



Joint UNESCO and ITU  
Global Symposium on Promoting the Multilingual Internet



# **Development of Arabic Domain Names System: UN - ESCWA perspective**

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## Background



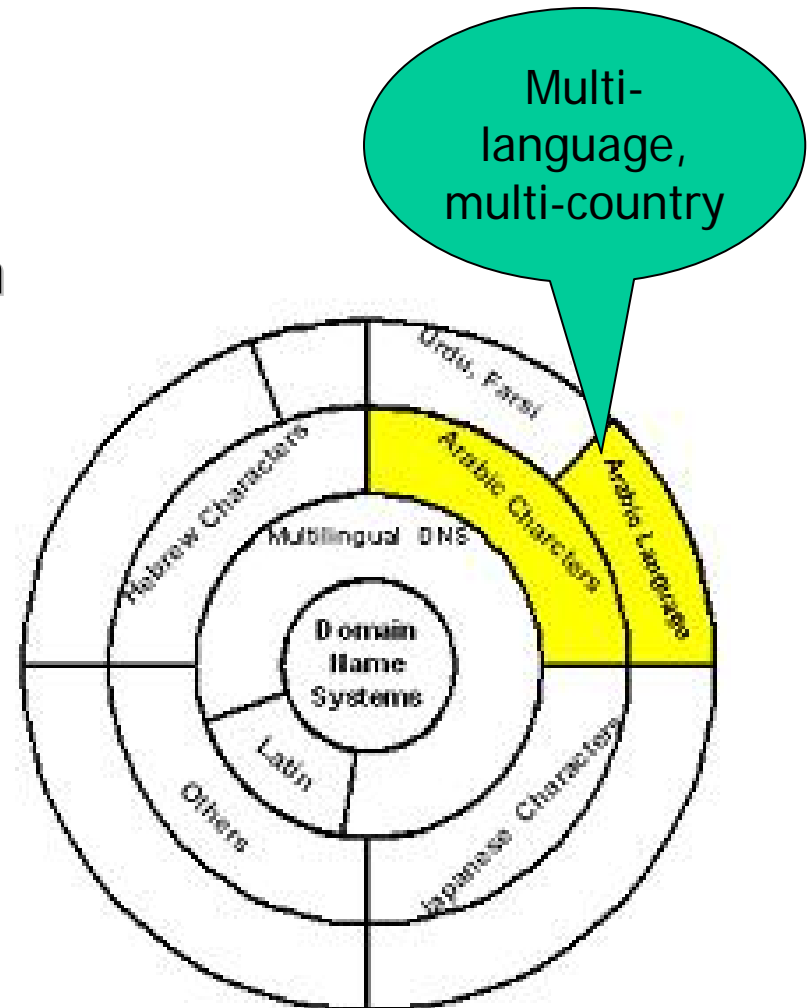
- The Arab region suffers from a digital divide
  - Low Internet usage rates
  - Weak digital Arabic content.
- Language is identified to be one of the main barriers to widespread Internet usage
- Hence, there is a substantial market and a latent demand for using the Arabic language on the Internet.



# Domain Name Systems and Languages



The Arabic Language, together with the Urdu and Farsi languages, share the same set of characters: the Arabic character set, whose handling falls under the subset of the MLDN DNS based languages.





## Global Scene before Q1-2003



- ICANN was developing, predominantly preoccupied with reorganization issues related to the entities responsible for coordinating the development of the conventional Internet.
- MLDN activities and efforts were started in Eastern Asia, for the Korean, Chinese and Japanese languages much earlier than for the Arabic language.
  - Therefore, a multitude of MLDN technology providers, registries, and registrars emerged in Eastern Asia before the IDN standard was defined.
  - Technologies differed amongst different MLDN providers mainly in terms of the manner in which they use the client-server relationship, in addition to the differences in the character-set and the language script itself.



## Global Milestone IDN Standards



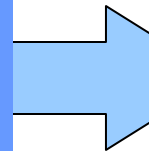
- The Internet Engineering Task Force (IETF) issued in March 2003 a set of RFCs for Internationalized Domain Names that are supposed to become the basis for domain names standards for all languages.
  
- The Internationalized Domain Names (IDN) Standards are:
  - Faltstrom, P., Hoffman, P. and A. Costello, "Internationalizing Domain Names in Applications (IDNA)", RFC 3490, March 2003.
  - Hoffman, P. and M. Blanchet, "Nameprep: A Stringprep Profile for Internationalized Domain Names (IDN)", RFC 3491, March 2003.
  - Costello, "Punycode: A Bootstring encoding of Unicode for Internationalized Domain Names in Applications (IDNA)", RFC 3492, March 2003.
  
- The IDN standards mainly solve the generic domain name access issue for scripts beyond the limitation of the existing ASCII character set used in Latin languages. Regional and localized language-specific implementations are to be drawn from this set of generic standards.



## Regional Evolution before 2003



- Starting from 1998, there were several previous partial attempts to develop Internet Domain Names in Arabic.
- During the period 1998-2003, implementations varied enormously amongst technology providers and their respective registries.
- Technology providers wanted to:
  - reinforce their position
  - gain recognition
  - sustain their innovation cycle
- They tried to impose technology standards upon the community, and to create a de facto standard
- They also interfered in trying to define linguistic aspects without sufficient coordination or endorsement.



- Chaos, and standardization was not achieved.
- Established registries were technology-centric, and took the risk of adhering to "standards" and/or technologies that may become obsolete in a very short term.
- Domain Names of the respective end-users, were unsustainable.
- Uniqueness on the Internet was not guaranteed
  - two entities/persons can register the same name on two different registries!
  - On the other hand, several registries refused to implement any solution before it is adopted by an independent authority.
  - most of the technology providers, not able to secure enough clients, went out of business.



## Regional Evolution before 2003



- The absence of a strong regional coordinating body prevented development in this area. At the start of the year 2003, the situation in the Arab region could be summarized as follows:
  - Professionals and consumers lacked awareness of the viability and importance of Arabic Domain Names in general;
  - Time and effort was wasted on competing technologies and standards, draining the resources of emerging ADNS companies;
  - The absence of a coordinating body reduced overall effectiveness and hampered efforts to move forward towards a regulated environment.
- This period, however, resulted in an accumulation of experience among the involved players, which became an asset that facilitated the next phase of the ADNS evolution.



## ESCWA's Arabic Domain Names' Strategy (2003-now)



- o Since its involvement in early 2003, ESCWA believed that:
  - There is a dire need for coordination on the regional level, especially after the battle for standards had been, to a large extent, resolved with the IDN RFCs of 2003.
  - New and emerging technology providers should not compete on setting the basic standards but rather on efficiency levels and the cost of the technology.
  - All registries and registrars need to be compatible and, most importantly, the domain names themselves have to be unique.
  - In order to satisfy the latent demand, an entire environment, that takes into account technology standardization, policy and administrative arrangements, as well as new applications, needs to be created.



## ESCWA's revitalization of Arabic domain names efforts



- In April 2003, ESCWA called for an Expert Group Meeting.
- From 3 - 5 June 2003, the Expert Group Meeting was organized by ESCWA at the UN House in Beirut, which:
  - incorporated a track to establish a new roadmap for development of the Arabic Domain Name industry;
  - discussed activities required to establish consensus on the ADNS;
  - discussed the potential and impact of the ADNS;
  - focused on identifying obstacles and setting objectives and initiatives for the promotion of the ADNS in a coordinated fashion;
  - formed an Arabic Domain Name Task Force (ADN-TF) under the auspices of ESCWA, which also acted as its secretariat.



## ESCWA's Arabic Domain Names Task Force (ADN-TF)



- o Objectives :
  1. Raising awareness among stakeholders about the importance of the Arabic Domain Names System (ADNS);
  2. Defining standards for ADNS through a "Request For Comments" (RFC) documents;
  3. Promoting the adoption of standards in a coordinated fashion;
  4. Obtaining global recognition for the adopted standards;
  5. Facilitating the deployment of these standards by the various stakeholders.



2003-2005 Worked towards achieving objectives (1), (2) and (3).

### o Achievement:

- Developed the first Internet Draft (ID) on ADNS, titled "Guidelines for an Arabic Domain Names System"
  - produced during the period end of 2003- mid 2004,
- Posted the Internet-Draft on the IETF website on June 2004, becoming the first global ID on the subject.

2005-2006 Worked towards achieving objectives (4), and (5).

### o Achievement:

- Assisted the Arabic Working Group on ADNs established by the League of Arab States, and obtained regional recognition
- Posted a modified version of the Internet-Draft in February 2006



## ESCWA's ADN-TF Internet Draft



Internet-Draft  
draft-farah-adntf-adns-guidelines-00.txt  
Intended status: Informational

Abdel-Ati  
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June 2004

### Guidelines for an Arabic Domain Name System

#### Status of this Memo

This memo provides information for the Internet community. Distribution of this memo is unlimited. Suggestions for improvements, amendments or additions are welcome. It does not specify an Internet standard of any kind.

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## ESCWA's ADN-TF Modified Internet Draft



Internet-Draft  
draft-farah-adntf-adns-guidelines-01.txt  
Category: Informational  
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Internet-Drafts are working documents of the Internet Engineering Task Force (IETF), its areas, and its working groups. Note that other groups may also distribute working documents as Internet-Drafts.



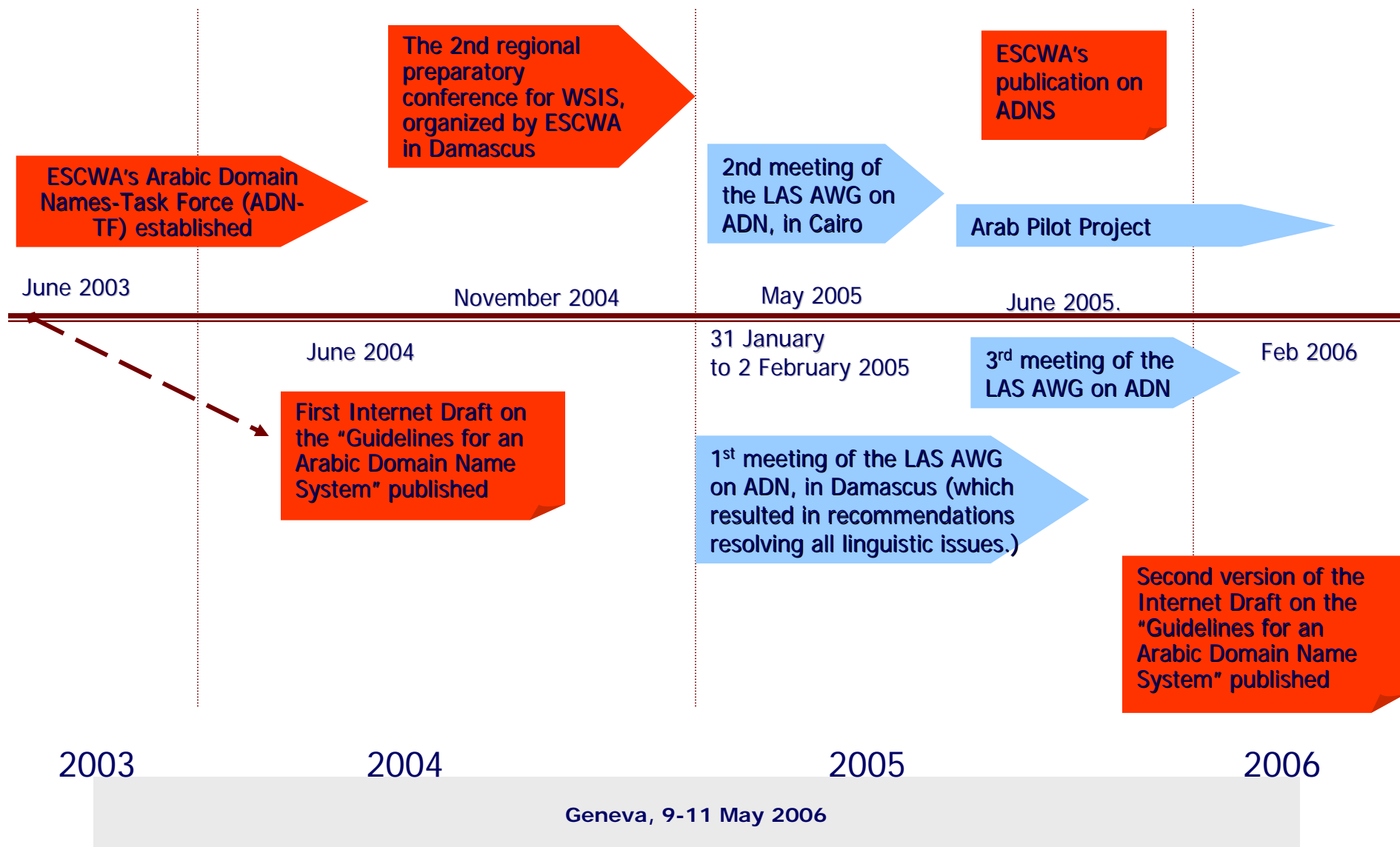
## League of Arab States Working Group on ADN



- In July 2004, the League of Arab States (LAS) established a Working Group on Arabic Domain Names (AWG-ADN), to decide and agree upon various issues related to establishing of an ADNS.
- AWG-ADN organized its first meeting in Damascus (31 January- 2 February 2005)
  - built on the ESCWA's first ID produced by ADN-TF, adopting specific linguistic aspects and resolving some pending issues.
- During the period AWG-ADN organized its second meeting in Cairo (7-9 May 2005),
  - discussed amendments to the first ID affected by ESCWA
  - triggered the regional pilot project for the proposed ADNS.
  - formed steering and technical committees which are entrusted several responsibilities, among which is to study and discuss technical issues (*presented in details within ESCWA recent publication in 2005*)
- The third meeting was convened in Tunis, 28 June 2006

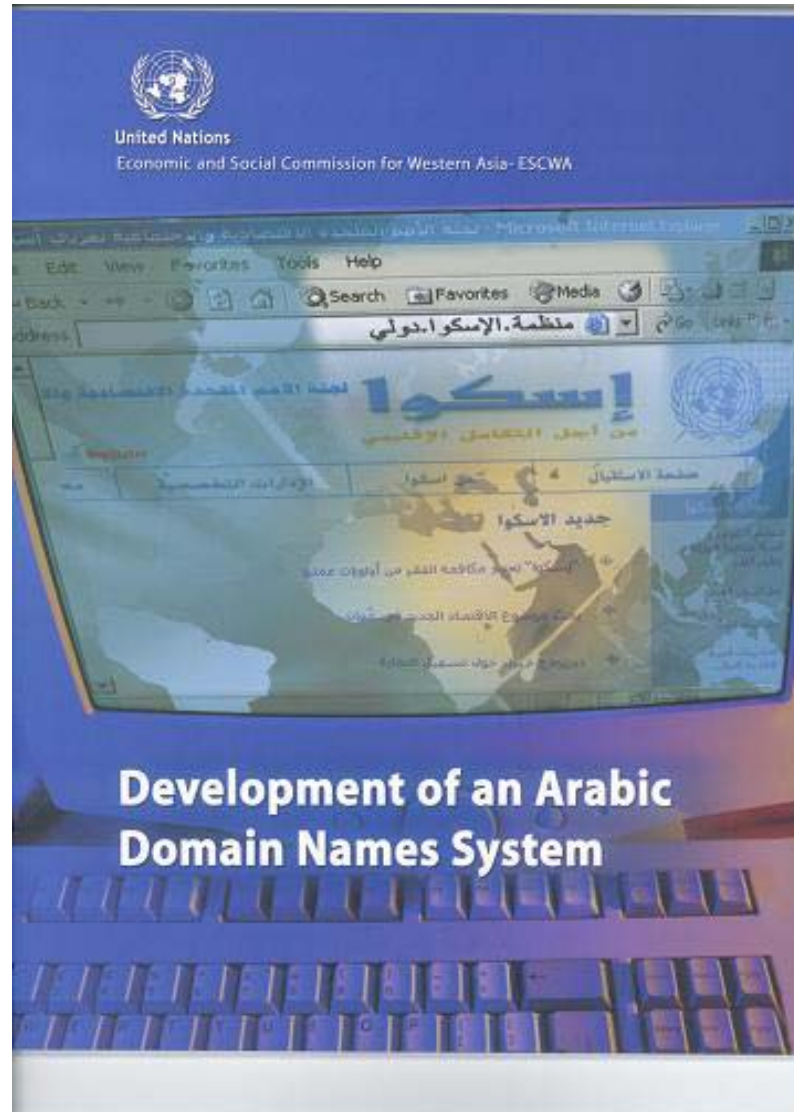


# ESCWA ADNS Milestones





## ESCWA's publication



Geneva, 9-11 May 2006



## ESCWA's latest publication



- This publication aspires to:
  - present a more complete description of the different aspects of the ADNS, and in so doing, becomes the basis for the full-fledged set of interoperable standards,
  - provide substantive input to the regional pilot project launched in May 2005.
- It describes in full three major aspects of ADNS: linguistic, technical and operational.
- While the content of the linguistic aspects has been thoroughly studied, discussed, debated and endorsed by AWG-ADN, the technical and operational aspects are tackled for the first time, with the aim of enriching and endorsing them by the AWG-ADN.
- full compatibility with both the IDN standards of 2003 and the Arab linguistic guidelines agreed upon by the AWG-ADN in 2005.



## ADNS Linguistic Goals



- To Increase Internet use amongst all strata of the Arabic-speaking communities.
  - the structure / hierarchy of the ADNS should meet certain core criteria;
  - a non-user friendly ADNS would further add to the ambiguity and the eccentricity of the Internet to the Arabic-speaking communities.
  
- Hence, there is a need to
  - define the Arabic character set to be used in spelling domain names in Arabic;
  - define the top-level domains of the Arabic domain name tree structure (gTLDs and ccTLDs).

*This chapter provides a summary for the linguistic section of ESCWA's ADN-TF first Internet Draft after being endorsed by the AWG-ADN.*



## Linguistic Criteria for gTLDs & ccTLDs



- As indicated in early studies, there are many valid criteria to evaluate the proposed TLDs, namely:
  - (a) Length of the gTLD or ccTLD;
  - (b) Coherence and clarity;
  - (c) Consistency with the Arabic language;
  - (d) Ease of pronunciation;
  - (e) Extendibility.
  - (f) The name as a whole, written with dots between words, to be easily guessable, by being as close as possible to the real-world name;
  - (g) The name as a whole to be acceptable to the native Arabic-speaker's ear, i.e. user friendly.
- Furthermore, consensus was reached by AWG-AND, towards:
  - (a) Simplification of the domain names, whenever possible, to facilitate interaction of the Arabic user with the Internet;
  - (b) Adoption of solutions that do not lead to confusion either in reading or writing, provided that this does not compromise the linguistic correctness of used words;
  - (c) Mixing Arabic and non-Arabic letters in the domain name is not acceptable. **ADN.ADN**



## recommended Arabic gTLDs/ccTLDs



- The alternative of Arabic gTLDs which use the entity type (.com, .gov..etc) for the classification are not suitable for the Arabic language.
- Therefore, with respect to Arabic TLDs, it is recommended to use the geographical classification as a start up for both Arabic gTLDs and Arabic ccTLDs.
- For Arabic gTLDs, it is recommended to use geographical descriptive words such as:
  - (دولي) (u+062F u+0648 u+0644 u+064A) and
  - (عربي) (u+0639 u+0631 u+0628 u+064A),which can be later expanded to include other activities such as educational or commercial.

It is recommended to use only the following UNICODE characters. These are based on the study and the report from the Arabic linguistic committee of AINC based on UNICODE version 3.1.



## recommended Arabic ccTLDs



- Several alternatives underwent a long discussion process. There were two choices for coding country names.
  - The first is based on a full word representation
    - also involves the use, or lack thereof, of the Arabic noun identification letter (Al-Altareef) (ﺍﻟﺘﺎﺭﻳﻒ) (u+0627 u+0644) depending on the country.
  - The second is based on a two-character coded abbreviation table.
- Although short names represent a high degree of practicality, some of the two letter abbreviations carry inappropriate meanings. Full word names, on the other hand, can be used within advertising material for clearer name representation.
- ESCWA together with the Arab Working Group on ADNS recommended the adoption of the short names for ccTLD's, as defined in Arab Standardization Organization's specification no. 642-1985, and not the symbolic two-character coded abbreviation.



## recommended Arabic ccTLDs (1/2)



The following table shows the recommended ccTLD codes for the Arab countries in the recommended single-word format.

Official State Names	Recommended name Single-Word format (with or without Al- Altareef)
Hashemite Kingdom of Jordan	u+0627 u+0644 u+0623 u+0631 u+062F u+0646  (الأردن)
United Arab Emirates	u+0627 u+0644 u+0625 u+0645 u+0627 u+0631 u+0627 u+062A  (الإمارات)
Kingdom of Bahrain	u+0627 u+0644 u+0628 u+062D u+0631 u+064A u+0646  (البحرين)
Republic of Tunisia	u+062A u+0648 u+0646 u+0633  (تونس)
People's Democratic Republic of Algeria	u+0627 u+0644 u+062C u+0632 u+0627 u+0626 u+0631  (الجزائر)



## recommended Arabic ccTLDs (2/2)



The following table shows the recommended ccTLD codes for the Arab countries in the recommended single-word format.

Federal and Islamic Republic of Comoros	u+0627 u+0644 u+0642 u+0645 u+0631	(القمر)
Republic of Djibouti	u+062C u+064A u+0628 u+0648 u+062A u+064A	(جيبوتي)
Kingdom of Saudi Arabia	u+0627 u+0644 u+0633 u+0639 u+0648 u+062F u+064A u+0629	(السعودية)
Democratic Republic of Sudan	u+0627 u+0644 u+0633 u+0648 u+062F u+0627 u+0646	(السودان)
Syrian Arab Republic هؤ	u+0633 u+0648 u+0631 u+064A u+0629	(سورية)
Somalia Democratic Republic	u+0627 u+0644 u+0635 u+0648 u+0645 u+0627 u+0644	(الصومال)
Republic of Iraq	u+0627 u+0644 u+0639 u+0631 u+0627 u+0642	(العراق)



## Arabic Domain Name Structure



- After considering and weighing a multitude of alternatives and combinations and after eliminating of many possible combinations, the following structure was recommended for an Arabic Domain Name based on the conclusion that the geographical classification is adopted and there is no more activity classification corresponding to (.com), (.org), etc.
- The proposed structure has the following syntax (to be read from right to left).

←  
<A-TLD>.<entity-name>

Where, <entity-name> represents the Arabic name of the entity and <A-TLD> represents an Arabic TLD.

- One of the features of this structure is switching the order of reading and writing the category identifier *to be at the beginning* and to be part of the name.
- The rationale behind the sequence is that in the Arabic language, it is more proper to say  
<com→company name> instead of saying <company name->com>



## Examples for Arabic Domain Names (proposed structure)



The following box illustrates examples for some Arabic Domain Names according to the proposed structure. UNICODE values in hexadecimal form are written below from left to right representing Arabic characters originally typed from right to left.

### Box 1. Examples for Arabic Domain Names according to the proposed structure

#### Example 1:

شركة زومان. السعودية

u+0634 u+0631 u+0643 u+0629 u+02D u+0632 u+0648 u+0645 u+0627 u+0646 u+002E u+0627 u+0644 u+0633  
u+0639 u+0648 u+062F u+064A u+0629

#### Example 2:

شركة أرامكو. السعودية

u+0634 u+0631 u+0643 u+0629 u+02D u+0623 u+0631 u+0627 u+0645 u+0643 u+0648 u+002E u+0627 u+0644  
u+0633 u+0639 u+0648 u+062F u+064A u+0629

#### Example 3:

المركز التجاري. سورية

u+0627 u+0644 u+0645 u+0631 u+0643 u+0632 u+02D u+0627 u+0644 u+062A u+062C u+0627 u+0631 u+064A  
u+002E u+0633 u+0648 u+0631 u+064A u+0629

#### Example 4:

اتحاد كرة الطائرة. عربي

u+0627 u+062A u+062D u+0627 u+062F u+02D u+0643 u+0631 u+0629 u+02D u+0627 u+0644 u+0637 u+0627  
u+0626 u+0631 u+0629 u+002E u+0639 u+0631 u+0628 u+064A

#### Example 5:

جامعة الخرطوم. السودان

u+062C u+0627 u+0645 u+0639 u+0629 u+02D u+0627 u+0644 u+062E u+0631 u+0637 u+0648 u+0645 u+002E  
0627 u+0644 u+0633 u+0648 u+062F u+0627 u+0646



### o 1. Numerals

- In the Arab countries, there are two sets of numerical digits used:
  - Set I: (0, 1, 2, 3, 4, 5, 6, 7, 8, 9), mostly used in the western part of the Arab region.
  - Set II: (0, 1, 2, 3, 4, 5, 6, 7, 8, 9) (u+0660, u+0661, u+0662, u+0663, u+0664, u+0665, u+0666, u+0667, u+0668, u+0669) mostly used in the eastern part of the Arab region.

Although visual differentiation between the Arabic zero (0) (u+0660) and the dot (.) (u+002E) in printed material is possible (the zero is larger in size and is printed higher than the dot), using it in domain names may lead to confusion. Folding set II to set I will eliminate the problem of the zero, and will unify the representation of numerals in general.

The recommendation is that both sets may be supported in the user interface and that both are folded to one set (Set I) at the preparation of internationalized strings (e.g., "stringprep") phase; i.e. storage of numerals in the zone file is done in ASCII format.



### o 2. The Space Character

- The space character is strictly not allowed in domain names, as it is a control character in the IDN standard. Instead, the hyphen (Al-sharta), i.e. u+02D is proposed as a separator between Arabic words: confusion can take place if the words are typed without a separator, unlike in ASCII.
- it is acceptable to use the hyphen to separate between words within the same domain name label; however, it is recommended to find technical solutions that can enable the use of the space character.



- o 3. TLD mapping and ccTLD
  - A TLD mapping process will allow a set of valid substitutions to be made, including those conventions previously used by older implementations.
  - This TLD mapping process will facilitate migration paths for existing systems. Users will be able to type domain names in one of the following formats:
    - long ccTLD name with/without Al-Altareef, where applicable, to support older conventions;
    - short two letter coded abbreviation, to support older conventions.
  - **Most importantly, the TLD mapping will facilitate registration of newly defined Arabic ccTLDs.**



## Arabic linguistic issues affected by technical constraints



Listed below are valid TLD mappings to accommodate the two-letter code abbreviation and/or the inclusion of the Arabic noun identification letter (Al-Altareef) (u+0627 u+0644), if the user wants to continue using them.

Official State Names	Country Code		
	Default With/without Al-Altareef	Alternative 1 2-letter abbreviation	Alternative2 With/without Al-Altareef
Hashemite Kingdom of Jordan	(الأردن)	u+0627 u+0631 (ار)	u+0623 u+0631 u+062F u+0646 (أردن)
United Arab Emirates	(الإمارات)	u+0627 u+0645 (ام)	u+0625 u+0645 u+0627 u+0631 u+0627 u+062A (إمارات)
Kingdom of Bahrain	(البحرين)	u+0628 u+062D (بح)	u+0628 u+062D u+0631 u+064A u+0646 (بحرين)
Republic of Tunisia	(تونس)	u+062A u+0648 (تو)	NOT AVAILABLE
People's Democratic Republic of Algeria	(الجزائر)	u+062C u+0632 (جز)	u+062C u+0632 u+0627 u+0626 u+0631 (جزائر)
Federal and Islamic Republic of Comoros	(القمر)	u+0642 u+0645 (قم)	NOT AVAILABLE
Republic of Djibouti	(جيبوتي)	u+062C u+064A (جي)	NOT AVAILABLE



## ADNS Technical Aspects



- o Discusses the extended technological aspects that have been pending from the first Internet-Draft. These include:
  - Technical considerations for Arabic Top Level Domain (TLD) mapping,
  - Integrating Arabic Domain Names with other Internet services like File Transfer Protocol (FTP) and e-mail,
  - iCLIENT implementation and support, with discussion of suggestions and an alternate (or complementary) implementation;
  - Future considerations and miscellaneous issues.



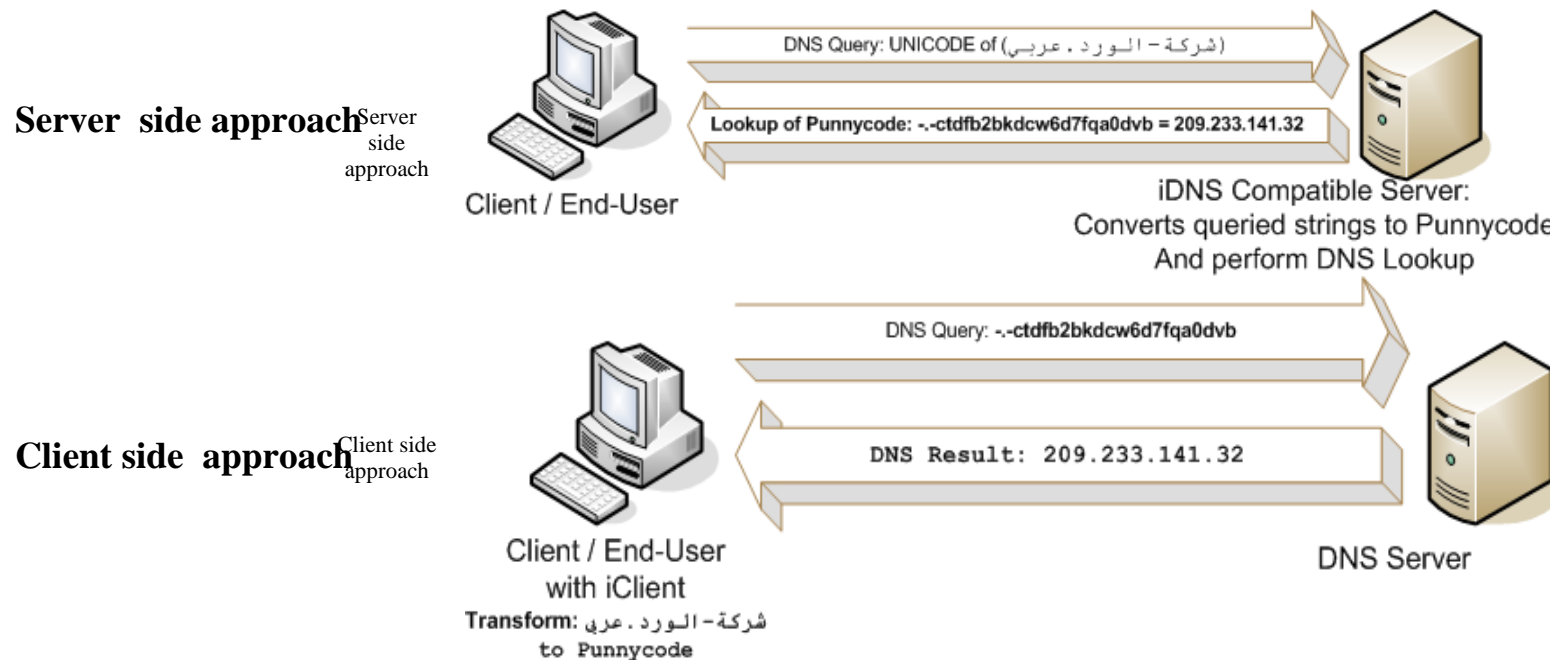
## DNS-Based Solution



- o Historically, there have been different approaches to resolution of Multilingual Domain Names (MLDNs). Solutions fell under one of two categories, namely “DNS solutions” and “Keyword solutions”.
  - Keyword approaches are viable only as a supplemental scheme over and above a robust DNS based solution, but they do not replace them.
- o It is recommended not to use a keyword-based solution, but rather to employ a DNS-based solution to preserve the integrity of the Arabic language, to eliminate any confusion and to become fully interoperable with existing DNS schemes.

*The realm of RFC 3743 from the JET adopts a similar solution for Chinese, Japanese, and Korean languages.*

- 0 Generally, for DNS-based solutions, there are two schemes for resolving MLDNs:



The figure presents an instance of both schemes in a layer above the current Internet Structure.



## Network Structure and Related Components



- o The proposed architecture for an ADNS is:
  - Compliant with the IETF standard for Internationalized Domain Names (IDN) which recommends that a client-side resolution scheme accommodate non-Latin languages like Arabic.
    - On the client side, workstations will be running some DNS resolution agent service at system level.
    - when the local agent receives a DNS resolution request from upper-level applications, it will take over the duty to talk to DNS servers configured for the workstation. When the agent receives responses from DNS server, it will pass back the results to upper-level applications.
- o Regarding IDN resolution:
  - A software client intercepts the resolution request before it reaches local resolution agent, and replaces the multilingual query with ASCII Compatible Encoding (ACE) formatted value, in this case PUNNYCODE. So for local resolution agent, it just follows the normal DNS resolution process just as it does for ASCII formatted queries.



## Technical Considerations for Arabic TLD Mapping



- As indicated, default ccTLD to be uniquely stored in the zone file is the “single-word format with or without Al-Altareef”;
- However, there are cases where it is required to support the use of alternatives, either to induce flexibility or to support a status-quo. While it is technically possible to deploy an Arabic DNS by assigning an individual PunyCode TLD for each of these representations,
  - It would not be operationally feasible
    - The number of additional DNS entries required may grow exponentially once subtrees are taken into consideration.
    - This would create separate and distinct DNS zones,
    - Administrative difficulties as TLD administrators will have to
      - ensure that the zone data match set of mapped TLD representations.
      - insert another DNS entry for every additional PunyCode TLD that exists for that particular representation.



- A “TLD mapping” mechanism has been proposed to give some flexibility, where a particular Arabic TLD may have one or more alternative representations in the user interface, *including but not limited to ccTLDs alternative single-word format without/with Al-Altareef, long ccTLD name and the two-letters abbreviation, where applicable.*
- Several solutions to address this issue have been proposed, these solutions are either based on “server-side aliasing” or “client-side aliasing”.

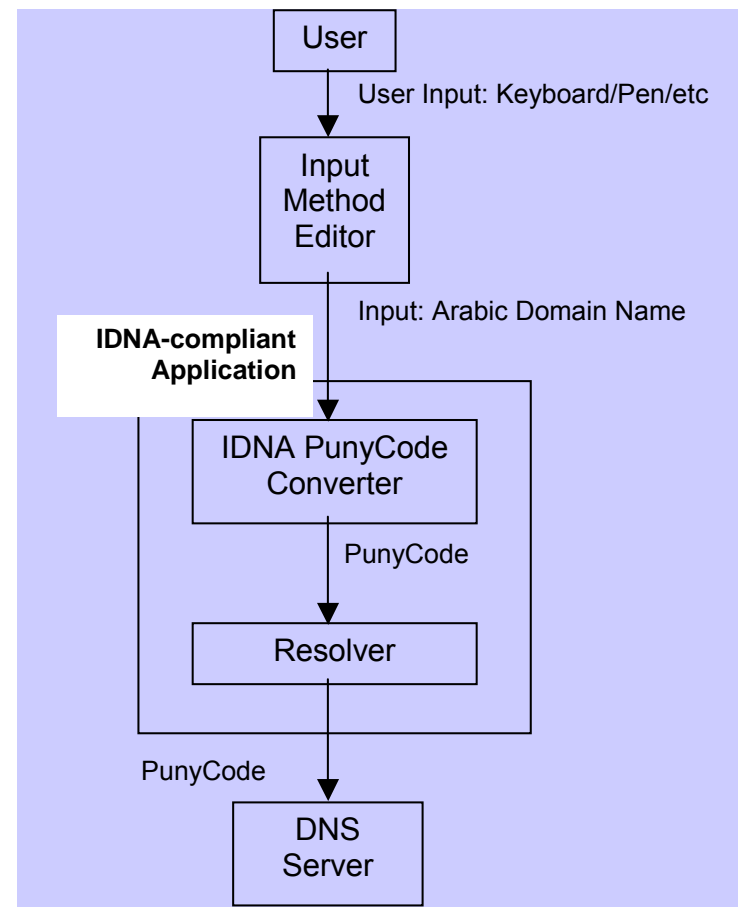


# Integrating Arabic Domain Names with Other Internet Services



- As the Arabic Domain Names System will fundamentally be based on the design principles and architecture of the Internationalized Domain Names in Applications (IDNA) standard, there should be no modification required to the existing DNS infrastructure or to lower-layer protocols.
- Any Internationalized Domain Name used in applications will be converted to PunyCode before DNS resolution, such that the data format of DNS requests on-the-wire will be ASCII-compliant PunyCode, preserving interoperability between existing DNS infrastructure elements.

**Figure: Architecture for Internationalized Domain Names in Applications**





## ADNS Operational Aspects



- o Discusses the operational aspects of ADNS, related to:
  - Building relationships between the registrant, the registrar, and the registry
  - The essential needs for setting up new domains to support the ADNS, especially gTLDs
  - Problems which can face the registry and the registrar during the setup of a new domain,
  - The impact of the Internationalized Domain names (IDN) on the tasks of the registrars.



## Key Recommendations



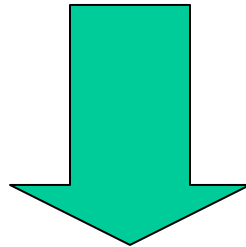
- Reserve a TLD (.arb) in Latin - mainly for Arabic gTLDs;
- Use TLD mapping to seamlessly resolve gTLDs & ccTLDs;
- On the country level, ccTLDs will be managed independently in each country by the country appointed Network Administrator;
- On the regional level, it is proposed to create a single body that should appoint either
  - (a) a single company to run a unique registry of generic Top-Level Arabic domain names or
  - (b) multiple companies that can work together in coordination



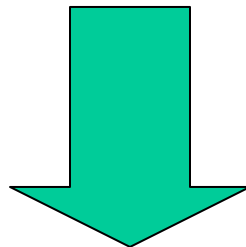
## Road ahead



Building on the regional achievement to-date in building the ADNS  
( the internet draft + the regional pilot project)



An RFC + An Arab Registry



the ongoing internationalization of the Internet, local empowerment and  
Internet Governance.



# Thank you

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