Supporting Internationalized Email Addresses

Universal Acceptance of Domain Names and Email Addresses

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Universal Acceptance Readiness

**Vision**
All domain names and email addresses work in all software applications.

**Impact**
Promote consumer choice, improve competition, and provide broader access to end users.
Categories to Support for UA Readiness

- **Domain Names**
  - **Newer** top-level domain names: `example.sky`
  - **Longer** top-level domain names: `example.abudhabi`
  - **Internationalized** domain names: 普遍接受-测试.世界

- **Internationalized email addresses (EAI):**
  - ASCII@IDN: `marc@société.org`
  - Unicode@ASCII: ईमेल@example.com
  - Unicode@IDN: 测试@普遍接受-测试.世界
  - Unicode@IDN; right to left scripts: ای-ميل@مثال.موقع
Acceptance of Email Addresses in Websites Globally

- arabic.arabic@arabic
- chinese@chinese.chinese
- chinese@ascii.ascii
- ascii@chinese.ascii
- ascii@ascii.newlong
- ascii@ascii.newshort

- 2020
- 2019
- 2017
Estimated Support of EAI in Email Systems Under All TLDs

Only 9.7% of the domains sampled were EAI ready; based on mail servers found through MX records in zones of All, Large, non-IDN and IDN TLDs. For details on methodology, see UASG021D: EAI Readiness in TLDs
Email Address Internationalization (EAI)
 Normalize Unicode (UTF-8) string before processing, storing, etc. For IDNs use **NFC form**: e + ` (è: U+0065 U+0300) → è (U+00E8).

- Support both **representations of IDN labels**: U-label and A-label. U-Label is used for displaying and comparing; A-label for processing.
  - exâmple => exemple-xta => xn--exemple-xta

- Always use IDNA2008, not the older IDNA2003 version.

- Do not use code/libraries that have a static list of top-level domains (TLDs) as these change often. See [IANA list for TLDs](https://www.iana.org/domains/root), with regular updates.

- Do not use regex for user input validation of internationalized identifiers. Use IDNA2008 libraries for IDN; EAI local part may be difficult to validate.
Email Protocol Changes for EAI

- **SMTP**
  - Is augmented to support EAI.
  - Has a signaling flag (SMTPUTF8) to specify support of EAI.
  - All SMTP servers in the path must support EAI to successfully deliver the email.

- **POP/IMAP**
  - Are augmented to properly support EAI.
  - Have a signaling flag to specify support of EAI.
SMTPUTF8 Example

Server S forwarding an email to server R

S: <connect>
R: 220 receive.net ESMTP
S: EHLO sender.org
R: 250-8BITMIME
R: 250 **SMTPUTF8**
R: 250 PIPELINING
S: MAIL FROM:<猫王@普遍接受-测试.世界> **SMTPUTF8**
R: 250 Sender accepted
S: RCPT TO:<ray@receive.net>
R: 250 Recipient accepted

Specific SMPTUTF8 Signaling (EAI support)
SMTPUTF8 Example

S:DATA
R:354 Send your message
S:From: 猫王 <猫王@普遍接受-测试.世界>
S:To: ray@receive.net
S:Subject: 我们要吃午饭吗?
S:
S:How about lunch at 12:30?
S:.
R:250 Message accepted 389dck343fg34
S:QUIT
R:221 Sayonara

Email itself
To send and receive an email with EAI:
- All email parties involved in the delivery path have to be updated for EAI support.
- If a single SMTP server in the path does not support EAI, then the email is not delivered.
Protocol Changes, Delivery Path Considerations

- What happens when one email (SMTP) server in the path does not support EAI?
  - The last server trying to send to the next hop:
    - Sends back to the sender user a report of unable to deliver.
    - Drops the email.
  - Similar to reports that a sender receives when an email address does not exist.
Additional Considerations

- **Case folding:**
  - In ASCII, email users expect the equivalence of lowercase and uppercase. For example, PETER@example.com and peter@example.com will be delivered to the same mailbox.
  - Typically for EAI, such case folding functionality is not automatically implemented in most EAI-ready software.

- **SPAM:**
  - EAI emails may be considered as spam by spam filtering software even when proper SPF/DKIM records are enabled.

- **Software/Services:**
  - Not every server/client software and services support EAI.
Some Relevant Materials

- See https://uasg.tech for a complete list of reports.
  - Universal Acceptance Quick Guide: UASG005
  - Introduction to Universal Acceptance: UASG007
  - Quick Guide to EAI: UASG014
  - EAI – A Technical Overview: UASG012
  - EAI – Evaluation of Major Email Software and Services: UASG021B
  - Universal Acceptance Readiness Framework: UASG026
Access all UA documents and presentations at website: https://uasg.tech

Access details of ongoing work from wiki pages: https://community.icann.org/display/TUA

Register to participate or listen in the UA discussion list at: https://uasg.tech/subscribe

Register to participate in UA working groups here

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