Universal Acceptance Roadmap

for Domain Name Registry and Registrar Systems

Marc Blanchet & Michael Bauland

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Agenda

1. Overview
2. Analysis
3. The Gates
4. Test Cases
   Use of Labels
5. Example of one
   Registry Test Case
6. Example of one
   Registrar Test Case

Overview

- Study to help Domain Registries and Registrars make their systems support Universal Acceptance(UA)
  - Systems = registration systems (EPP, RDAP, Web, …), customer support, DNS zone generation, ...
  - Universal Acceptance = Σ IDN, EAI, long and new TLDs
- Report is currently in ICANN Public call for comments (closes october 17th)

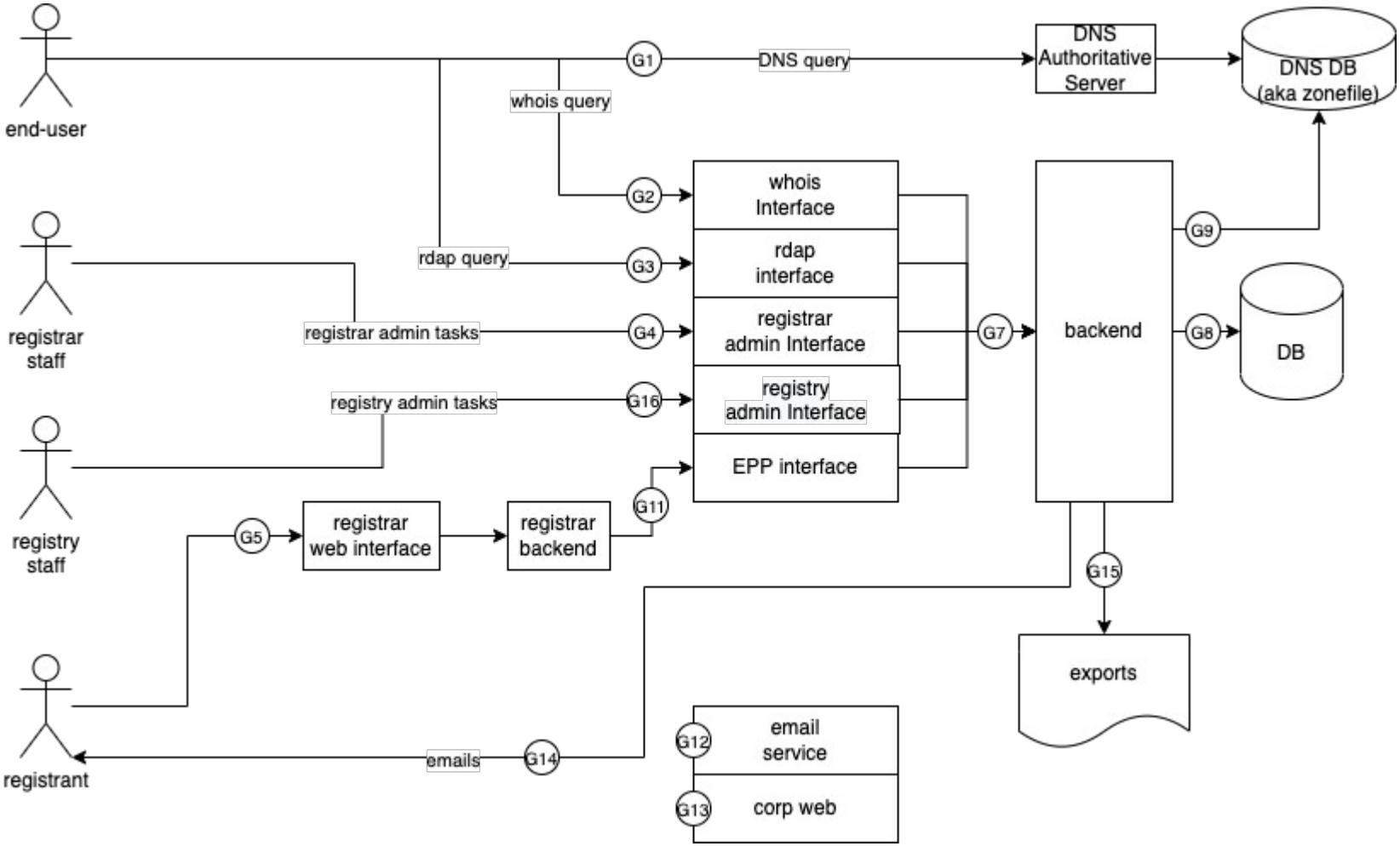
Study Methodology

- Uses the UASG026 UA Readiness Framework
  - Which is generic to any application
- Applies it to a generic model of Registry and Registrar systems
  - gTLD and ccTLD. Includes specifics of ICANN Contracted Parties Requirements
- Identifies gates within these systems where UA support needs to be verified
- Proposes test cases for this verification
- Analyses two registry systems and one registrar system as examples
  - Registry systems : Google Nomulus & KnippTANGO Registry Services
  - Registrar System : COREhub: GatewayNG
- Report targeted to registry and registrar operators, registry backend providers, developers and technical managers.

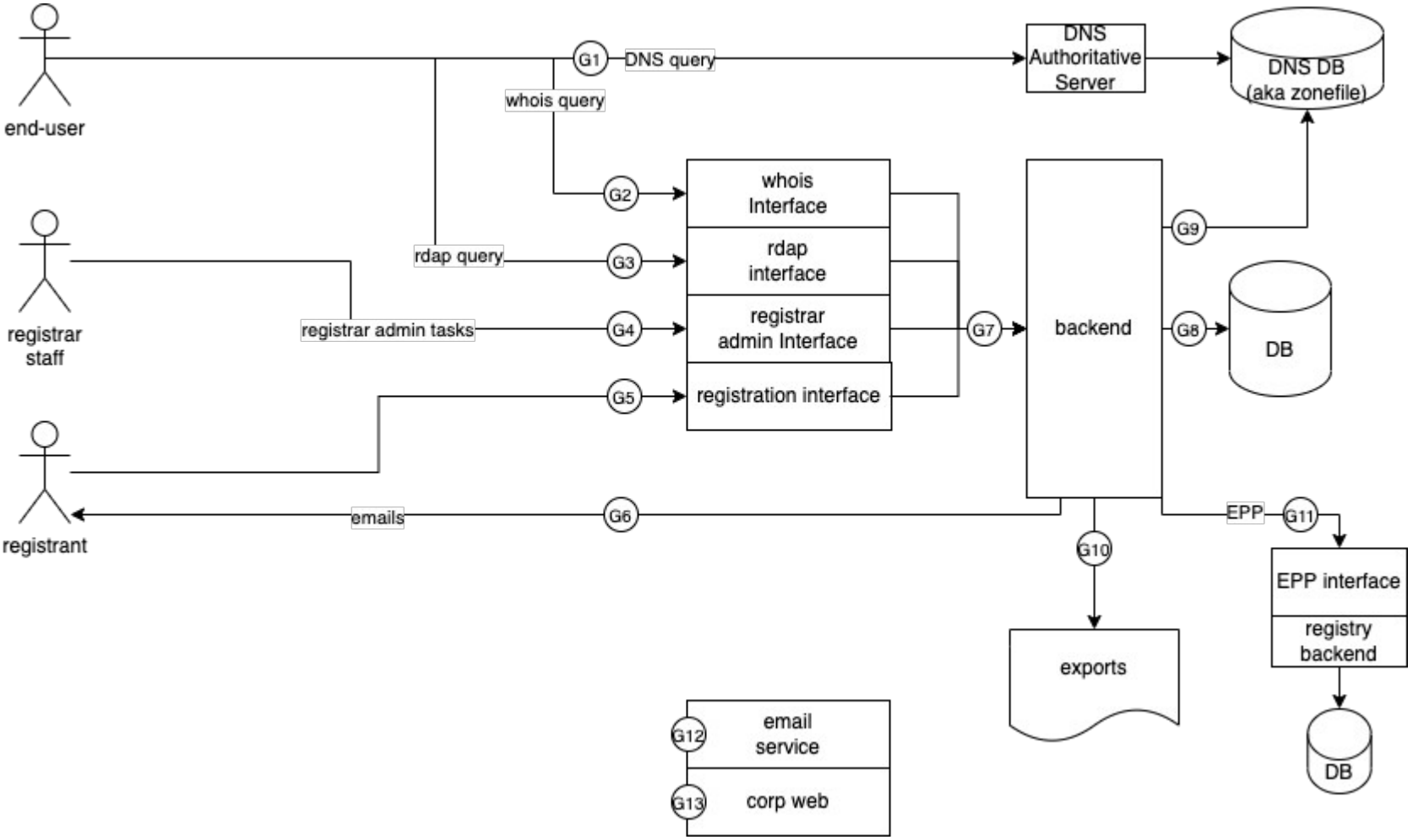
Architectures and Gates

- Registry High-Level Architecture
- Registrar High-Level Architecture
- For each identified gate, the expected behavior of the software is described.
- A set of test cases is provided

Registry High-Level Architecture

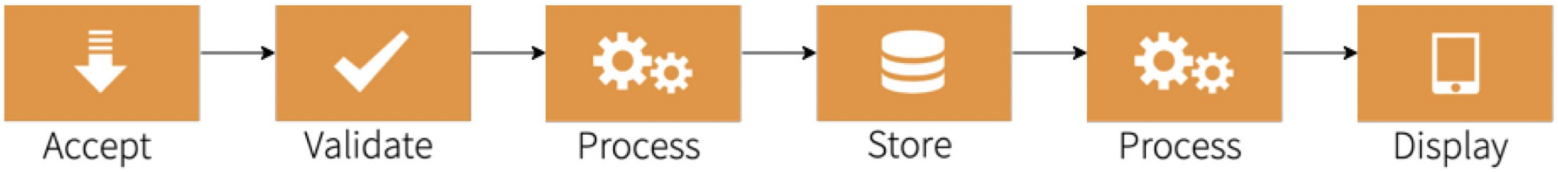


Registrar High-Level Architecture



Gates

- Gates are numbered, unique for both architectures
- Most are identical for both architectures, but some are different.
  - EPP usage is (obviously) different for registry and registrars : e.g. client vs server
- This is a generic architecture. Adapt accordingly to your own environment.
- Gates are identified based the UASG026 UA Readiness Framework model :



Gate Examples

- G10 and G15 identify exports to third-parties such as ICANN.
  - A list of relevant fields in these exports are identified with the expected format
- G7 identifies the backend. The report discusses important considerations about backend development and the fact that some language libraries and open-source software may or may not be UA compliant, therefore affecting the backend as a whole.

Other Considerations

- Protocols : report identifies key fields in EPP and Whois/RDAP protocols that should conform to UA.
- Generic considerations are provided about the processing of i18n elements such as :
  - string normalization
  - support of different scripts (directionality for example),
  - IDN handling (either UTF-8 or punycode)
  - ...

IDN Variants

- It is very important to note that IDN variants (different IDN labels that are considered equivalent for registration) have **NOT** been considered in this report.
- However, the impact of variants on these systems is pretty significant and therefore should be carefully thought of when starting the work.
- Some initial and minimal considerations for IDN variants are provided in the report.

Next Section and Next Steps

- Next section of this presentation discusses the tests made to two registry systems and one registrar system.
  - These are described in the appendices of the report
- The whole report (including appendices) is on ICANN Public comment. Comments are due by October 17th. Please read and provide comments.

Test Cases – Use of Labels

- Choice and Selection of Labels

Selection of Sample Test Cases - Labels

- Set up sample registry system serving .example and . テスト
- Sample non-existing test labels (obtained from the IANA Root Zone DB) used to build domain names and e-mail addresses, e.g.,
  - பரிசோ ≅ xn--hlcj6aya9esc7a (Tamil script)
  - 测试 ≅ xn--0zwm56d (Han script)
  - परीक्षा ≅ xn--11b5bs3a9aj6g (Devanagari script)
- Sample existing e-mail addresses (for checking receipt of e-mail)
  - michael@لكانبـازار ≅ michael@xn--igbi7fn.xn--mgbab2bd
  - grüün@knipp.de (EAI)

Registry Test Case Example

- Testing the TANGO Registry Services®

Registry Software Tested Features

- Registry Software
  - EPP
  - Control Panel (Web Interface)
  - DNS Name Server
  - Port 43 Whois
  - RDAP
  - Escrow Export

Registry Software Tested Features – Example

- Registry Software
  - EPP
    - Contact Update
  - Control Panel (Web Interface)
  - DNS Name Server
  - Port 43 Whois
  - RDAP
  - Escrow Export

EPP Contact Update - Request

Update a contact and set its e-mail address to δοκιμή@ テスト .பரிட்சை

Request:

```
<?xml version="1.0" encoding="UTF-8"?>
<epp xmlns="urn:ietf:params:xml:ns:epp-1.0">
 <command>
  <update>
   <contact:update xmlns:contact=
    "urn:ietf:params:xml:ns:contact-1.0">
    <contact:id>C100033</contact:id>
    <contact:chg>
     <contact:email>δοκιμή@ テスト .பரிட்சை
 </contact:email>
    </contact:chg>
   </contact:update>
  </update>
  <clTRID>ABC-12345</clTRID>
 </command>
</epp>
```

Response (problem highlighted in red):

```
<?xml version="1.0" encoding="UTF-8"?>
<epp xmlns="urn:ietf:params:xml:ns:epp-1.0">
 <response>
  <result code="2306">
   <msg>Parameter value policy error</msg>
   <extValue>
    <value>
     <contact:email xmlns:contact=
"urn:ietf:params:xml:ns:contact-1.0">
      δοκιμή@ テスト .பரிட்சை
     </contact:email>
    </value>
    <reason>field value is disallowed by policy</reason>
   </extValue>
  </result>
  <trID>
   <clTRID>ABC-12345</clTRID>
   <svTRID>1651750771689-4065</svTRID>
  </trID>
 </response>
</epp>
```

EPP Contact Update - Request

Update a contact and set its e-mail address to 测试 @ 测试 . 测试

Request:

```
<?xml version="1.0" encoding="UTF-8"?>
<epp xmlns="urn:ietf:params:xml:ns:epp-1.0">
 <command>
  <update>
   <contact:update xmlns:contact=
    "urn:ietf:params:xml:ns:contact-1.0">
    <contact:id>C100033</contact:id>
    <contact:chg>
     <contact:email> 测试 @ 测试 . 测试
</contact:email>
    </contact:chg>
   </contact:update>
  </update>
  <clTRID>ABC-12345</clTRID>
 </command>
</epp>
```

Response:

```
<?xml version="1.0" encoding="UTF-8"?>
<epp xmlns="urn:ietf:params:xml:ns:epp-1.0">
 <response>
  <result code="1000">
   <msg>Command completed successfully</msg>
  </result>
  <trID>
   <clTRID>ABC-12345</clTRID>
   <svTRID>1651751124705-4068</svTRID>
  </trID>
 </response>
</epp>
```

EPP Contact Update – Analysis

- What went wrong?
  - Email address causing issues: δοκιμή@ テスト .பரிசை
  - Working email address: 测试 @ 测试 . 测试
- Both addresses uses non-ASCII characters both for the local part as well as for the domain part.
- It is also not the Tamil script as such. Another test showed that the following email address also works: δοκιμή@ テスト .பரி
- Debugging showed, the issue is with a 3rd party library (javax.mail), which simply marked the address as not valid.

EPP Contact Update – Solution

- How to fix the issue for TANGO?
  - It turned out the same e-mail address using the A-label version of the domain name was successfully validated by the javax.mail: δοκιμή@xn—zckzah.xn--hlcj6aya9esc7a
- Implementing a work-around:
  - validate the domain name part individually: テスト .பரிசை
  - if valid, convert domain name part to A-label: xn—zckzah.xn--hlcj6aya9esc7a
  - validate that e-mail address using the javax.mail library: δοκιμή@xn—zckzah.xn--hlcj6aya9esc7a
  - store the original e-mail address: δοκιμή@ テスト .பரிசை

Registrar Test Case Example

- Testing the CORE GatewayNG

Registrar Software Tested Features

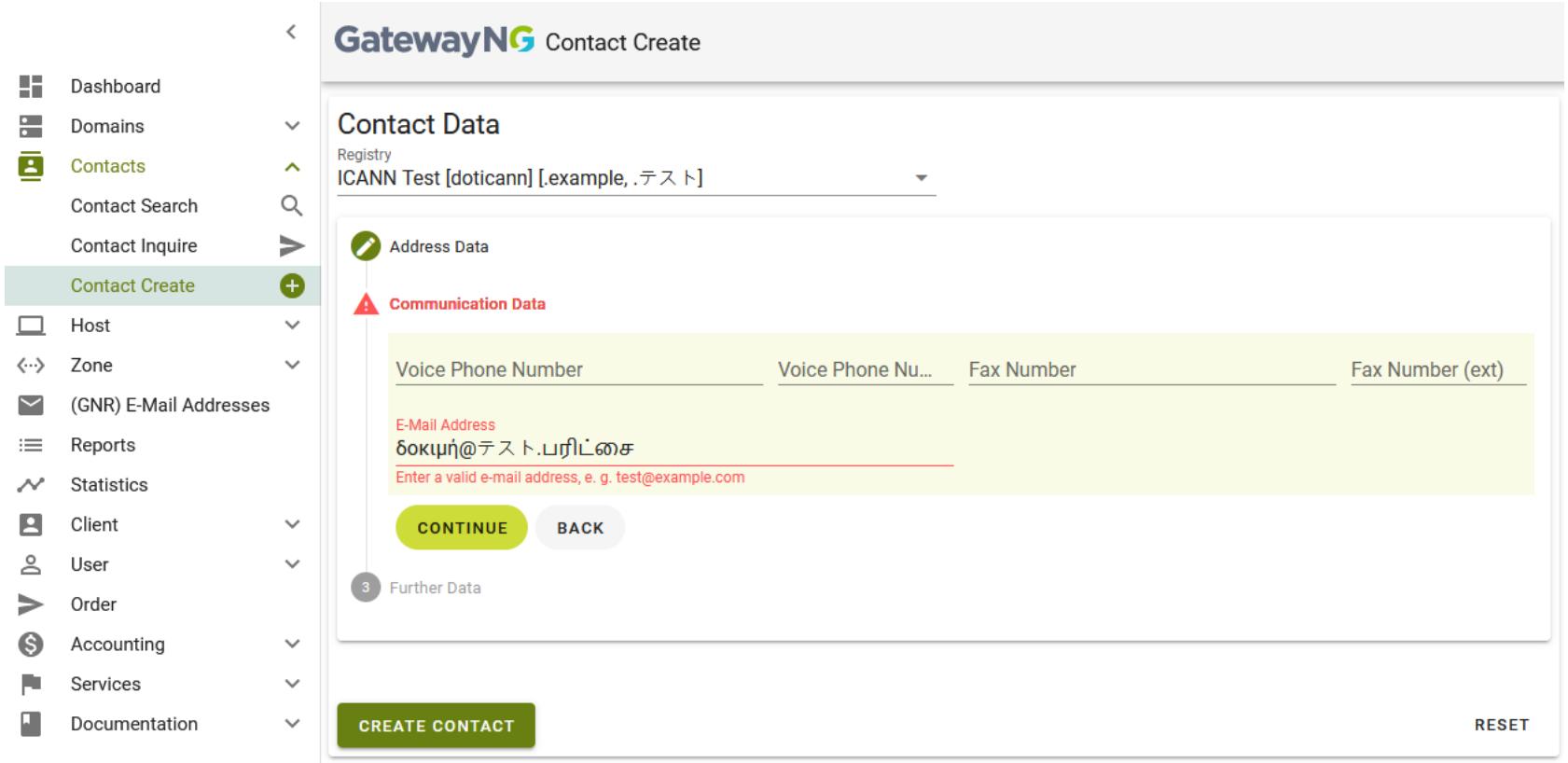
- Registrar Software
  - API (CORE Provisioning Protocol - Payload)
  - Control Panel (Web Interface)
  - DNS Name Server
  - Port 43 Whois
  - RDAP
  - Escrow Export
  - Email sending (WAP, Transfer Notifications)

Registrar Software Tested Features – Example

- Registrar Software
  - API (CORE Provisioning Protocol - Payload)
  - Control Panel (Web Interface)
    - Contact Create
  - DNS Name Server
  - Port 43 Whois
  - RDAP
  - Escrow Export
  - Email sending (WAP, Transfer Notifications)

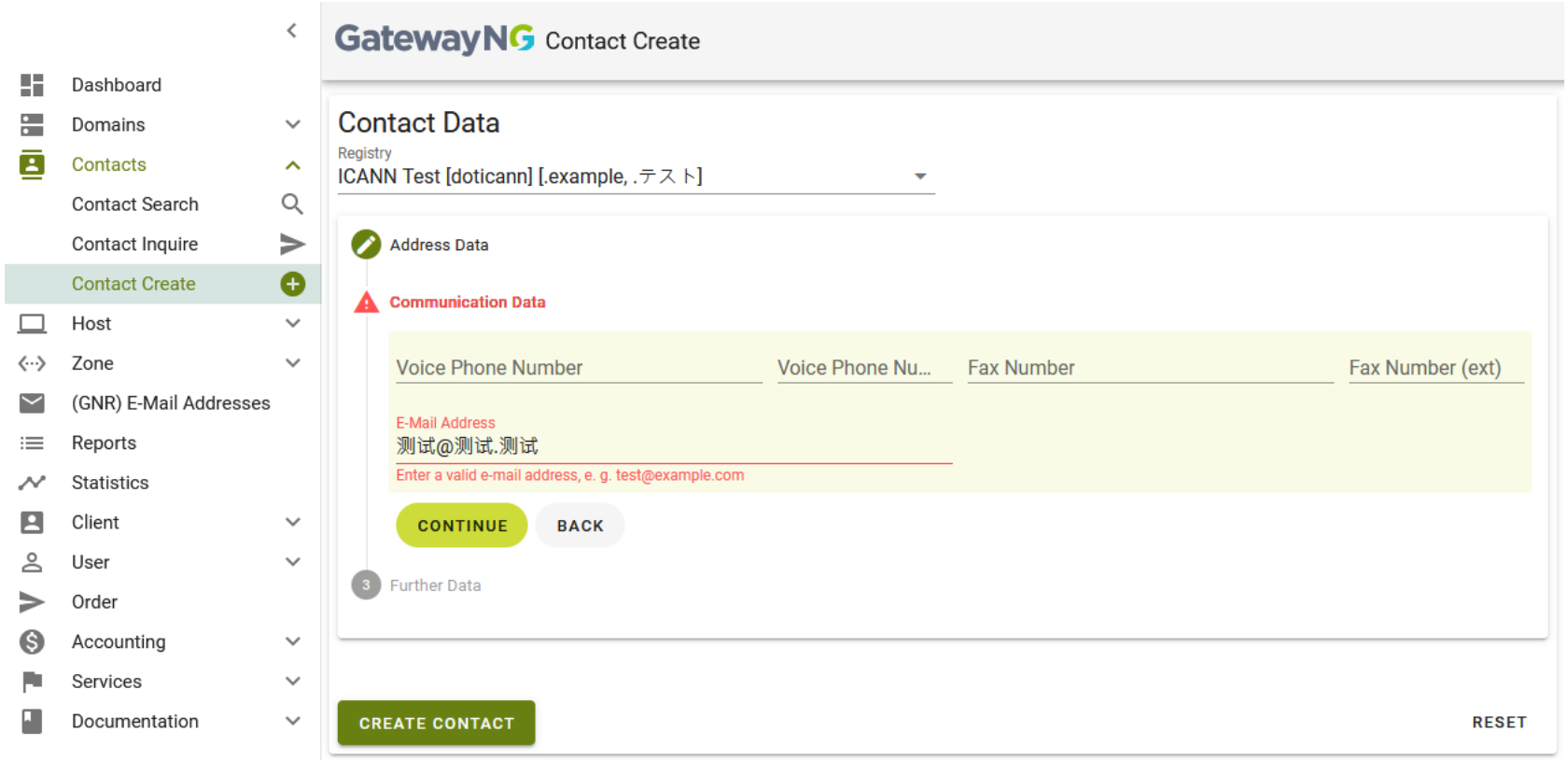
Web Interface Contact Create – Request

- Create a contact and with δοκιμή@ テスト .பரிட்சை



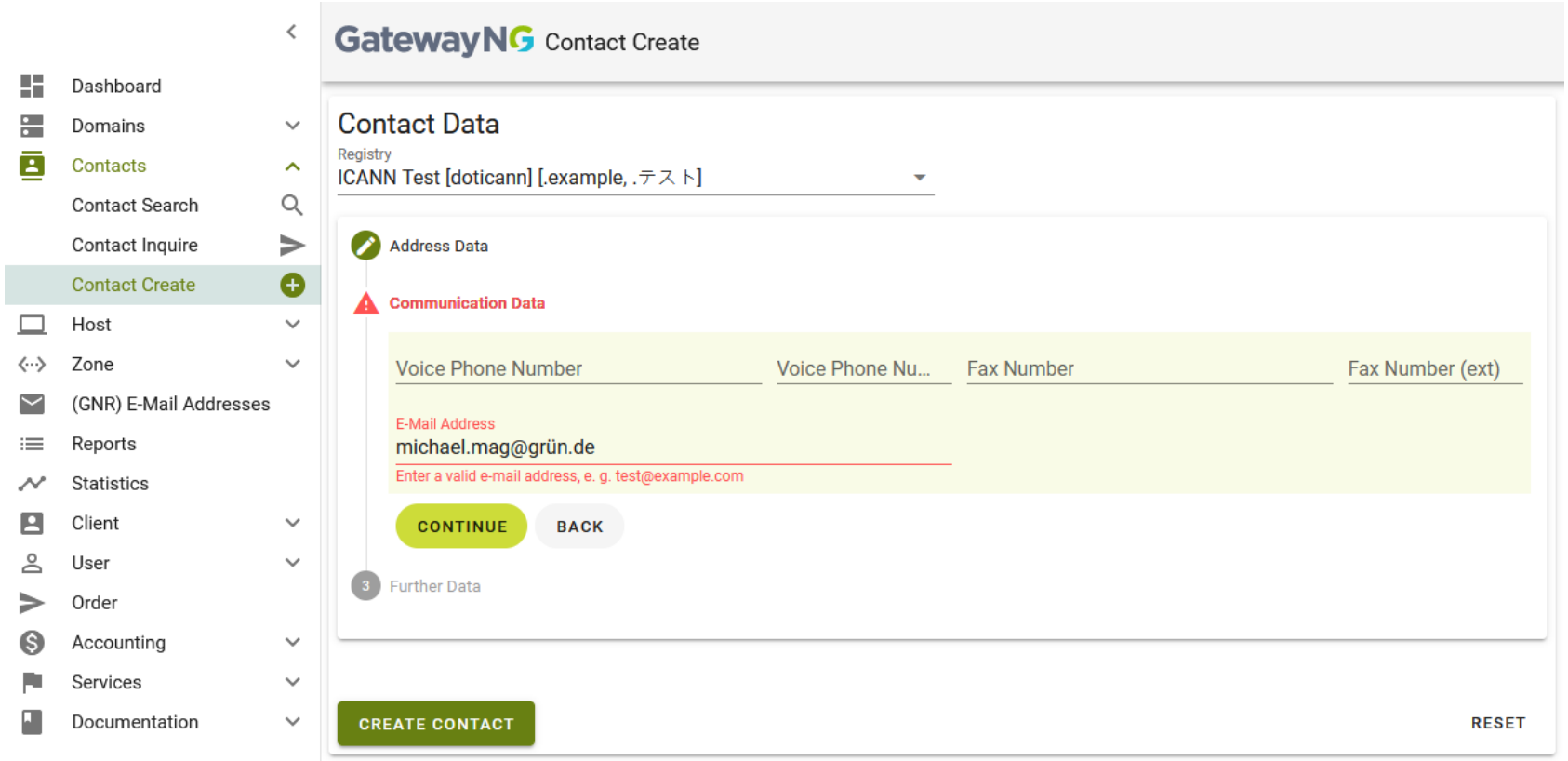
Web Interface Contact Create – Alternate Request

- Create a contact and with 测试 @ 测试 . 测试



Web Interface Contact Create – Alternate 2 Request

- Create a contact and with michael.mag@grün.de



Web Interface Contact Create – Analysis

- What went wrong?
  - Email addresses causing issues:
    - δοκιμή@ テスト .பரிசோ
    - 测试 @ 测试 . 测试
    - michael.mag@grün.de
- Presumably any non-ASCII character is rejected.
- Taking a look at the source code revealed:
  - Frontend is written using vue.js
  - Validation is carried out using vuelidate library, which uses a rather complex regular expression, but does not support any non-ASCII characters

Web Interface Contact Create – Solution

- How to fix the issue for GatewayNG?
  - It makes no sense to fix the regular expression and try to find one that takes all cases into account. Far too much work and error-prone.
- Let the backend do the work:
  - The backend Java code anyhow has to validate the email address (again).
  - Simplify the frontend javascript validation by just checking for very basic errors (i.e., not really an email address):
    <somestring>@<somestring>.<somestring>
    with <somestring> having no real restrictions.
  - The finer, more detailed validation is done afterwards in Java.

Engage with ICANN – Thank You and Questions

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