

Situation Overview

Sending and receiving emails is a cornerstone to daily life. However, while email capabilities have been available for 50 years, there is still a disconnect - not every system can support Internationalized Domain Names (IDNs) or email addresses that use non-Latin languages, such as Arabic, Chinese, Hindi, Russian, Thai, and more. The process that enables email addresses with the mailbox name (johnsmith@) or domain name (@example.com) in local languages and scripts to work properly when sending and receiving emails is known as Email Address Internationalization (EAI). EAI is a key component of Universal Acceptance (UA), which ensures all valid domain names and email addresses are accepted equally by all Internet-enabled applications, devices, and systems.

Currently, [60 percent](#) of the top worldwide websites use the English language, but most people around the world do not speak English as a first language. In fact, [only a little more than a third](#) of the world population uses the Latin alphabet in English, while there are billions of people who prefer to read and write in Arabic, Chinese, Cyrillic, Devanagari, and other scripts. EAI adoption is essential to supporting inclusive and multilingual communications and experiences online. As Internet access continues to expand globally, there will be increased demand for services that can support all domain names and email addresses. Businesses that support customers in this way will have a first-mover advantage and will play an imperative role in achieving digital inclusivity.

Executive Summary

To ensure every global Internet user can send and receive emails using multilingual addresses, email technology and service providers, as well as domain name registration services, must become EAI-ready. Recently, two such organizations – [Coremail](#) and the [Thai Network Information Center Foundation](#) (THNIC) – embarked on their own EAI-ready journeys. By updating their systems to support domain names and email addresses in localized languages, they reduced technical debt and have ensured their systems keep pace with the evolving domain name landscape. Most importantly, these organizations can better serve the needs of their local communities by enabling users to communicate with others in their region/worldwide while using a unique online identity of choice. While Coremail and THNIC's EAI journeys were unique, there were common key learnings shared, including:

- *Leverage UTF-8 encoding* in data processing and storage. [UTF-8](#) is a variable-width character encoding used for electronic communication. It is defined by the Unicode Standard, and the name is derived from Unicode Transformation Format 8-bit.
- *Focus on email mailbox name encoding in UTF-8*, which is the key component for the reconstruction of email systems to become EAI-ready.
- *Configure internal email systems to support EAI*, which requires support for the [SMTPUTF8](#)¹ extension and other updates in tools supporting Internet Message Access Protocol (IMAP)/Post Office Protocol (POP).
- *Work with third-party products and services*. Outside systems and organizations may not be UA-ready and can hamper the use of EAI. Early outreach notifying these systems of your EAI efforts is key.
- *Plan ahead*. Start the process early, especially if email tool modifications are necessary.

Additionally, a few key Universal Acceptance Steering Group (UASG) resources that have been valuable for these EAI-readiness projects, and subsequent system upgrades, include:

- [EAI: A Technical Overview](#) (UASG 012)
- [Quick Guide to EAI](#) (UASG 014)
- [EAI: Evaluation of Major Email Software and Services](#) (UASG 021A)
- [EAI: Evaluation of Major Email Software and Services, EAI Pilot Test Cases](#) (UASG 021B)
- [EAI Readiness in TLDs](#) (UASG 021D)
- [Evaluation of EAI Support in Email Software and Services Report](#) (UASG 030)

What follows is a summary of each organization's EAI-readiness projects.

¹ The SMTPUTF8 extension supports UTF-8 text, allowing international addresses in non-Latin scripts. https://en.wikipedia.org/wiki/Simple_Mail_Transfer_Protocol



Coremail

Overview

The Coremail email system was developed in 1999 as the first mail system in China. Currently, it has more than 900 million end users in mainland China. Coremail's SaaS-based corporate email service, Coremail XT 5.0, is EAI-ready and its 10 million users have access to a mail system that supports the sending and receiving of internationalized emails.

Coremail's EAI journey began in 2011 when the China Internet Network Information Center (CNNIC) and Coremail started the commercialization of multilingual email technology. In 2013, Coremail applied the international standards for multilingual email accounts and the technical standards for Chinese email accounts to the Coremail mail system. It then successfully launched email addresses in Chinese, French, Portuguese, and Spanish languages. In 2014, Coremail assisted other leading email providers to support multilingual email accounts. Finally, in 2015 Coremail reconstructed its own email system, Coremail XT 5.0 to be EAI-ready.

Coremail's CEO, system architects, executives, operation, and maintenance personnel, as well as various email-related developers were involved in updating Coremail's systems to be EAI-ready. The Ministry of Industry and Information Technology (MIIT), Internet Society of China (ISC), ICANN Beijing Engagement Center, and the China Internet Network Information Center (CNNIC) also played essential roles in Coremail's EAI efforts through policy development and expert resources.

EAI Approach

Coremail reconstructed its email system, Coremail XT 5.0, by adjusting its system to support UTF-8. The technical transformation included the compatibility of email address "mail to" lines from 7-bit [ASCII](#)² encoding to 8-bit encoding to allow support for Chinese characters. This change included updates to the internal environment, client support interfaces, external environment support, and selective components of the system which support sending and receiving email.

² American Standard Code for Information Interchange - ASCII is a common numerical code for computers and other devices that work with text. Computers can only understand numbers, so an ASCII code is the numerical representation of a character such as 'a' or '@'. When mentioned in relation to domain names or strings, ASCII refers to the fact that before internationalization only the letters a-z, digits 0-9, and the hyphen "-", were allowed in domain names.

EAI Case Study:

Coremail 论客

Industry: Email technology and services

Location: Guangzhou, China

EAI-Ready Systems: Coremail XT 5.0

Benefits Identified:

- Improved customer experience.
- Chinese email users can use email addresses with Chinese characters.
- Users can now participate in communication activities between upstream (email systems) and downstream manufacturers (IT systems) and competent units regardless of script used in the email address.

"As a pioneer of China's email technology, we are focusing on Email Address Internationalization (EAI) and plan to apply it for our one billion users to facilitate communication in native languages."

— Leihua Chen
President of Coremail



EAI Supports a Culturally and Linguistically Diverse Internet

For Coremail, although many system components needed to be updated, adjusted, and tested, the work to ensure the system's EAI-readiness was not difficult. Overall, the effort took about 500 days of one person's working time and cost approximately CNY 5,000,000 (approx. US\$772,000). The two key challenges Coremail experienced during this process consisted of:

1. The reconstruction of email systems is mainly on email address encoding. It exists everywhere in system modules. It took Coremail a long time to optimize the EAI email application because they had to adjust their own mail system to adapt to those that cannot support Chinese email addresses.
2. Many third-party systems do not support registration with an EAI email address. Therefore, it is important to consider how to communicate with unsupported systems before beginning the project.

Results and Implications

Currently, about 100,000 existing Coremail XT 5.0 users have activated the EAI feature for Chinese email addresses, with more anticipated adoption. For providers, although EAI transformation requires a dedicated effort, the subsequent upgrade is still very simple. For Coremail, the key benefits of EAI are improving the customer experience and enabling consumer choice to register and use a preferred Chinese email address instead of English.

About:

Coremail 论客

Coremail is an associate of NetEase (NASDAQ: NTES), which is headquartered in Guangzhou and has branches in Beijing, Shanghai, Wuhan, and other cities in China. As a company specialized in email technology and services, Coremail's technical team includes a large number of Chinese email veterans and experts, and the company has accumulated a large number of patented technologies over the years. The Coremail mail system was developed in 1999 and has been certified by relevant national constitutes. Additionally, Coremail provides the first Chinese domain name registration platform: <http://互联网.中国>.

"Support for Universal Acceptance (UA) is the embodiment of a company's R&D strength. For providers, becoming UA-ready is simple and ensuring system compatibility is critical to improving the customer experience."

— Marvin Woo
Vice President of Coremail



Thai Network Information Center Foundation (THNIC)

Overview

The Thai Network Information Center Foundation (THNIC) has been the registry of .th since 1988 and .ไทย (.Thai) since 2011. As of March 2021, THNIC has more than 73,000 domains registered under .th and 18,000 domains under .ไทย. To promote localization in domain names, THNIC provides a free .ไทย domain for each .th domain registration. While the local population is well served by Thai language website content, there has historically been a need to use some English in web and email addresses, which has presented a barrier to increased Internet penetration as there is [low](#) English literacy in Thailand.

EAI Approach

In 2016, THNIC partnered with Throughwave (Thailand) Co., Ltd. to develop EAI email services for .th and .ไทย. Throughwave is a network and IT infrastructure solutions provider for Thailand and regional business organizations, and its Crossflow system supports IDNs in the domain name as well as non-ASCII characters in the mailbox name (e.g., ทดสอบยูเอ@คน.ไทย or ua-test@kon.in.th). Until now, the Crossflow system had hosted various EAI email services. Since March 2021, THNIC has transformed the free email service @คน.ไทย (@kon.in.th) to be ไทยไอดีเมล or ThaiDM. The mailbox can be accessed via a dedicated webmail client คน.คน.ไทย (m.kon.in.th), and some major email client applications that support EAI, e.g., MS Outlook, Thunderbird, or Mail (on macOS). THNIC local technical stakeholders and service providers have all played a major role in THNIC's EAI-readiness effort.

THNIC defines being EAI-ready in two stages:

1. *Thai EAI-ready*: support for new ASCII domain names and Thai IDNs – the latter both in the local script and [Punycode](#) (the letter, digit, hyphen (LDH)-compatible encoding syntax designed for use with IDNs in applications) – as well as Thai email addresses.
2. *Fully EAI-ready*: supporting all use cases for UA-readiness evaluation as [defined](#) by the Universal Acceptance Steering Group (UASG).

Currently, THNIC has accomplished stage one Thai EAI-readiness for .th core customized systems, and the project is still progressing for remaining systems. The project to provide an EAI-ready email service began in 2018, led by THNIC's Chief Technical Officer and support team. In 2019, THNIC started to change its systems to be EAI-ready by identifying and analyzing systems/services that are required to support Thai IDN domain names and email addresses. First, THNIC put the priority on the core systems for its business that affect domain registrants, which are the Domain Name System (DNS) backend, domain registration frontend, Extensible Provisioning Protocol (EPP) registration service, Shared Registry

EAI Case Study:



Industry: Internet domain registration services

Location: Bangkok, Thailand

EAI-Ready Systems:

- Domain Name System
- Domain registration frontend
- Extensible Provisioning Protocol (EPP) registration service
- Shared Registry System Database (SRSDB)
- WHOIS/RDAP system
- Email systems

Benefits Identified:

- Being Thai UA-ready benefits customers and users by expanding their choice in domain names and email addresses.
- There are many nuances and words in Thai with no equivalent in English; without IDNs this creates transliteration and translation problems and makes it hard to properly convey the meaning of the websites.
- Support for more Internet users, both local and international, who prefer using local scripts.
- UA-readiness offers better and greater value to users by staying up to date with the latest advancements in new types of domain names and email addresses.
- For Thai organizations, .th and .ไทย provide a unique identity on the Internet.

System Database (SRSDb), WHOIS/RDAP system, and email systems. In total, six core systems have been updated, including four other related organizations/project websites. All changed systems were tested and are considered to be Thai EAI-ready.

THNIC took on no additional cost associated with EAI-readiness except internal manpower allocation and time waiting for pieces of the third-party product to be ready. In terms of difficulty, updating systems to accept, validate, and display IDNs properly for the frontend is not difficult to handle. The larger technical effort is required to update the backend systems to process and store IDN and EAI email addresses correctly (e.g., email server configuration, which depends on many systems). THNIC's systems have already implemented support for UTF-8 to support the Thai script, which allows them to skip some steps of EAI implementation.

As one of the first movers, THNIC received EAI support and resources from the UASG community. Discussions around best practices with UASG members (e.g., CNNIC, Coremail, and Throughwave) have been invaluable to support the project. Key lessons include:

- Always use UTF-8 encoding in data processing and storage.
- UA-readiness may depend on third-party products and services, which can delay the implementation, and reaching out for their support for UTF-8 and EAI at the beginning of the project is key.
- Planning is important. If the system is urgently required to be UA/EAI-ready, hard-coding modifications may be necessary. Otherwise, consider changing dependent products and services, or just wait.

The challenges THNIC experienced during this process consisted of:

- External hurdles occurred during the implementation because some of the systems depend on other systems, libraries, and modules that are not EAI-ready.
- Apart from the core systems, some parts of web applications/websites were also changed to become EAI-ready. For example, they had to manually change the "Contact Us" form validation logic that depended on CMS WordPress plug-in.

Results and Implications

THNIC accomplished stage one Thai EAI-readiness for core systems related to domain registrants and email services, and this first stage of the project is expected to be completed for all remaining systems in 2022. While .th core customized systems have recently become Thai EAI-ready, THNIC has not yet assessed user engagement. THNIC chose to update its system to support Thai IDN and email addresses first because they understand the language and have resources to test their systems; however, stage two, becoming fully EAI-ready, is the optimal goal.

About:



The Thai Network Information Center (THNIC) foundation is a non-profit organization established in 2007 as a center to develop, promote, and facilitate Internet usage. It also focuses on the development of Internet domain systems and suitable and effective domain name registration policy through the cooperation of relevant parties and listening to the opinions of interested individuals. THNIC is best known as the center to promote and facilitate the use of Internet domain name registration and database management of Country Code Top Level Domain Name .th and .ไทย (.Thai) as well as to support research and development of the Internet infrastructure in Thailand.

"Using Thai IDNs, such as .ไทย (Thai), is as much about promoting our culture as it is accessibility. As a pioneer organization in the Thai Internet industry, we want to be a catalyst in this ecosystem. IDNs and EAI are keys in enabling the future of a truly multilingual Internet."

— Pensri Arunwatanamongkol
Executive Director of THNIC