

# Six Years of Persian Domain Names

**IDN Variant Experience Webinar**  
ICANN IDN Variant Issues Project

**Behnam Esfahbod**  
behnam.esfahbod.info

**IRNIC, ccTLD Registry of Iran**  
nic.ir

**Persian Internet Society**  
persian-isoc.org

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# History

- Persian is the official language of Iran
- Available for registration since Sep 2005
- Only under .ایران.ir (.IRAN.ir)
  - Also served under .ایران (.IRAN) by IRNIC DNS Servers
  - Registered domains will be valid under .IRAN IDN ccTLD
- Based on IDNA2003
  - IRNIC is planning migration to IDNA2008
- IRNIC has employed a bundling system from the beginning
  - A bundle may include up to **6 labels**

# Issues: Digits

- Three sets of digits
  - **ASCII** (U+003x), **Arabic** (U+066x), and **Persian** (U+06Fx)
- 0 ≈ . ≈ .
- 1 ≈ ١ ≈ ۱
- 2 ≈ ٢ ≈ ۲
- 3 ≈ ٣ ≈ ۳
- 4 ≈ ٤ ≈ ۴
- 5 ≈ ٥ ≈ ۵
- 6 ≈ ٦ ≈ ۶
- 7 ≈ ٧ ≈ ۷
- 8 ≈ ٨ ≈ ۸
- 9 ≈ ٩ ≈ ۹

(MS Windows encodes the ASCII characters, but displays the ASCII, Arabic, or Persian glyphs based on user's preferences or the context)

# Issues: Two Letters

- Two characters each of the letters Yeh and Kaf
  - **Arabic** and **Persian**
- Yeh: ي ي ي ي ي ي ≈ ی ی ی ی ی ی
  - U+064A ≅ U+06CC
- Kaf: ك ك ك ك ك ك ≈ ک ک ک ک ک ک
  - U+0643 ≅ U+06A9

(Both series of characters have been in use because of some encoding and font issues in MS Windows systems)

# Issues: Joining Control

- Joining Control characters:
  - U+200D Zero Width Joiner (ZWJ)
  - U+200C Zero Width Non-Joiner (ZWNJ)
- Unfortunately, "simply deleted" in IDNA2003
  - IDNA2008 has resolved this problem
- **ZWNJ is a basic requirement of Persian script**
  - Not equivalent in language (نامه‌ای ≠ نامهای ≈ نام‌های)
  - But equivalent in protocol (نامه‌ای ≈ نامهای ≈ نام‌های)
- Not a bundling issue so far, but in the transition period
  - IRNIC has a record of the original requested labels!
  - Size of the bundle will increase to 12 (with and w/o ZWNJ)

# Bundling the Labels

- Each label has a normalized form
  - Persian characters are defined as the normal ones
- ×3 labels for digits
- ×2 labels for Yek/Kaf
  - Once for Persian Yeh/Kaf and once for Arabic ones
  - Persian Yeh cannot be mixed with Arabic Kaf in one label
  - Persian Kaf cannot be mixed with Arabic Yeh in one label
- Labels are "equivalent" **if and only if** they have the same normalized form
  - $L1 \cong L1$
  - $L1 \cong L2 \Rightarrow L2 \cong L1$
  - $L1 \cong L2, L2 \cong L3 \Rightarrow L1 \cong L3$



# Policies for Bundling

- Characters are considered equivalent if...
  - Some operating system makes the characters look alike  
e.g. The digits
  - Some encoding replaces the Persian character with another one  
e.g. Letters Yeh and Kaf
  - Statistics show that the community is "already using" the alt chars  
e.g. Both digits and letters Yeh and Kaf
- NO other characters are considered equivalent
  - آ ≇ ا and أ ≇ ا and إ ≇ ا
  - ه ه ≇ ه ة
  - و و ≇ و ؤ
  - ي ي ي ≇ ي ئ ئ ئ ئ

# Managing a Bundle

- **Any label** of a bundle can be used in DNS, WHOIS, EPP queries!
  - WHOIS returns the requested domain name, the "normal" U-label form, and the "normal" A-label form
- **Web-based Registration system**
  - Any label can be used for registration and searching
  - All the labels of a bundle are shown in "View Domain" page
  - One record is shown to user for each bundle, thus one "contact management" and one "DNS management" interface
- In DNS, all NS records are set independently for each label of a bundle
  - No CNAME/DNAME, thus no DNSSEC problem

# An Example

Domain:

مثال ۴۵۶ کی.ایران

= (EXAMPLE)456(YEH)(ZWNJ)(KEY).(IRAN)

ASCII (all clients/servers)		Unicode (IDNA-enabled clients/servers)	
xn--456-nzet2mdf6c.xn--mgba3a4f16a	open...	مثال 456 کی.ایران	open...
xn--456-nzet5me02fsj.xn--mgba3a4f16a	open...	مثال 456 کی.ایران	open...
xn--mgbh0fb2ngh05cfk.xn--mgba3a4f16a	open...	مثال ۴۵۶ کی.ایران	open...
xn--mgbh0fb71cyg9jiaj.xn--mgba3a4f16a	open...	مثال ۴۵۶ کی.ایران	open...
xn--mgbh7edc8ay1hiaj.xn--mgba3a4f16a	open...	مثال ۴۵۶ کی.ایران	open...
xn--mgbh7edc8aynij.xn--mgba3a4f16a	open...	مثال ۴۵۶ کی.ایران	open...
xn--456-nzet2mdf6c.xn--mgba3a4fra	open...	مثال 456 کی.ایران	open...
xn--456-nzet5me02fsj.xn--mgba3a4fra	open...	مثال 456 کی.ایران	open...
xn--mgbh0fb2ngh05cfk.xn--mgba3a4fra	open...	مثال ۴۵۶ کی.ایران	open...
xn--mgbh0fb71cyg9jiaj.xn--mgba3a4fra	open...	مثال ۴۵۶ کی.ایران	open...
xn--mgbh7edc8ay1hiaj.xn--mgba3a4fra	open...	مثال ۴۵۶ کی.ایران	open...
xn--mgbh7edc8aynij.xn--mgba3a4fra	open...	مثال ۴۵۶ کی.ایران	open...
xn--456-nzet2mdf6c.xn--mgba3a4f16a.ir	open...	مثال 456 کی.ایران.ir	open...
xn--456-nzet5me02fsj.xn--mgba3a4f16a.ir	open...	مثال 456 کی.ایران.ir	open...
xn--mgbh0fb2ngh05cfk.xn--mgba3a4f16a.ir	open...	مثال ۴۵۶ کی.ایران.ir	open...
xn--mgbh0fb71cyg9jiaj.xn--mgba3a4f16a.ir	open...	مثال ۴۵۶ کی.ایران.ir	open...
xn--mgbh7edc8ay1hiaj.xn--mgba3a4f16a.ir	open...	مثال ۴۵۶ کی.ایران.ir	open...
xn--mgbh7edc8aynij.xn--mgba3a4f16a.ir	open...	مثال ۴۵۶ کی.ایران.ir	open...
xn--456-nzet2mdf6c.xn--mgba3a4fra.ir	open...	مثال 456 کی.ایران.ir	open...
xn--456-nzet5me02fsj.xn--mgba3a4fra.ir	open...	مثال 456 کی.ایران.ir	open...
xn--mgbh0fb2ngh05cfk.xn--mgba3a4fra.ir	open...	مثال ۴۵۶ کی.ایران.ir	open...
xn--mgbh0fb71cyg9jiaj.xn--mgba3a4fra.ir	open...	مثال ۴۵۶ کی.ایران.ir	open...
xn--mgbh7edc8ay1hiaj.xn--mgba3a4fra.ir	open...	مثال ۴۵۶ کی.ایران.ir	open...
xn--mgbh7edc8aynij.xn--mgba3a4fra.ir	open...	مثال ۴۵۶ کی.ایران.ir	open...

- At the moment:  
6 × 4 = 24 FQDNs
- Transition period:  
12 × 4 = 48 FQDNs

# References

- IDNs at IRNIC  
<https://www.nic.ir/IDN>
- Bundle Generator at IRNIC Tools Server  
[https://tools.nic.ir/Punycode\\_Converter](https://tools.nic.ir/Punycode_Converter)
- Persian IDN Table at IANA  
[https://www.iana.org/domains/idn-tables/tables/ir\\_fa\\_1.0.html](https://www.iana.org/domains/idn-tables/tables/ir_fa_1.0.html)