ENUM in Austria

Internet Telephony, APEET
APRICOT 2005
Kyoto, Japan
24. February 2005

Richard Stastny, ÖFEG*

* The opinions expressed here may or may not be that of my company

Content

- What is ENUM – a short re-cap
- ENUM in Austria
  - history
  - results of trial
  - business cases and examples
- enum.at
  - current status
  - contracts and entities
  - lessons learned
- Summary

ENUM is defined by the IETF

- Electronic or E.164 NUMber mapping is defined by the Internet Engineering Task Force (IETF) in RFC3761
- **The mapping of „Telephone Numbers“ to Uniform Resource Identifiers (URIs) using the Domain Name System (DNS) in the domain e164.arpa**
  - URIs are used to identify resources on the Internet (e.g. http://enum.nic.at)
- The purpose of ENUM is to enable the convergence between the PSTN and the Internet

ENUM in a nutshell

- take an E.164 phone number +43 1 7972840 32
- turn it into a FQDN 2.3.0.4.8.2.7.9.7.1.3.4.e164.arpa.
- query the DNS (for NAPTR)
- returns list of URIs

sip:richard.stastny@iphone.at
mailto:richard.stastny@oefeg.at
sms tel:+436644204100

```
IN NAPTR 10  10 "u" “E2U+sip“ !^.*$!SIP:richard@iphone.at“! .
```

Why the DNS?

- It’s there …
- It works…
- It’s global…
- It scales…
- It’s open…
- Anyone can use it…

Why E.164 Numbers ?

ÖFEG

- People know how to use phone numbers
- Billions of devices only use numeric key pads, especially wireless devices
- Many VoIP customers use normal phones with terminal adapters or IP phones with numeric keypads
- URIs like sip:user@domain have advantages and disadvantages
  - biggest problem: they cannot be dialed on the PSTN
- Phone numbers may be used for other services on the Internet (Instant Messaging, Video, ...)
- URI's and telephone numbers will co-exist for the indefinite future
  - approx. 10 years? ;-)

ENUM as a glue

ÖFEG

- An URI (AoR) entered in an ENUM domain related to an E.164 number allows you:
- to reach any destination on IP from the PSTN/ISDN
  - ported out, ENUM-only routed numbers, access codes, ACQ
- to reach any destination on IP directly from IP
  - by dialing the full E.164 number as default
  - dialing local numbers and cross connections is still possible if a proper numbering and dialing plan is used
- and to reach any destination existing only on the PSTN
  - but only calls to numbers not found in ENUM are routed via the PSTN

What is THE basic requirement for ENUM?

- A public SIP URI on the Internet
- Any „IP Telephony or VOIP service“ not providing a SIP URI cannot be reached via the public Internet and cannot be used in ENUM
- Vonage, Skype cannot be considered as VoIP

What is ENUM not?

- a real-time call forwarding service
  - ENUM should not be used to implement a follow-me service, modifying ENUM entries in real-time depending on location, time-of-day, etc.
  - This should be done as a SIP service at the SIP proxy
- a „presence“ service
  - Presence should also be implemented at the SIP proxy (e.g. with SIMPLE)
  - ENUM does not provide NOTIFY and also no policies
- but ENUM may point to a presence service or to a geo location
  - e.g. for a company or a hotel

What are the major benefits?

- Linking to together VoIP islands on the Internet, enabling all Internet services
  - VoIP PBX and also „Carrier“ networks
- Allowing terminals on the Internet to be reached from the PSTN
  - Terminals on the PSTN may dial only numbers and not URIs
- ENUM can be used for any URI = any service
  - mailto, fax, video, ...
  - sms, mms, ...
  - h323, pres, im, ...
  - http, ft,
  - certificates, locations, ...

(Very short) ENUM History

1999 – IETF ENUM WG formed

2000 – IETF ENUM WG – RFC2916

2001 – Int. and nat. workshops (ITU-T, Europe, US, Asia, ...)

2002 – ITU -T Interim Procedures (IAB, RIPE-NCC)
- ETSI TS 102 051 "ENUM Administration in Europe“
- National Consultations and ENUM–Trials started (Austria)

2003 – ETSI TS 102 172 "Minimum Requirements for Interoperability of European ENUM Trials"
- more national ENUM–Trials joined

2004 – ETSI ENUM Workshop (Feb 2004)
- IETF new RFC3761
- Enumservices registration at IANA ongoing
- US LLC for CC 1 formed
- 1st commercial ENUM service worldwide in Austria

2005 – ETSI TS 102 172 V2 “Minimum Requirements for Interoperability of ENUM Implementations” approved
- ETSI TR 102 055 “Infrastructure ENUM” approved
- ETSI ENUM Plugtest End of May (see Jim Reid)

ENUM Implementations

ÖFEG

Delegations in e164.arpa as of Dec. 31st, 2004

- 31 Netherlands
- 33 France
- 353 Ireland
- 358 Finland
- 36 Hungary
- 374 Armenia
- 40 Romania
- 41 Switzerland
- 420 Czech Republic
- 421 Slovakia
- 423 Liechtenstein
- 43 Austria
- 44 UK
- 46 Sweden
- 48 Poland
- 49 Germany
- 246 Diego Garcia
- 247 Ascension
- 290 Saint Helena
- 55 Brazil
- 61 Australia
- 65 Singapore
- 86 China
- 88234 Global Networks
- 87810 VISIONng UPT
- 971 UAE

- 1 North America soon to come
- additional Asian countries (Korea, Japan, ...) trials, but not in .arpa

http://www.ripe.net/enum/request-archives/
http://www.centr.org/kim/enum/index.html

ENUM in Austria

ÖFEG

- First ENUM Consultation by RTR (Aug. 2001)
- Delegation of 3.4.164.arpa via RTR to nic.at (May 2002)
- Austrian ENUM (Trial) Platform (Sept. 2002) established
- Austrian ENUM Trial in full operation (Oct. 2002)
- New Austrian Telecommunication Law (TKG 2003)
  - based on the New European Regulatory Framework (NRF)
- New Numbering Ordinance in Austria (May 2004)
  - taking VoIP and ENUM already into account
  - +43 720 for national portable numbers and VoIP
  - +43 780 for VoIP and ENUM (nomadic)
- Contract between NRA (RTR) and Tier1 Registry (enum.at)
  - contains the policy framework for ENUM
  - the charter for the 3.4.e164.arpa domain
  - the validation guidelines for the Registrars
  - framework for contracts with registrars and validation entities
  - not defining validation procedures (only examples), but the margins for error
  - basic technical, operational and administrative requirements
- Commercial service launched by enum.at (Dec. 2004)

Austrian ENUM Platform

ÖFEG

- The Austrian ENUM **TRIAL** Platform has fulfilled its task:
  - It demonstrated the feasibility of ENUM (proof of concept)
  - had its lessons learnt
  - solved the open issues (e.g. validation, numbers to use) (more or less ;-)
  - considered ENUM ready for production
- Created together with the Austrian National Regulatory Authority (NRA) - RTR a legal framework for ENUM
- The **Austrian ENUM Platform** will continue to consult the RTR regarding ENUM issues

Lessons learnt in the ENUM Trials

ÖFEG

- Basic issues solved
  - ENUM technology works,
  - ENUM policy and administration: most problems solved,
  - but there was a shift in focus for the business models.
- The original business model of ENUM for residential subscribers with opt-in for existing numbers has problems:
  - it's a second line service,
  - privacy problems with multiple services (e-mail spam)
  - Validation and re-validation problem, ...
- but the major problem is: How to overcome Metcalfe's Law?
  - *The usefulness, or utility, of a network equals the square of the number of users*
- so new approaches are needed.

New approaches to ENUM

- New approaches for IP Communications with ENUM:
  - ENUM for IP-based private networks ("PBX“ and “IP-Centrex”) with direct-dial-in (DDI)
  - ENUM-driven number ranges for IP Communications for nomadic users (teleworkers and road-warriors, using laptops, PDAs, WiSIP phones and dual-mode devices)
  - mobile numbers with validation via the SIM-Card
  - residential users using terminal adapters with FXO ports

- Note well: IP Communications is not IP Telephony
  - it is IP based services
  - ONE of these services is VoIP - and others like:
    - Directory, Mobility,
    - Instant Messaging, Presence, Video, Chat, SMS, and, and, ...
  - will become more and more important

Numbering Resources for ENUM

ÖFEG

- Geografic numbers
- Numbers for private networks („05“)
- Mobile numbers („06“)
- National portable numbers („0720“)
- Numbers for convergent services („0780“)
- Freephone numbers („0800“)

- Not available:
  - Numbers for value added services(„0900“ etc.), 0810, 0804, 0820,
  - „Service numbers“ (133, 118xxx, 1503, etc.)

ENUM-driven Number Range

- Format: +43 780 abcdef (ghi)
- the registration of the ENUM domain IS the number assignment
- a cancellation of the ENUM domain will relinquish the number
- easy, cheap, one-step process
- decoupling of number range allocation and gateway operator
- any gateway may route the whole number range, just needs to be able to query ENUM
- any gateway may route similar number ranges (e.g. +87810, +42360, +260510, ...)
- these gateways are called generic gateways (GG)

Identification and Validation

ÖFEG

- Identification of E.164 number assignees within the ENUM system
  - depending on identification required for E.164 number
- (Re-)Validation: (re-)checks the right to use the E.164 number
  - this does not necessarily require identification within ENUM
- Validation methods are therefore dependent on the number range used:
  - ENUM-driven numbers (+43780)
    - only identification may be required (pre-paid?), validation is implicit
  - Mobile numbers (opt-in)
    - validation via SIM-Card (e.g. SMS)
  - numbers directly assigned to end-user (e.g. private networks) (opt-in)
    - validation via assignment document
  - geographic numbers (opt-in)
    - validation via credentials under investigation
- If Registrar=TSP: Identification and Validation internal matter

Primary Goals of ENUM

ÖFEG

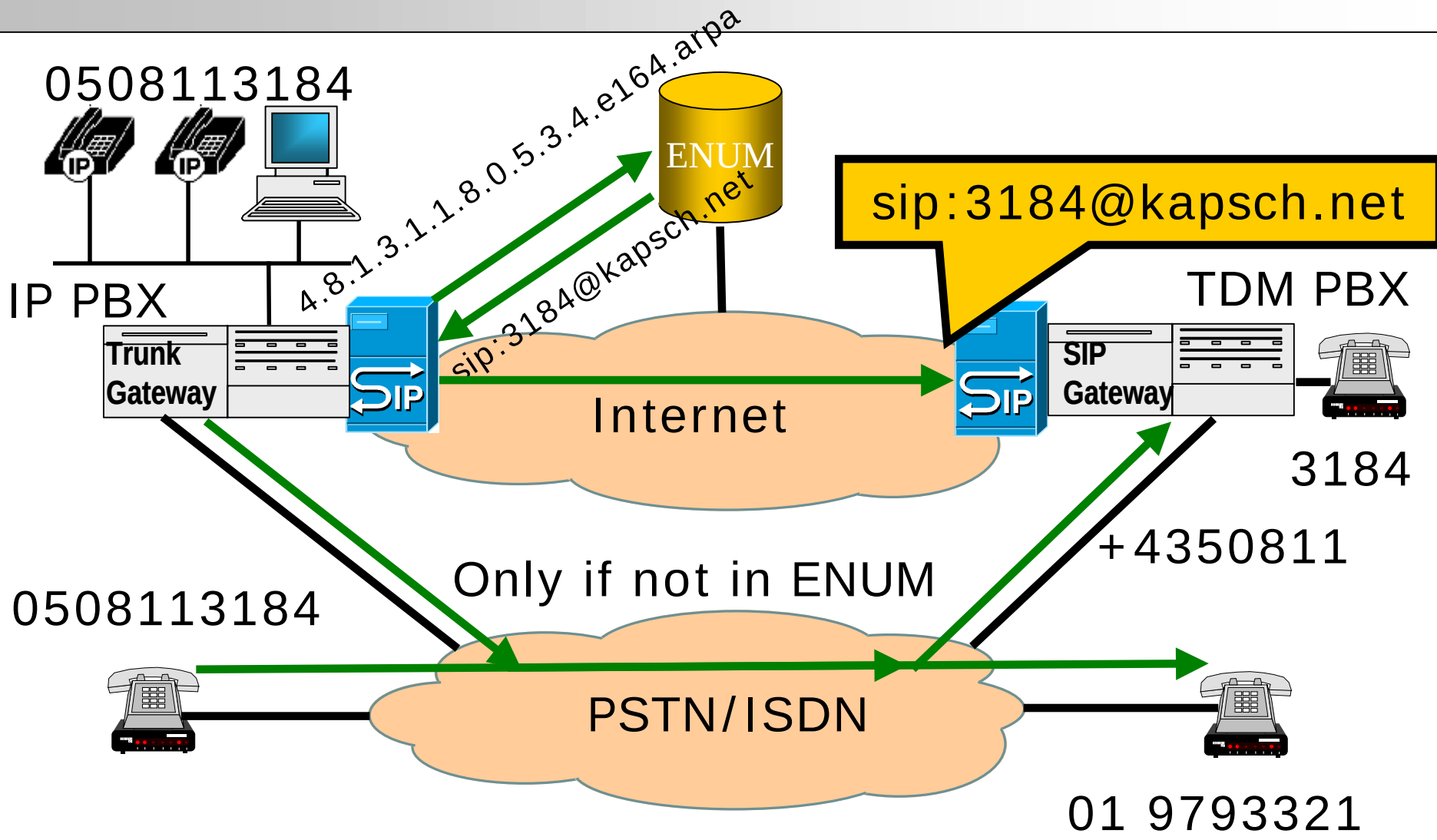
- Primary goals of ENUM:
  - Goal 1: Never touch the PSTN, if you can avoid it
  - Goal 2: If you cannot avoid it:
    - a. early exit from the PSTN or
    - b. late entry to the PSTN
  - Goal 3: enable IP Communications (SMS, MMS, Presence, IM, Video, ...)

- Some examples:
- Corporate Users (Never touch the PSTN)
  - Linking IP PBX together globally
- Generic gateways (early exit from and late entry to the PSTN)
  - for all ENUM-only routed numbers and others
- Mobile numbers for easy testing

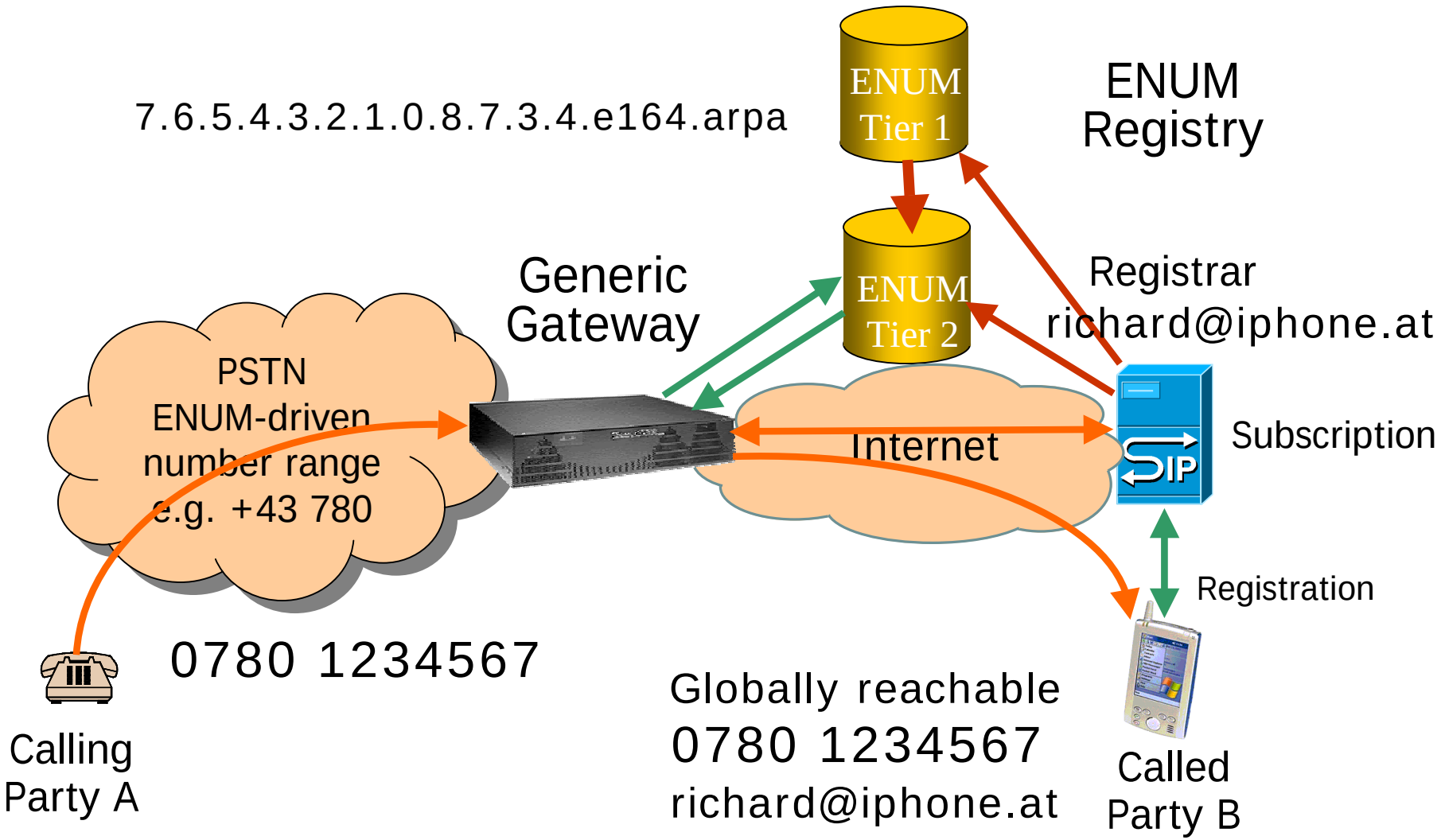
The Business Cases

- For companies and call centers (0800)
  - the company PBX can be reached from PSTN and from Internet
  - calls to other ENUM-enabled numbers are routed via VoIP and the Internet
  - improved functionality (IM, Video, Conferencing, presence, ...)
  - better quality for native VoIP calls
- For residential users with +43 780 numbers
  - same as above
  - reachable via any broadband connection globally
- Possible also for residential local and mobile numbers

One example: ENUM for companies



Example: +43780 and the Generic Gateway



Wanna give ENUM a try?

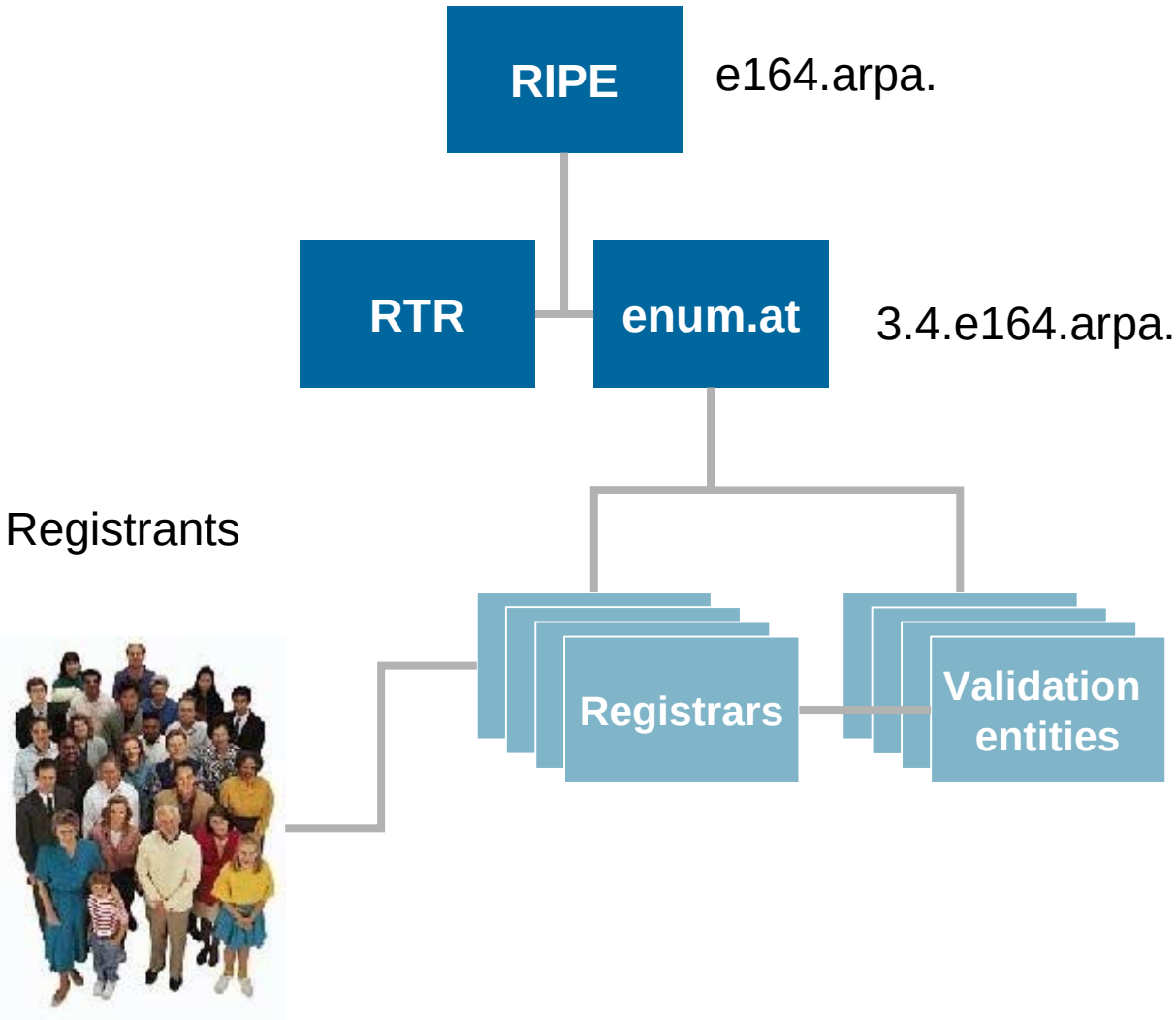
ÖFEG

- First: get yourself a VoIP account and a SIP URI
  - (e.g. from fwd.pulver.com, iptel.org, sipgate.at, ...)
  - see references at www.my-enum.at
- Send a SMS from any Austrian mobile phone with text ENUM to **0900 401011** (2€), confirm with JA
- You get back a SMS containing Userid and PW
- Your mobile number is now validated and registered in ENUM (for 2 month)
- Login at www.my-enum.at
- Enter the sip URI for your mobile number
- Done

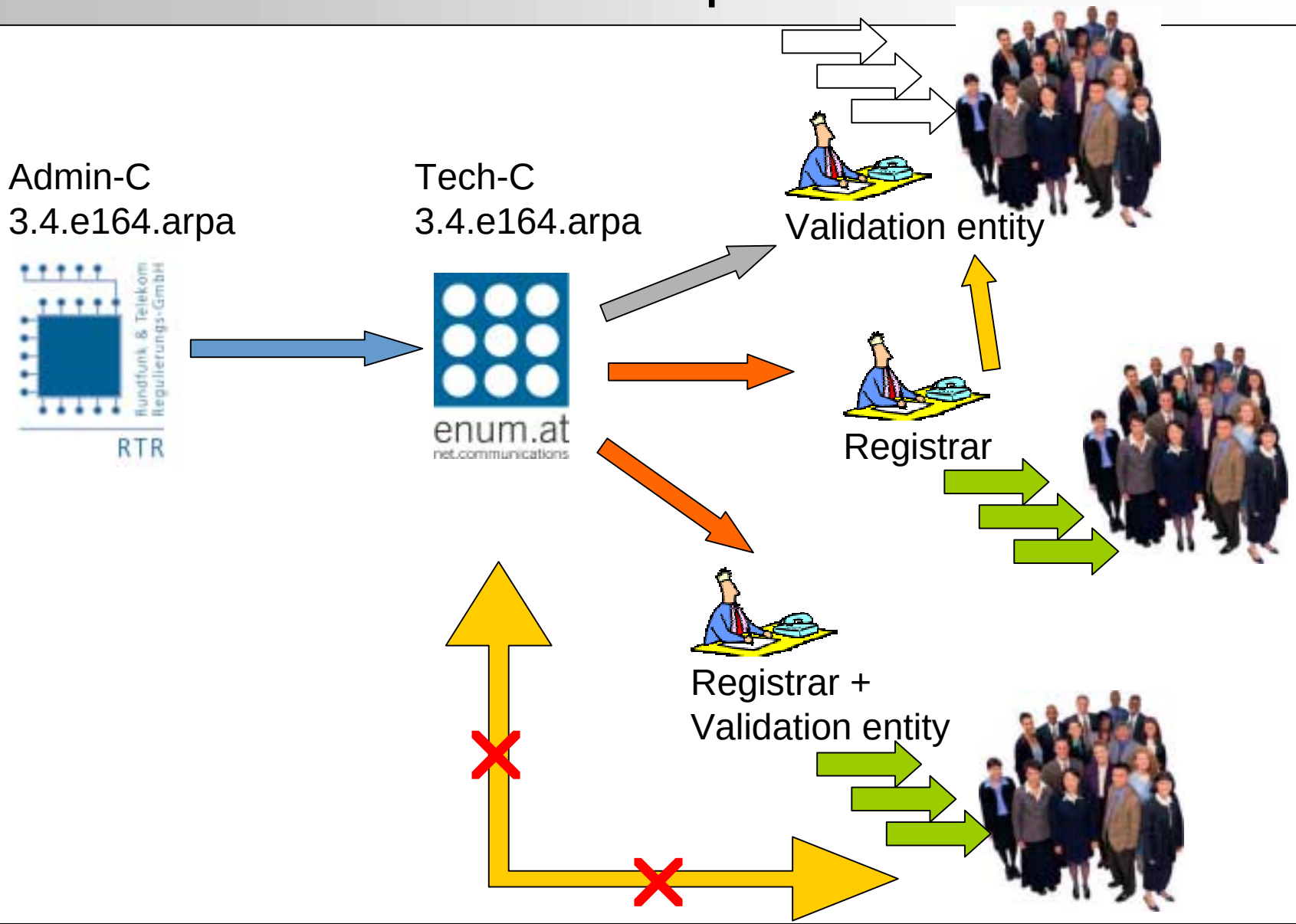
enum.at

- enum.at DienstleistungsGmbH for convergent communication services is a 100%-subsidary of the Internet Foundation Austria (IPA).
- IPA is also the owner of nic.at, the Austrian ccTLD.
- The core business of enum.at is the operation of Tier 1 ENUM-Registry Services for 3.4.e164.arpa
- For the provision of these services enum.at is using the experience and resources of nic.at

ENUM Architecture



Contractual Relationships



Current Status

- five Registrars und Validation entities
  - 3 in operation
  - 2 in set-up and test
  - More to come, but need some month to get into gears
- not many delegations yet (~200), since required products not yet available or not available for production
- but reachability should be measured in reachable subscribers and not in delegations:

  one delegation:
  - > 3.100 subscribers at University of Vienna
  - > 1.900 extensions at Kapsch

Austrian National Activities 2005

ÖFEG

- Planned:
  - Make numbers in ENUM SMS- and MMS-enabled
  - Provide trusted identification on SIP for CLI (emergency service)
  - Provide certificates for E.164 numbers
    - to be used in signaling and validation
  - Usage of SIM-Cards and IMSI for mobile and nomadic IP Communications (OnePhone)
  - Provide location information and emergency service routing proxies

Lessons Learned during Production

ÖFEG

- The ENUM technology is simple
- Organizational and legal issues are – as usual - much more complex
- Validation issues often pop-up often not until the time of the specific definitions of the general conditions for production
- Processes must be designed to work also with reluctant or non-co-operating market participants (this problem does not stand out so much during the trial)

Lessons Learned during Production

- Product development does not really happen during the trial phase
- A production environment with defined general conditions is essential for the development of a market
- Smaller providers and new market entrants are more flexible
- Key factors for success are **open** VoIP services → but these emerge only by customer demand
- **You cannot sell ENUM to the End-user, the End-user just does not understand it, you have to sell it in a package**

Summary

- ENUM is available now
- It works - technically and administrative
- It is based on the reliable, scalable, globally available DNS infrastructure
- It is simple to use (just dial a phone number as usual)
- Enables all additional features provided on the Internet
  - lower cost, more functionality, better quality
- without loosing the connectivity with the PSTN and the familiar phone numbers

Contact (not Content) is King

Douglas Rushkoff

Thank you

Richard Stastny

ÖFEG

+43 664 420 4100

richard.stastny@oefeg.at