



ENUM – background

Andrew Bartosiewicz

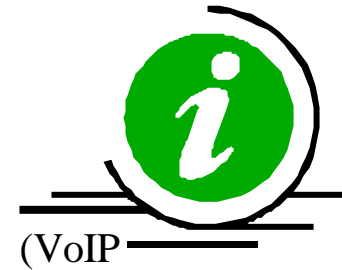
andrzejb@nask.pl

Agenda

- Glossary
- Main players
- How to get ENUM delegation?
- ENUM delegations
- Technical background
- ENUM domain - example
- Solutions for End Users
- Number portability
- EPP versus ENUM

Basic glossary...

- URI - Uniform Resource Identifier
- NPDB - Number Portability Database
- RFC - Request for Comments
- PSTN - Public Switched Telephone Network
- VoIP - Voice Over IP
- SIP Session Initiation Protocol (VoIP signalling protocol)



...basic glossary

- ITU-T International Telecommunications Union
- ITU-TS ITU-Telecommunication Sector
- TSB -Telecommunications Standardization Bureau
- IAB - Internet Architecture Board
- IETF - Internet Engineering Task Force
- ETSI European Technical Standards Institut





Main players

• **ITU – International Telecommunication Union**

- RIPE NCC – Réseaux IP Européens
- IETF - Internet Engineering Task Force
- ETSI - European Telecommunications Standards Institute

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ITU – RIPE relationships



INTERNATIONAL TELECOMMUNICATION UNION

*Telecommunication
Standardization Bureau*

20 May 2002

Ref: COM 2-586/RH
Contact: Richard Hill
Tel: +41 22 730 5887
Fax: +41 22 730 5853

Mr Axel Pawlik
Managing Director
RIPE NCC
Geneva

1. RIPE NCC commits to honour objections and approvals submitted by TSB. That is, ENUM delegations will not be implemented if there is an objection by TSB, and any approvals granted by TSB can be revoked at any time.

Source: ITU.

Fragment of the letter

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Useful mailing lists



- **enum@ietf.org**

www1.ietf.org/mailman/listinfo/enum

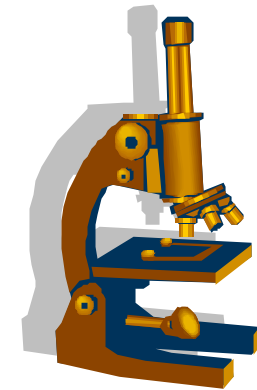
- **enum-trials@ripe.net**

www.ripe.net/mailman/listinfo/enum-trials (thanks to Carsten Schiefner)

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ENUM administration



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ENUM administration



<http://www.itu.int/ITU-T/inr/enum/procedures.html>

3.2 National Position Known

- If the conditions of 3.1 are met, and **if the concerned Member State has notified the TSB of its position regarding delegation for ENUM of its CC**, then the TSB will immediately make that position known to RIPE NCC.
- That is, TSB will inform RIPE NCC that the concerned Member State either approves or objects to the delegation. **If the Administration objects, the delegation will not take place.**
- Since the request from RIPE NCC will designate a specific ENUM Tier 1 Registry, the TSB will only be able to approve the request if the Member State has notified the TSB that it approves that particular Tier 1 entity.

Source: ITU.

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ENUM administration



<http://www.itu.int/ITU-T/inr/enum/procedures.html>

3.4 Change in National Position

If a Member State notifies the TSB of a change in its position, the TSB will communicate that change to RIPE NCC, who will implement the change. The changes can be:

- A previously granted approval becomes an objection. In this case, the delegation will be removed and ENUM will no longer be available for the concerned CC.
- A previously stated opposition, or lack of approval, becomes an approval. In this case, the delegation will be granted and ENUM will be available for the concerned CC.
- There is a change in the party to which the CC is delegated, that is, a change in the ENUM Tier 1 Registry.

That is, a Member State may at any time stop, enable, or change ENUM delegations.

Source: ITU.

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How to get ENUM delegation?



- Configure your servers
- Send the request to RIPE NCC
- Send the letter of support from your State Member (check the ITU web site) to ITU-T

A screenshot of the ITU (International Telecommunication Union) website. The page title is "International Telecommunication Union" with a navigation menu including "Our Sites", "News", "Events", "Publications", and "Site M". The breadcrumb trail shows "Home : Overview : Member States". The main heading is "ITU Member States". Below this, a search result summary states "Result of your search: [ITU Member States] 189 membre(s) - member". A table with two columns, "Dénomination en français" and "Designation in English", lists several member states. The table is partially visible, showing entries for Afghanistan, Albania, Algeria, and Germany.

Dénomination en français	Designation in English
Afghanistan	Afghanistan
Albanie (République d')	Albania (Repub
Algérie (République algérienne démocratique et populaire)	Algeria (People
Allemagne (République fédérale d')	Germany (Fede

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Who have already the ENUM delegation in Europe?

31	Netherlands	Ministry	23/05/02
36	Hungary	CHIP/ISzT	15/07/02
43	Austria	Regulator	11/06/02
44	UK	DTI/Nominum	16/05/02
48	Poland	NASK	18/07/02
49	Germany	DENIC	16/05/02

Source: ITU.

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ENUM delegations

Total countries: 11

ccTLD: 5

Regulator/ Government: 6

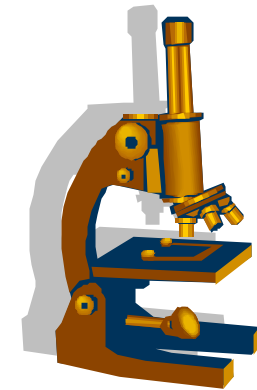
2 trial delegations (VISIONng, NeuStar)

Source: ITU.

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Technical side

ENUM is really simply solution!



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RFC 2916

Author: P. Faltstrom.

Status: PROPOSED STANDARD; September 2000

**This document discusses the use of the
Domain Name System (DNS) for storage
of E.164 numbers**

- Defines how the telephone number has to be entered into DNS as domain name
- When the ENUM domain exists in the DNS we may configure the data set associated with the domain – NAPTR records

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RFC 2915

Author: M. Mealling, R. Daniel

Status: PROPOSED STANDARD; September 2000

The Naming Authority Pointer (NAPTR) DNS Resource Record

This document describes a Domain Name System (DNS) resource record which specifies a regular expression based rewrite rule that, when applied to an existing string, will produce a new domain label or Uniform Resource Identifier (URI).

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RFC 2396

Author: T. Berners-Lee

**Uniform Resource Identifiers (URI)
provide a simple and extensible means
for identifying a resource.**

- FTP
 - H323
 - HTTP
 - MAILTO
 - NEWS
 - TELNET
 - SIP
- Examples:
- `ftp://ftp.is.co.za/rfc/rfc1808.txt`
 - `gopher://spinaltap.micro.umn.edu/00`
 - `http://www.nask.pl`
 - `mailto: tomekz@nask.pl`
 - `news:comp.infosystems.www.servers.unix`
 - `telnet://melvyl.ucop.edu/`

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RFC 2543

*Author: M. Handley, H. Schulzrinne,
Columbia U, E. Schooler, J. Rosenberg*

SIP: Session Initiation Protocol

The Session Initiation Protocol (SIP) is an application-layer control (signaling) protocol for creating, modifying and terminating sessions with one or more participants. These sessions include Internet multimedia conferences, Internet telephone calls and multimedia distribution. Members in a session can communicate via multicast or via a mesh of unicast relations, or a combination of these.

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How to create the ENUM domain?

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ENUM Example



How to translate the telephone (i.e. 0 606 24-15-70 from Poland) number into ENUM domain:

- Add to the telephone number the country code number. In our case it is „+48”. The number looks like: +48 606 24-15-70.
- Remove all characters except digits. The number looks like: 48606241570.
- Add dots between digits: 4.8.6.0.6.2.4.1.5.7.0
- Reverse the order: 0.7.5.1.4.2.6.0.6.8.4
- Add Tier-0 zone - e164.arpa (it may be changed in the future).
- And finally our ENUM domain:
0.7.5.1.4.2.6.0.6.8.4.e164.arpa

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ENUM Example



Using an example, domain name
"0.7.5.1.4.2.6.0.6.8.4.e164.arpa" is
segmented into zones as follow:

- E164.arpa - **domain zone**
- 8.4. - **country code zone** (1, 2, or 3 digits dependent on CC)
- 0.7.5.1.4.2.6.0.6. - **national zone**

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NAPTR example

```
$ORIGIN 0.7.5.1.4.2.6.0.6.8.4.e164.arpa.
```

```
IN NAPTR 100 10 "u" "sip+E2U"  
"!^.*$!sip:andrzejb@nask.pl!" .
```

```
IN NAPTR 102 10 "u" "mailto+E2U"  
"!^.*$!mailto:andrzejb@nask.pl!" .
```

```
IN NAPTR 102 10 "u" "tel+E2U"  
"!^.*$!tel:+48225231395!" .
```

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Practical use

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Potential

Currently in Poland:

- 160 000 „traditional” domains
- 27 000 000 telephone numbers

??? ENUM = DNS x 100 ???

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Solutions for end users

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Solution for end users



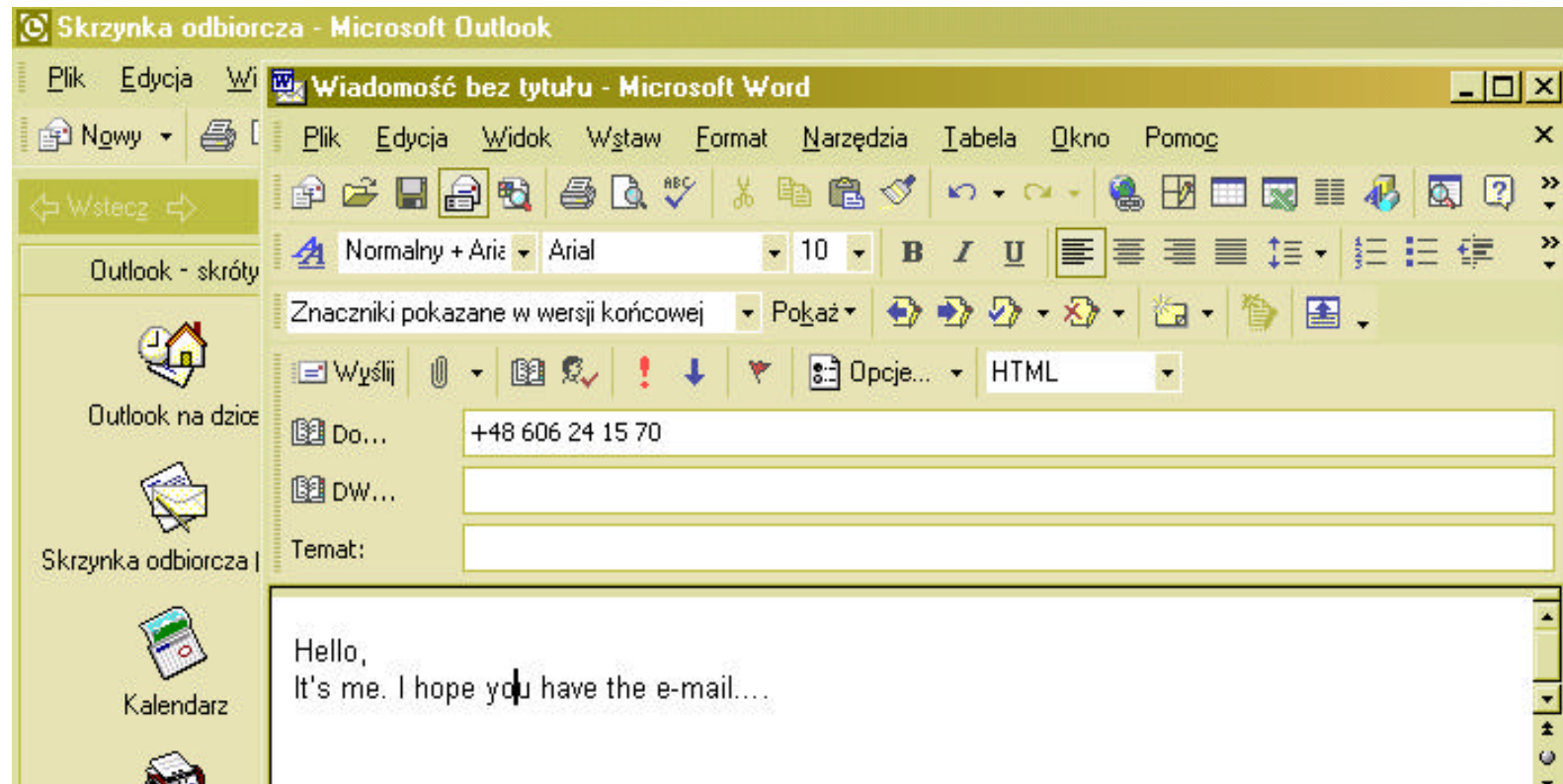
- Service provider/telecom operator adds new services and bind these services with telephone number (new URI in NAPTR records). URIs identify the ways of contacting the holder of a telephone number:
 - phone, mobile phone, fax,
 - SIP, H323
 - voicemail,
 - email address,
 - #ICQ, #Yahoo
 - web home page,
 - PGP keys for secure email,
- User enters the telephone number (using i.e. PDA) and software automatically asks DNS for all the possible ways of contact with call recipient (i.e. described above)
- User choose the best (i.e. cheapest) solution.

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Sending e-mails



Sending e-mail without knowing the e-mail address:

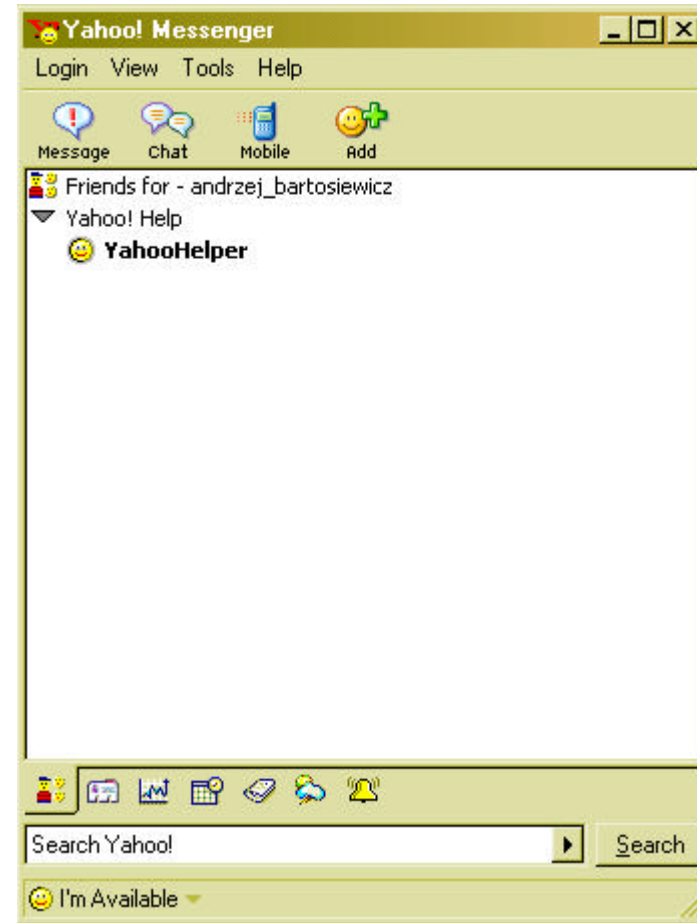


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End user's side services



Recipient's identification by tel. number instead of #ICQ or #Yahoo



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End user's side services



Other services:

- Call forwarding on a global basis
- Advanced phone book with all the information up-to-date.

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Number portability

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Number portability



Number Portability allows the telephone user to keep his old telephone number when he changes:

- location
- service provider
- services (change/add/delete)

ENUM provides a globally reachable (centralized) database storing:

- rn - routing number
- cic- carrier identification code

RN and CIC information are necessary to route calls directly to the destination network hosting this E.164 number

General information are in
<draft-ietf-enum-e164-gstn-np-05.txt>

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Number portability in SIP



Extensions (like "rn") to the "tel" URL (registered in NAPTR record) allow the SIP protocol to carry the Number Portability information in the "tel" URL.

Example: tel:+1-202-533-1234;rn=+1-202-544-0000;

Internet Draft
Document: <draft-yu-tel-url-06.txt>
Category: Standards Track

James Yu
NeuStar, Inc.
August 27, 2002

Extensions to the "tel" URL to Support
Number Portability and Freephone Service

<draft-yu-tel-url-06.txt>

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Number translation database for operators



Problems with “**user-ENUM**”:

- Data privacy
- Opt-in
- Necessary information like identity of operator serving the E.164 number or destination address

Solution - “**Infrastructure-ENUM**” (also based on RFC2916&2915):

- Created by network operator
- The only task is to serve the information of number translation
- Only available to network operator/ISP who creates the database

On base of : ETSI /DTS/SPAN-110107

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ENUM and EPP (Extensible Provisioning Protocol)

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ENUM and EPP



To register ENUM domains REGISTRY may use the EPP-based software (using the XML and XML Schema notation):

Internet Engineering Task Force
Internet-Draft
August 22, 2002

S. Hollenbeck
VeriSign, Inc.
Expires: February 22, 2003

Extensible Provisioning Protocol E.164 Number Mapping
<draft-ietf-enum-epp-e164-01.txt>

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