Topics of Discussion

• Top Level Domains (TLDs)
• ccTLDs
• gTLDs
• New gTLDs
• DNS Root Servers
• Registry/Registrar/Registrant
• Dispute Resolution
• Business Opportunities in the Domain Name Industry
What is the DNS?

http://www.youtube.com/watch?v=72snZctFFtA
Top Level Domains (TLDs)

- Exists at the highest level of the DNS hierarchy
- Is the entry installed into the root-zone
- Consists of various groups:
  - ccTLDs (.pk, .kw, .jo, .eg, .tn)
  - gTLDs
    - Sponsored (.asia, .cat)
    - Unsponsorred (.com, .net, .org)
    - New (.apps, .shop, .موقع, .شبكة)
  - IDN TLDs (. ابوظبي, .بازار, .تونس)
What is a Domain Name?

http://www.youtube.com/watch?v=2ZUQ2Szu-JI
Parts of a Domain Name?

http://icann.org/

Protocol
Top Level Domain

Domain Name
Country Code TLDs (ccTLD)

Source at http://dreamstime.com/
Where do ccTLDs get Their Code From?

• The ISO-3166 provides 2-letter codes and 3-letter codes of countries or a grouping of countries
• 249 assigned 2-letter codes
  • According to the UN, the world has 196 countries
• More at https://www.iso.org/obp/ui/#search
History of TLD

Before 1998
- 8 gTLDs pre-date ICANN’s creation

2000 - 2004
- 2 previous rounds of new gTLDs
  - .com
  - .edu
  - .gov
  - .int
  - .mil
  - .net
  - .org
  - .arpa
  - .aero
  - .biz
  - .coop
  - .info
  - .museum
  - .name
  - .pro
  - .asia
  - .cat
  - .jobs
  - .mobi
  - .post
  - .tel
  - .xxx
  - .travel

2005 - 2007
- Policy Development Process
- Introduction of new gTLDs: Principles, Recommendations and Implementation Guidelines

2008 - 2012
- Policy Implementation (Design)
- Development of the New gTLD Applicant Guidebook

2012 - 2017
- Policy Implementation (Deploy, Support)
- Evaluation, Delegation and Launch of new gTLDs

Potential future rounds
The 2012 New gTLDs Program

- Considered the 3rd round of New TLDs
- More than 5 years of community collaboration to come out with the “TLD Applicant Guidebook”
- A one-time application fee of USD 185,000, and an annual fee of USD 25,000
- Allowed the application of non-Latin names
- 1,930 applications received for 1,420 unique strings
  - 116 non-Latin strings
... cont. (The 2012 New gTLDs Program)

- A rigorous application and evaluation process
  - To ensure that TLDs remain operational and that registrants do not lose their domain names due to the instability of a TLD
- The New gTLD microsite at http://newgtlds.icann.org/
- More statistics on the program can be found at http://newgtlds.icann.org/en/program-status/statistics
Understanding New gTLDs

Get Ready for the Next Big Thing
An Overview of New gTLDs
New gTLDs Application Breakdown by Region

1930 total number of applications received

911 North America

675 Europe

24 South America

17 Africa

303 Asia Pacific
Where do Things Stand At?

- 1930 applications
- 1300+ potential TLDs delegated by 2017
- 750 new gTLDs delegated (as of 18 September 2015)
- More than 50% of the IDN gTLDs have been delegated (103 applications)
The New Landscape
How does the Name Space Look Nowadays?

New gTLDs
- .brand
- .generic
- .city
- .acronym
- .gIDNs
- .community
- .region

Fast Track Program
- .jobs
- .name
- .post
- .pro
- .museum
- .travel
- .tel
- .coop
- .aero
- .xxx
- .cat
- .arpa

IDN ccTLDs
- .امارات
- .مصر
- .قطر
- .موقع
- .pF
- .cn

New gTLD Program
- .com
- .net
- .info
- .edu
- .int
- .gov
- .mobi
- .arpa
- .gov
- .mobi
- .travel
- .tel
- .coop
- .aero
- .xxx
- .cat
- .arpa
Root Servers

• Publish the root zone file to other DNS servers and clients on the Internet
• The root zone file describes where the authoritative servers for the DNS TLDs are located
• The root name server operators publish the root zone file as received from the IANA
Root Server Operators

1. A - VeriSign Global Registry Services
2. B - University of Southern California - Information Sciences Institute
3. C - Cogent Communications
4. D - University of Maryland
5. E - NASA Ames Research Center
7. G - U.S. DOD Network Information Center
8. H - U.S. Army Research Lab
9. I - Autonomica/NORDUnet
10. J - VeriSign Global Registry Services
11. K - RIPE NCC
12. L - ICANN
13. M - WIDE Project

13 root-servers

12 Operators
Root Servers Around the World (~480 instances)

Source at http://root-servers.org/
Registry/Registrar/Registrant

- **Registry** – The entity that operates a TLD
- **Registrar** – A middle-agent that sells domain names to registrants on behalf of a TLD Registry
  - ICANN Accredited Registrar vs. Resellers
  - ccTLDs vs. gTLDs
- **Registrant** – Entity registering a domain name
The DNS Industry Ecosystem
Cases could arise where a registrant registers a domain name that could infringe the naming rights of others. This is also called “Cybersquatting”.

When ICANN was formed in 1998, one of the first things it worked on was the “Uniform Domain Name Dispute Resolution Process (UDRP)”

- 5 accredited providers for gTLDs to date
- ccTLDs can customize this to fit their needs and local laws
- An expensive and sometimes long process
New gTLDs and Dispute Resolution

- With the introduction of 100s of New gTLDs, cybersquatting is on the high
- Several protection and DRP mechanisms devised
  - Trademark Clearinghouse (TMCH)
  - Uniform Rapid Suspension (URS)
  - Post Delegation Dispute Resolution Procedure (PDDRP)
- UDRP would not be the best path for clear cut cases that need urgent attention
  - TMCH is good for initial protection, while URS comes in for a faster and cheaper path for resolving disputes
Trademark Clearinghouse (TMCH)

http://www.youtube.com/watch?v=ZXP2dieeZes
Business Opportunities in the DNS Industry

• Registry Services
  • 4 ccTLDs in the region have state-of-the-art registries. Many others are moving to a shared system
  • Having a Registry/Registrar model is the way forward

• New gTLDs
  • Providing more options in the TLD space away from the traditional .com/.net/.org and the ccTLDs, and providing multilingual TLDs

• Accredited Registrars
  • More than 1000 registrars
  • More at http://www.icann.org/en/resources/registrar/accreditation
• Dispute Resolution Services
  • Five providers in total the last of which joined in 2013
• Online Intellectual Property Protection Services
  • Domain names are digital assets online
• Domain Name Aftermarket
  • insurance.com sold for USD 35.6 million in 2010
  • 360.com sold for USD 17 million in 2015
• Development of Domain Name Tools and Software
Domain Name Ecosystem in Pakistan

- ccTLD is .pk, and is run by PKNIC
- IDN ccTLD applied for is باکستان. in Urdu by the MoITT
- 1 ICANN Accredited Registrar
- 5 root-server instances (2 in Karachi | 2 in Islamabad | 1 in Lahore)
- Membership from MoITT and PTA in the GAC
- ISOC Islamabad Chapter is an ALS
- Many Pakistani stakeholders attend ICANN meetings; mainly through the ICANN fellowship program
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Manager, Stakeholder Engagement, Middle East
E: fahd.batayneh@icann.org
W: http://icann.org/

Questions!?
Internationalized Domain Names (IDNs)

http://www.youtube.com/watch?v=wnauGpYh96c
Overview of Presentation

- **IDNs at Top Level**
  - IDN TLD Program
    - Label Generation Ruleset (LGR)
    - LGR Toolset
    - IDN Variant Implementation
  - IDN ccTLD Fast Track Process Implementation

- **IDNs at Second Level for gTLDs**
  - IDN Implementation Guidelines
  - Reference LGR

- **Community Outreach and Involvement**
ASCII Domain Name Label

www.cafe.com

Third Level Domain Second Level Domain Top Level Domain (TLD)

Top Level Domains (TLDs)

- Country Code TLDs (ccTLDs)
  - .sg, .cn, .kh, .la, .mm, .th, .ca, ...
  - Two letter [a..z] codes, reserved for countries and territories by ISO 3166 standard

- Generic TLDs (gTLDs)
  - .com, .org, .net, .edu, ... - organizations
  - New gTLDs – 1930 applications in 2012

Domain Stakeholders

- ICANN
- Registry
- Registrar
- Reseller
- Registrant
- End-User
ASCII Domain Name Label

www.cafe.com

Third Level Domain  Second Level Domain  Top Level Domain (TLD)

Forming ASCII Labels
Use LDH
• Letters [a-z]
• Digits [0-9]
• Hyphen (LDH)
Label length = 63
Other constraints (e.g. on hyphen)

Forming ASCII Labels
Use only Letters
• Letters [a-z]
Label length = 63
Syntax of IDN Labels

Valid U-Label: Unicode code points as constrained by IDNA2008
Valid A-Label - “xn--” followed by punycode of U-Label of length 59

Syntax of IDN Labels

Valid U-Label, further constrained by the “letter” principle for TLDs
Valid A-Label
Timeline of ICANN’s Progress on IDN TLDs

- **ICANN produces IDN Implementation Guidelines v.1.** (2003)
- **ICANN introduces .tld IDN TLDs in multiple scripts in the root zone.** (2007)
- **38 IDN country code Top-Level Domains created in the root zone through the Fast Track Program.** (2010)
- **ICANN initiates the development of Label Generation Ruleset (LGR) for the root zone. The LGR is a mechanism for creating and maintaining rules to determine valid IDN labels and their variants, if any, in different scripts.** (2013)
- **35 IDN generic Top-Level Domains created in the root zone through the New gTLD Program.** (2014)
- **Look for more IDN TLDs to be created in the root zone.** (FUTURE)
Successfully evaluated IDN ccTLDs/Total countries and territories
IDN TLD Program

Community agreed to define a Label Generation Rules (LGR)

Reports and documentation of all completed projects available at:
https://www.icann.org/resources/pages/reports-2013-04-03-en
Label Generation Rules for the Root Zone

- For the Root Zone, single “table” containing data for all scripts
  - As it is a shared resource, must be conservative
  - Must be stable and secure
  - Must be based on inclusion based analysis

- For each script or writing system:
  - Which code points are valid for use?
  - Are any of these code points variants of each other?
  - Are there any additional constraints on the labels?
## LGR for the Root Zone

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### Diagram

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\[\text{Diagram content}^{\text{diagram content}}\]
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Unicode

IDNA2008 – by IETF
LGR for the Root Zone

LGR Proposal – by **Generation Panel** of Script Community

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<tr>
<th>Unicode</th>
<th>IDNA2008</th>
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<td><strong>Maximal Starting Repertoire (MSR)</strong></td>
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- LGR Proposal
- Generation Panel
- Maximal Starting Repertoire (MSR)
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Label Generation Rules (LGR)

- Valid code points
- Variants code points

Label constraints:
- Cannot mix \( \cs{ک} \) and \( \cs{ک} \) in a label

Example:
- \( \cs{پاکستان} \)
- \( \cs{پاکستان} \)
- \( \cs{پاکستان} \)
- \( \cs{پاکستان} \)
- \( \cs{پاکستان} \)
- \( \cs{پاکستان} \)
LGR Specification


- Example: excerpt from MSR-2 XML file

```xml
... <range first.cp="0780" last.cp="07B0" tag="sc:Thaa" ref="3"/>
<char cp="07B1" tag="sc:Thaa" ref="5"/>
<char cp="08A0" tag="sc:Arab" ref="12"/>
<range first.cp="08A2" last.cp="08AC" tag="sc:Arab" ref="12"/>
<range first.cp="08E4" last.cp="08EF" tag="sc:Arab" ref="12"/>
<range first.cp="08F4" last.cp="08FE" tag="sc:Arab" ref="12"/>
<range first.cp="0901" last.cp="0903" tag="sc:Deva" ref="0"/>
<char cp="0904" tag="sc:Deva" ref="6"/>
<range first.cp="0905" last.cp="0939" tag="sc:Deva" ref="0"/>
<range first.cp="093A" last.cp="093B" tag="sc:Deva" ref="11"/>
<char cp="093C" tag="sc:Deva" ref="0"/>
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<range first.cp="0981" last.cp="0983" tag="sc:Beng" ref="0"/>
...
```
LGR Specification and Toolset

- LGR machine-readable specifications at: https://datatracker.ietf.org/doc/draft-davies-idntables
  - LAGER WG at IETF

- Open source LGR Toolset tentative timeline:
  - Create LGR - available
  - Use LGR – 12/15
  - Manage LGRs – 3/16

... <char cp="06CC"> <var cp="0649" type="blocked"/> <var cp="064A" type="allocatable"/> </char> ...

...
Status of LGR Development

Label Generation Rules (LGR)

- **Finalizing**
  - Arabic
  - Armenian
  - Chinese
- **Seated**
  - Cyrillic
  - Japanese
  - Khmer
  - Korean
  - Lao
  - Latin
  - Myanmar
  - Neo-Brahmi
- **Active**
  - Thai
  - Tibetan
- **Forming**
  - Other:
    - Ethiopic
    - Georgian
    - Greek
    - Hebrew
    - Sinhala
    - Thaana

Maximal Starting Repertoire (MSR)
XML representation of Arabic script LGR

- Example of Arabic Script:

<table>
<thead>
<tr>
<th>Code point definition:</th>
<th>WLE rule:</th>
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<tbody>
<tr>
<td><code>&lt;char cp=&quot;0647&quot; tag=&quot;sc:Arab&quot; ref=&quot;0 100&quot;&gt;</code></td>
<td><code>&lt;rule name=&quot;no-mix-alef-maksura-farsi-yeh&quot;&gt;</code></td>
</tr>
<tr>
<td><code>&lt;var cp=&quot;0629&quot; type=&quot;blocked&quot; /&gt;</code></td>
<td><code>&lt;choice&gt;</code></td>
</tr>
<tr>
<td><code>&lt;var cp=&quot;06BE&quot; type=&quot;blocked&quot; /&gt;</code></td>
<td><code>&lt;rule&gt;</code></td>
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<td><code>&lt;var cp=&quot;06C0&quot; type=&quot;blocked&quot; /&gt;</code></td>
<td><code>&lt;rule&gt;</code></td>
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<td><code>&lt;var cp=&quot;06C1&quot; type=&quot;allocatable&quot; /&gt;</code></td>
<td><code>&lt;char cp=&quot;0649&quot; /&gt;</code></td>
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<tr>
<td><code>&lt;var cp=&quot;06C2&quot; type=&quot;blocked&quot; /&gt;</code></td>
<td><code>&lt;any count=&quot;0+&quot; /&gt;</code></td>
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<td><code>&lt;char cp=&quot;06CC&quot; /&gt;</code></td>
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## Code Points

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<th>077</th>
<th>08A</th>
<th>08B</th>
<th>08C</th>
<th>08D</th>
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<th>08F</th>
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Example of Variant Code Points

<table>
<thead>
<tr>
<th>Conventional Arabic Orthography</th>
<th>Western (African) Orthography</th>
</tr>
</thead>
<tbody>
<tr>
<td>ف١</td>
<td>ب١</td>
</tr>
<tr>
<td>ق٢</td>
<td>ف٢</td>
</tr>
<tr>
<td>ن٣</td>
<td>ل٣</td>
</tr>
<tr>
<td>ك٤</td>
<td>ك٤</td>
</tr>
<tr>
<td>ی٥</td>
<td>ی٥</td>
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</table>
## Example of Variant Code Points

<table>
<thead>
<tr>
<th>Unicode Code Point</th>
<th>Isolated Form</th>
<th>Initial Form</th>
<th>Final Form</th>
<th>Medial Form</th>
<th>Applicable Principle No.</th>
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<td>بب</td>
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</tr>
<tr>
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<td>ی</td>
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<td>بب</td>
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<tr>
<td>064A</td>
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<td>بب</td>
<td>بب</td>
<td>2 (06CC), 5 (064A)</td>
</tr>
<tr>
<td>0626</td>
<td>ې</td>
<td>بب</td>
<td>بب</td>
<td>بب</td>
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### Example of Whole Label Evaluation Rules

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<th>S.No.</th>
<th>Code points cannot co-occur within a label</th>
<th>Notes</th>
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<tbody>
<tr>
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<td>0643 and 06A9</td>
<td>و k and k</td>
</tr>
<tr>
<td>2</td>
<td>0643 and 06AA</td>
<td>و k and k</td>
</tr>
<tr>
<td>3</td>
<td>06CC and 0649</td>
<td>ي and i</td>
</tr>
<tr>
<td>4</td>
<td>06C1 and 0647</td>
<td>ه and ه</td>
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<tr>
<td>5</td>
<td>0647 and 06D5</td>
<td>ه and ه</td>
</tr>
<tr>
<td>6</td>
<td>0647 and 06BE</td>
<td>ه and ه</td>
</tr>
<tr>
<td>7</td>
<td>0629 and 06C3</td>
<td>ئ and ئ</td>
</tr>
<tr>
<td>8</td>
<td>06D1 and 06BD</td>
<td>ن ي and ن ي</td>
</tr>
<tr>
<td>9</td>
<td>067E and 06BD</td>
<td>ن پ and ن پ</td>
</tr>
<tr>
<td>10</td>
<td>0641 and 06A2</td>
<td>پ ف and پ ف</td>
</tr>
<tr>
<td>11</td>
<td>0642 and 06A7</td>
<td>ق ف and ق ف</td>
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</tbody>
</table>
Summary of the Arabic LGR Proposal

Number of code points: 128.

Variants:
Total number of variants: 192 (this is more than the code points as the variants are directional)
Number of variants for type 'allocatable': 26.
Number of variants for type 'blocked': 166.

WLE Rules:
Number of rules defined: 17.
LGR at work!

For the IDN ccTLD of Iran: ایران

Code point sequence: 0627 06CC 0631 0627 0646

Variants Generated: 400

allocatable=4 (including 1 original)
blocked=396