENEW PROHIBITED
Status:CLIENT TRANSFER PROHIBITED
Status:CLIENT UPDATE PROHIBITED
Registrant ID:C8510690-LRMS
Registrant Name:Domain Name Department
Registrant Organization:Sveriges Kommuner och Landsting
Registrant Street1:Sveriges Kommuner och Landsting
Registrant City:STOCKHOLM
Registrant State/Province:
Registrant Postal Code:118 82
Registrant Country:SE
Admin ID:C14365-LRMS
Admin Name:Domain Name Department
Admin Organization:Dipcon AB
Admin Street1:William Gibsons vag 1
Admin City:Jonsered
Admin Postal Code:43376
Admin Country:SE
Billing ID:C14365-LRMS
Billing Name:Domain Name Department
Billing Organization:Dipcon AB
Billing Street1:William Gibsons vag 1
Billing City:Jonsered
Billing State/Province:
Billing Postal Code:43376
Tech ID:C14365-LRMS
Tech Name:Domain Name Department
Tech Organization:Dipcon AB
Tech Street1:William Gibsons vag 1
Tech City:Jonsered
Tech Postal Code:43376
Tech Country:SE

Name Server:A.DNS.SONGNETWORKS.SE
Name Server:B.DNS.SONGNETWORKS.SE
Name Server:C.DNS.SONGNETWORKS.SE
Name Server:NS.SKL.SE

IDN Script:de
Unicode Hex:U+0073 U+0076 U+0065 U+006E U+0073 U+006B U+0061 U+006B
U+006F U+006D U+006D U+0075 U+006E U+0066 U+00F6 U+0072 U+0062 U+0075
U+006E U+0064 U+0065 U+0074
Unicode HTML:svenskakommunf&#246;rbundet
```

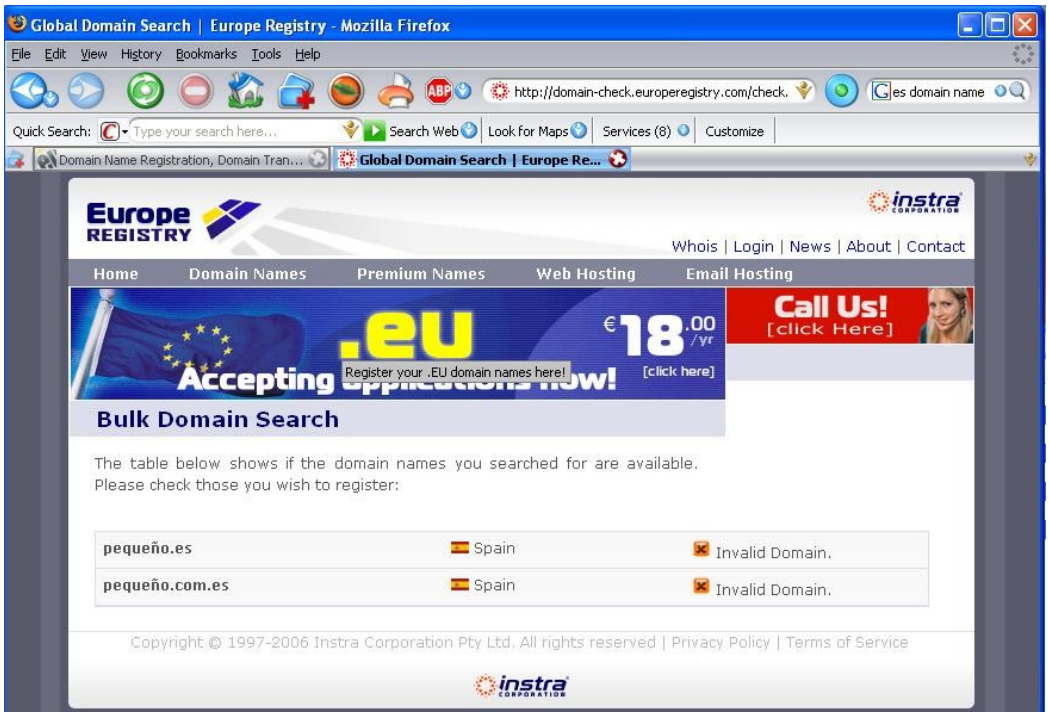
Example Web-based UI WHOIS queries

Example 1: IDN Input, IDN and A-label output



Example 2: IDN Input not recognized





Example 3: Web-based WHOIS Queries, A-label and IDN

Submitting the IDN label (above left image) returns an error (above right image).

Submitting the A-label returns the registration information, illustrated below: