More on ENUM

National Information Technology Center

ENUM Task Force

ENUM Classifications

ENUM Types

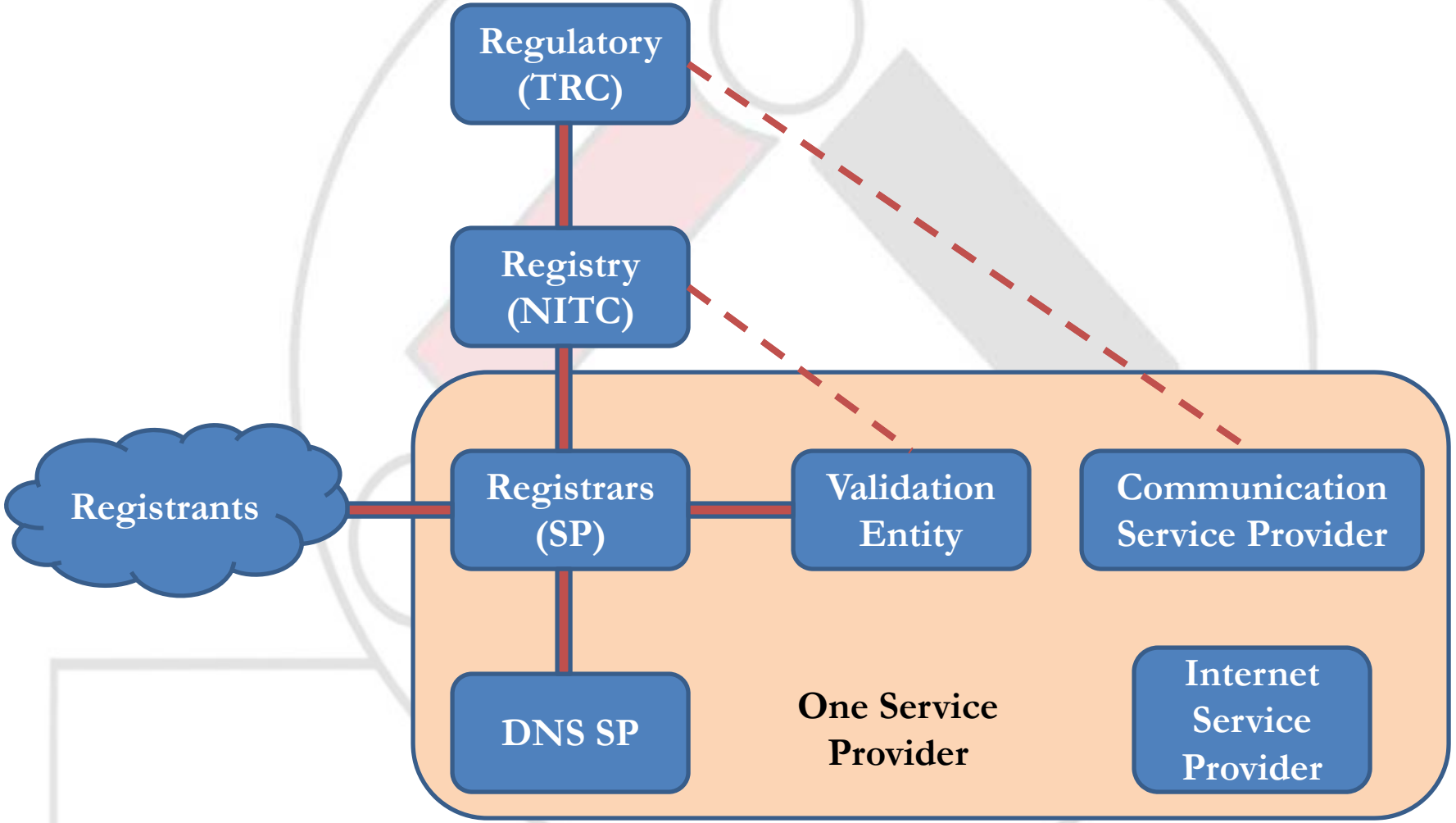
- **Public User ENUM**
  - **Does** require e164.arpa domain name resolving
  - For all end users
  - A service provider only provides connectivity services
  - Regulatory sets policies and regulations
  - Each user has his own ENUM number
- **Infrastructure ENUM**
  - **Does** require e164.arpa domain name resolving
  - Strictly for network operators and carriers
  - Regulatory sets policies and regulations

… continue (ENUM Types)

- **Private User ENUM**
  - **Does not** require e164.arpa domain name resolving
  - Local within an organization, or shared between several distributed organization
  - Regulatory has no say regarding policies and regulations
  - Also called "*Operator ENUM*" or "*Enterprise ENUM*"
- **Federation ENUM**
  - Strictly for interconnection of service providers over IP
  - Regulatory has no say regarding policies and regulations (international rules apply)

ENUM Stakeholders and Players

Main Players



Telecommunication Regulatory

- Sets policies - together with the local community, e.g. Validation policy
- Accredits the "*Communication Service Provider*"
- Provides number allocation for the "*Communication Service Provider*"

Registry

- Acknowledges delegation request of country code (with *ITU* and *RIPE NCC*)
- Administrative owner of local ENUM zone
- Technical authority for local ENUM zone
- Provides DNS and registry services (Servers, WhoIS, Registration System, … etc)
- Works jointly with the *Regulatory*
- Accredits *Registrars*
- Accredits *Validation Entities*
- Has no direct contract with *Registrants* - Prohibited

Registrar

- Provides ENUM registration to customers (*Registrants*)
- Has contract with *Registry*
- Uses *Validation Entity* for validation
- Interacts with the registry ENUM system via EPP (*Extensible Provisioning Protocol*)

Validation Entity

- Performs actual validation
  - Is the *Registrant* the *Number Holder*?
- Enforces validation policy
- Provides services to *Registrars*
- Accreditation must be provided by the *Registry*
- Could support various validation methods
- Could serve several registrars (*Validation Service Provider*)

Registrant (Number Owner)

- Owns an ENUM number; i.e. *Number Holder*
- Has right on respective ENUM domain (*Registrant*)
- Contracts a *Registrar* to register ENUM domain
- Needs to provide information for validation purposes
- Decides on points of contact and their priorities

Communication Service Provider

- Receives number allocation from *Regulatory*
- Usually accredited by *Regulatory*
- Assigns numbers to *Registrants* (number holders)
- Typically has authoritative number ownership information – in coordination with *Regulatory* under strict privacy
  - ❖ Useful for validation

DNS Service Provider

- The main target of DNS delegations from the *Registry*
- Hosts ENUM domains of *Registrant*
- Provides DNS zone provisioning interfaces (EPP with DNS server)
- DNS entries point to services of the *Service Provider*
- Needs to work together with *Registrar*

Internet Service Provider

- Mainly provides services such as hosting (web, mail, IM) and VoIP

ENUM Organization Patterns

- Led by an independent organization
  - Registry, Telecom Operator, Vendor, ISP, …
  - Austria, UK, Netherlands, Sweden, Japan, … (majority)
- Led by a ccTLD
  - ccTLD plays the leading role
  - Germany, S. Korea, Jordan
- Led by the regulatory
  - Telecommunication Regulatory Authority plays the leading role
  - China, Singapore

… continue (ENUM Org. Patterns)

- Led by a company entrusted by the regulatory
  - Private company plays the leading role
  - Armenia, Romania, Switzerland
- Led by an entrusted registry of another country
  - Another country's ENUM switch plays the leading role
  - Lichtenstein

Added Value and Advantages

ENUM Added Value

- Bridging PSTN with the Internet; thus allowing PSTN to access Internet terminals
  - ❖ Low call costs – outdated
  - ❖ Linking together all VoIP islands on the Internet
- Single point of contact (Number Portability)
- Extract information of an ENUM number registrant via lookup techniques

Single Point of Contact

- For a call initiator to reach a recipient, the initiator can store one number (ENUM number)
- This single number could forward a call to a home land line, cell phone(s), work land line, IP phone, … depending on how you setup your ENUM zone file priorities
  - ❖ If initiator sends text, the text could arrive as SMS, fax, e-mail, or IM
- DNS is reliable, and easy to implement and understand

Low Call Costs

- The idea of ENUM came to live in 1998
  - Back then, the IETF and ITU were studying possibilities to reduce costs on calls – amongst other options
- ENUM came to life as a method to reduce costs of calls, but it required integration of PSTN with other voice technologies (SIP, H.323, … etc)
- This theory has been outdated!

Policy Issues to Consider

Issues to Consider

- How to authenticate the identity of the subscriber for ENUM services?
- Who are the ENUM registrars, and what are they responsible for?
- How to validate ENUM data for potential subscribers (Add – Modify – Delete) in the NAPTR list of services and preferences?
- How is data provisioned in the country code name servers?

… continue (Issues to Consider)

- How to obtain end-user agreement if necessary to enter a number in DNS?
- How to harden the ENUM zone data against data mining, especially for the purposes of spam and scamming?
- Competition models amongst suppliers of ENUM services, and related portability issues

Subscriber Identity Authentication

- When a registrant requests a new ENUM number, what is the process? And what identification is required?
- Is registration requirements same for all sectors?

ENUM Registrars

- How does registry choose them?
- Nature of agreements between registry and registrars
- Connection between registry servers and registrar servers

ENUM Data Validation

- Do the forwarding options (land line, cell phone, e-mail ID, fax, …) belong to the registrant?
  - **Land line** – Via regulatory
  - **Cell Phone** – Via regulatory
  - **SIP or H.323 Number** - Via regulatory
  - **Fax** - Via regulatory
  - **E-Mail** - ???
  - **Website** – Is it limited to personal websites? Or can I add any website (socially-rejected websites prohibited, but how)?
  - **Instant Messaging** - ???

Data Provisioning

- What data is stored for registry / registrar usage ONLY
- What data can be shown to the public (via WhoIS)?

End-User Agreement

- The nature of agreement between registrar and registrant
- Length of agreement
- Commitments of registrant to registrar and vice versa

ENUM Number Lookup Process

- Some registrars show content of zone file to the free world
  - ❖ Spam e-mail, scam calls, call re-routing, website hacking
- When looking up data for an ENUM domain, what should be visible to all?
- Can registrant decide what data to show and what data to hide?

ENUM Competition Models

- Is pricing unified amongst all registrants?
- Nature of royalty fee for registry
- Is accreditation required?
- Rules and conditions to become a registrar
- Are their any rules imposed on the number of registrars?
- Can the registrars have their say on the registry and local regulatory?

References

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