

*enum*

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Short introduction:  
How to create the ENUM domain?

# ENUM Example



How to translate the telephone (i.e. 0 606 24-15-70) 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**

# 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**



# 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!" .
```



administrative side

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# basic glossary -organisations

- ITU 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


ICANN is not involved at all in the  
ENUM project.

There is no indications that ICANN may be  
involved in the ENUM in the future.



## Main players

- **ITU – International Telecommunication Union** *itu.int*
- **RIPE NCC – Réseaux IP Européens** *ripe.org*
- **IETF - Internet Engineering Task Force** *ietf.org*
- **ETSI - European Telecommunications Standards Institute** *etsi.org*



## International Telecommunication Union

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### Welcome to ITU-T

The **ITU Telecommunication Standardization Sector (ITU-T)** is one of the three Sectors of the International Telecommunication Union (ITU).

ITU-T's mission is to ensure an efficient and on-time production of high quality standards (Recommendations) covering all fields of telecommunications.

**Join ITU-T** and participate in shaping the future of global telecommunications.



**Mr. Houlin Zhao**  
Director of TSB

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- Membership Information and Services

„The ITU, headquartered in Geneva, Switzerland is an international organization within the United Nations System where **governments and the private sector coordinate global telecom networks and services.**”

„ITU-T was created on 1 March 1993, replacing the former International Telegraph and Telephone Consultative Committee (CCITT) whose origins go back to 1865. The **public and the private sectors cooperate within ITU-T for the development of standards** that benefit telecommunication users”

„The TSB provides **secretarial support for the work of the ITU-T Sector and services for the participants** in ITU-T work, **diffuses information** on international telecommunications worldwide and establishes agreements with many international Standards Development Organizations.”

# ITU-T

ITU-T TSB evaluates delegation requests.

# ITU-T procedures



<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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# ITU-T procedures



<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.

# Member States in ITU

- Member States are responsible for final decisions concerning their ENUM's national zones



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**ITU Member States**

Result of your search: [ITU Member States] 189 membre(s) - member

Dénomination en français	Designation in English
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<a href="#">Albanie (République d')</a>	<a href="#">Albania (Repub</a>
<a href="#">Algérie (République algérienne démocratique et populaire)</a>	<a href="#">Algeria (People</a>
<a href="#">Allemagne (République fédérale d')</a>	<a href="#">Germany (Fede</a>

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## RIPE Network Coordination Centre



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## RIPE (Réseaux IP Européens)

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# RIPE



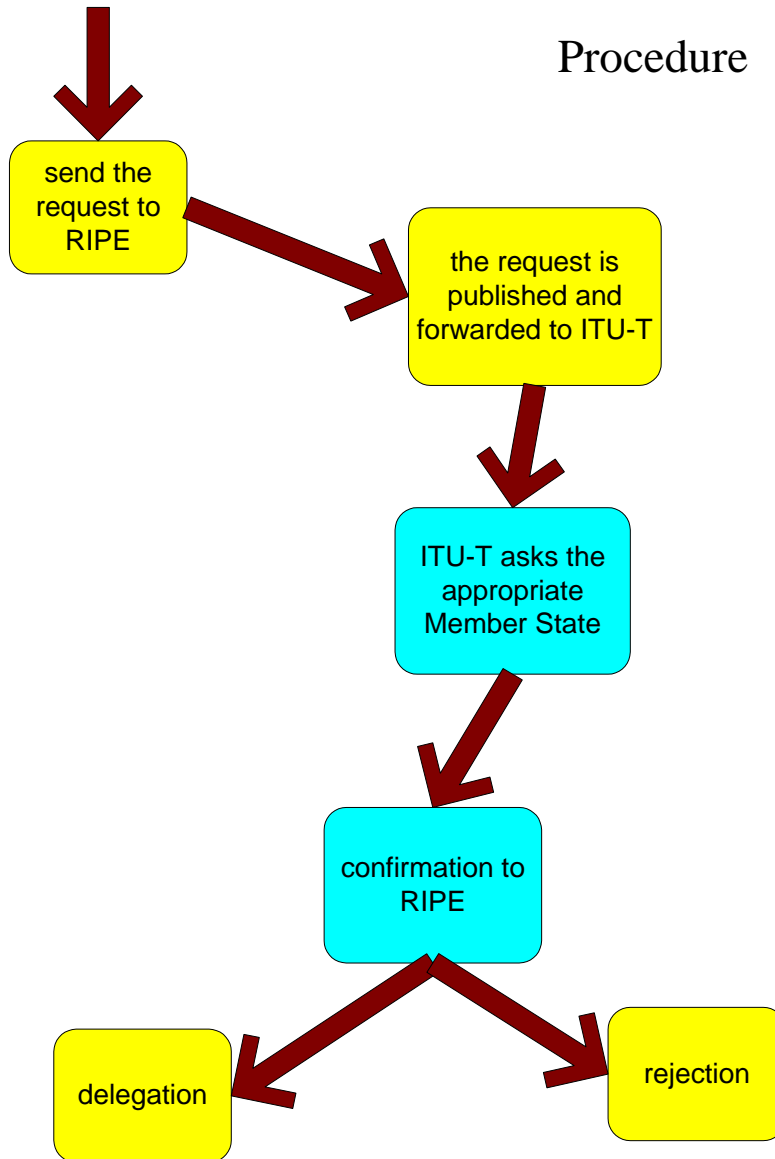
RIPE (Réseaux IP Européens) is a collaborative forum open to all parties interested in wide area IP networks. The objective of RIPE is to ensure the administrative and technical coordination necessary to enable the operation of the Internet within the RIPE region.

# RIPE

## **The RIPE NCC:**

- **Takes care of administrative side of enum domains registrations**
- **Collects and publish all requests, documents etc.**
- **Checks the correctness of the technical information submitted in the request**
- **Manages the e164.arpa zone**

## Procedure



# Procedure



- (1.1) A request for a delegation is to be sent to the RIPE NCC, to an email address that the RIPE NCC will define
- (1.2) The RIPE NCC will then acknowledge the request to the sender.
- (1.3) The RIPE NCC will then announce the existence of the application in all of the following three ways:
  - (1.3.1) On a public Mailing List that the RIPE NCC will define.
  - (1.3.2) On a Webpage that the RIPE NCC will define.
  - (1.3.3) Via electronic mail to ITU-T TSB
- (1.4) The RIPE NCC will then track any comments about the request during a waiting period. This waiting period is sixty (60) days.
  - (1.4.1) If ITU-T TSB explicitly authenticates a request during the waiting period, the domain is delegated even though the 60 day period has not ended.
  - (1.4.2) If ITU-T TSB does not object, and does not inform the RIPE NCC of the objection during the waiting period, the domain is delegated according to the request.
  - (1.4.3) No delegation will be performed if ITU-T TSB objects within the sixty (60) day waiting period.
- (1.5) Anyone who has concerns about the delegation should contact the RIPE NCC or ITU-T TSB. If comments come to the RIPE NCC on the proposed delegation, the RIPE NCC will forward the comments to ITU-T TSB. The comments, the dates they are received by the RIPE NCC, as well as the forwarding of the comments by the RIPE NCC to ITU-T TSB are all made public.
- (1.6) All communication regarding the application for a specific delegation is to be publicly archived.

Source: RIPE.



Source:<http://www.ripe.int/ripenncc/pub-services/enum/>

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- [ENUM Home](#)

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- [ENUM Draft Request Form](#)

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- [ENUM Draft Request Form Example](#)

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- [ENUM Mailing Lists](#)

[enum-announce](#)  
[enum-request](#)  
[enum-trials](#)

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- [ENUM Request Archives](#)

## ENUM Draft Request Form and Instructions

The instructions regarding operations of the domain e164.arpn that can be found at the URL: <http://www.ripe.net/enum/instructions.html> are instructions from the IAB to the RIPE NCC. They do not implicitly give the ability for anyone to receive a domain delegation for an E.164 CC by contacting the RIPE NCC.

The RIPE NCC will not evaluate any requests for delegation that it happens to receive apart from the correctness of the technical information submitted in the request. (Please see specifications listed at: <http://www.ripe.net/enum/request.html>).

It is ITU-T TSB that evaluates delegation requests and questions. We urge anyone interested in discussing E.164 matters which are not DNS related to contact ITU-T TSB.

Information on how TSB will handle ENUM requests can be found under the bullet "Interim Procedures" at the ITU-T Web site at: <http://www.itu.int/ITU-T/inr/enum/>.



# RIPE: ENUM request

ENUM Request form is available on RIPE web page:

<http://www.ripe.int/enum/request.html>



[homepage](#) | [what's new](#) | [whois db](#) | [search](#) | [site map](#) | [f.a.q.](#)

## ENUM Draft Request Form Template

Draft Request form for delegation of a zone under  
e164.arpa

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# mailing lists

[enum-announce@ripe.net](mailto:enum-announce@ripe.net)

<http://www.ripe.net/mailman/listinfo/enum-announce>

The enum-announce list is used for general announcements about ENUM delegations. The list is closed for postings, subscription is open to all.

[enum-request@ripe.net](mailto:enum-request@ripe.net)

<http://www.ripe.net/mailman/listinfo/enum-request>

The enum-request list is used for requests by organisations that apply for an ENUM delegation. Subscribing is not possible, postings are moderated

[enum-trials@ripe.net](mailto:enum-trials@ripe.net)

[www.ripe.net/mailman/listinfo/enum-trials](http://www.ripe.net/mailman/listinfo/enum-trials)

The enum-trials list is meant to be a forum to discuss issues of the various ENUM trials, mainly in the RIPE NCC service region. It's a public list, with closed and moderated access.

# ITU – RIPE relationship



## 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

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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# ETSI

*ETSI (the European Telecommunications Standards Institute) is a not for profit organization whose mission is to produce the telecommunications standards that will be used for decades to come throughout Europe and beyond.*

*ETSI unites 768 members from 55 countries inside and outside Europe, and represents administrations, network operators, manufacturers, service providers, research bodies and users. The Institute's work programme is determined by its members, who are also responsible for approving its deliverables. As a result, ETSI's activities are maintained in close alignment with the market needs expressed by its members.*

# ETSI

*ETSI plays a major role in developing a wide range of standards and other technical documentation as Europe's contribution to world-wide standardization in telecommunications, broadcasting and information technology. ETSI's prime objective is to support global harmonization by providing a forum in which all the key players can contribute actively. ETSI is officially recognized by the European Commission and the EFTA secretariat.*

# ETSI

ETSI TS 102 051 V1.1.1 (2002-07):  
*ENUM Administration in Europe*

## Scope:

- Background of ENUM
- Opportunities from ENUM
- Risks from ENUM
- General administrative and operating assumptions and requirements
- Administrative process



# ETSI working groups

SPAN: Services and Protocols for Advanced Networks:

ETSI TS 102 172 V1.1.2 (2003-02):

## *Minimum requirements for interoperability of European ENUM trials*

Scope: „...general guidance on European ENUM trials and the specification for:

*The format, contents and meaning of the information in the NAPTR records that are held by the ENUM Tier 2 Nameserver providers and accessible by DNS.*

*The ways in which ENUM client software should interpret and act upon information obtained from NAPTR records...”*



Who have already the ENUM  
delegation?

# ENUM requests



Zone	Administrative contact
"008"	
1	
30	
31	Holland; Ministerie van Verkeer en Waterstaat
33	
36	Hungary; Council of Hungarian Internet Providers (CHIP)
40	Romania; ROENUM Registry
43	Austria; The Austrian Regulatory Authority for Telecommunications and Broadcasting
44	UK; DTI
46	Sweden; National Post and Telecom Agency
47	
48	Poland; NASK
49	Germany; DENIC eG
55	Brasil; Brazilina Internet Steering Committee -Comite Gestor da Internet no Brasil

Data source: RIPE  
March 20<sup>th</sup>, 2003

# ENUM requests



Zone	Administrative contact
61	
86	China; China Internet Network Information Center
246	Diego Garcia; Government of British Indian Ocean Territory
247	Ascension Island; Government of St. Helena and Ascension Island
262	
290	St. Helena; Government of St. Helena and Ascension Island
358	Finland; Finnish Communications Regulatory Authority
508	
590	
594	
596	
681	
687	
689	
886	
971	Emirates; Emirates Telecommunications Corporation
878 10	VISIONg
991 001	NeuStar

Data source: RIPE  
March 20<sup>th</sup>, 2003



# ENUM requests

## national zones

approved & delegated	15
objected	14
total requests	29

## others

approved & delegated	2
objected	1
total requests	3



administrative contact	
governmental	8
non governmental	7



# Administration inside national zone

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# Inside national zone



- **Tier 1 Registry:**

- responsible for maintaining the authoritative zone file for national ENUM domain

- **Registrars:**

- register ENUM domains in Tier 1 registry database
- Provides services (but not obligatory)

- **DNS Providers:**

- updates NAPTR records
- provides DNS name server services

Very good reference document prepared by UKEG: „PRELIMINARY REPORT ON THE IMPLEMENTATION OF ENUM IN THE UK”

Update available also as GA2002/16-12

# Technical side



ENUM is really simply solution!



# RFC 2916

*Author: P. Faltstrom.  
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



# RFC2916bis-04

*Authors: Michael Mealling, Patrik Faltstrom*

*March 2003*

## **The E.164 to URI DDDS Application (ENUM)**

*This document discusses the use of the Domain Name System (DNS) for storage of E.164 numbers. More specifically, how DNS can be used for identifying available services connected to one E.164 number.*

draft-ietf-enum-rfc2916bis-04.txt

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# RFC 2915

*Author: M. Mealling, R. Daniel*

*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).*



# RFC 2396

*Author: T. Berners-Lee*

*August 1998*

## **Uniform Resource Identifiers (URI): Generic Syntax**

*A Uniform Resource Identifier (URI) is a compact string of characters for identifying an abstract or physical resource. This document defines the generic syntax of URI, including both absolute and relative forms, and guidelines for their use*

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# URI-examples

Hypertext Transfer Protocol	http	<b>RFC 2616</b>
Hypertext Transfer Protocol Secure	https	<b>RFC 2818</b>
File Transfer Protocol	ftp	<b>RFC 1738</b>
E-mail address	mailto	<b>RFC 2368</b>
Telephone	tel	<b>RFC 2806</b>
Session Initiation Protocol	sip	<b>RFC 3261</b>
Lightweight Directory Access Protocol	ldap	<b>RFC 2255</b>



# RFC 2543

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

*March 1999*

## **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.



# Practical use

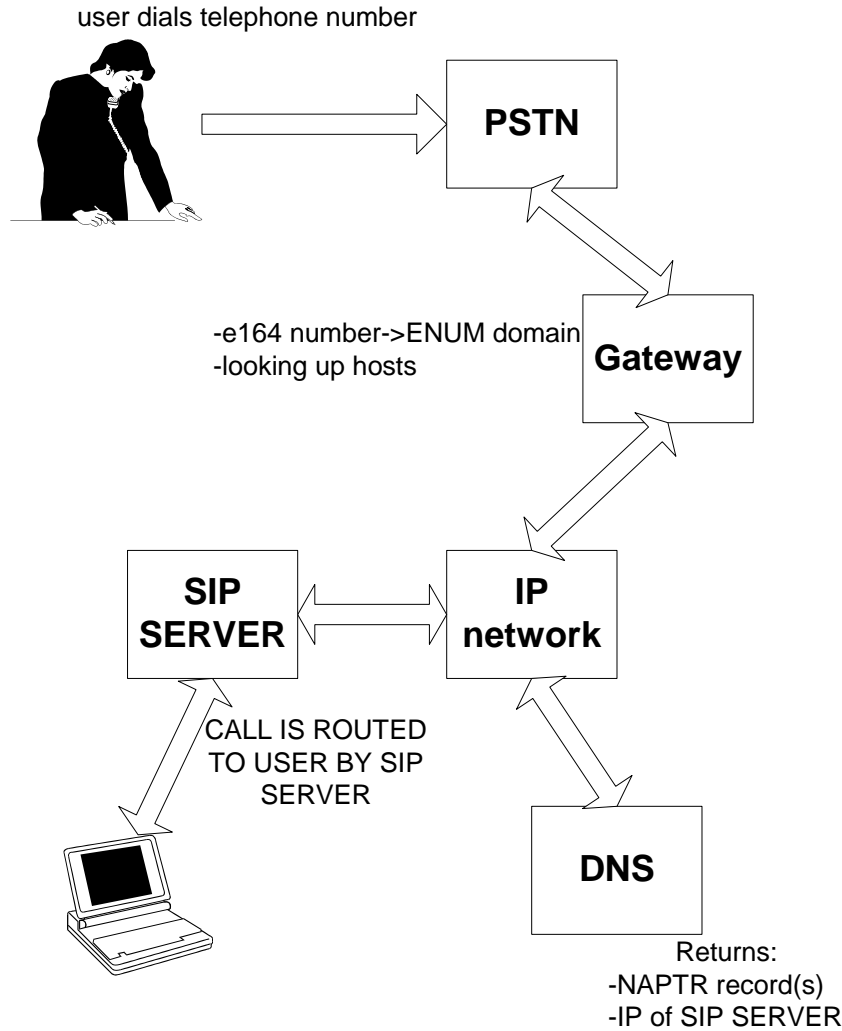
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# Test registrations under *8.4.e164.arpa*



<b>0.0.3.1.3.2.5.2.2</b>	<b>Pawel Krzesniak</b>	<a href="mailto:imo@nask.pl"><u>imo@nask.pl</u></a>
<b>0.7.5.1.4.2.6.0.6</b>	<b>Andrew Bartosiewicz</b>	<a href="mailto:andrzejb@nask.pl"><u>andrzejb@nask.pl</u></a>
<b>2.5.5.3.1.5.8.0.6</b>	<b>Pawel Krzesniak</b>	<a href="mailto:imo@nask.pl"><u>imo@nask.pl</u></a>
<b>6.7.7.6.6.4.0.0.6</b>	<b>Tomek Zygmuntowicz</b>	<a href="mailto:tomekz@nask.pl"><u>tomekz@nask.pl</u></a>
<b>7.0.1.0.5.6.6.0.6</b>	<b>Krzysztof Olesik</b>	<a href="mailto:kolesik@nask.pl"><u>kolesik@nask.pl</u></a>
<b>8.6.3.5.8.2.2.0.5</b>	<b>Rafal Galinski</b>	<a href="mailto:rafal.galinski@nask.pl"><u>rafal.galinski@nask.pl</u></a>
<b>0.7.4.0.0.3.8.0.6</b>	<b>Tomek Zygmuntowicz</b>	<a href="mailto:tomekz@nask.pl"><u>tomekz@nask.pl</u></a>
<b>8.2.5.5.5.6.6.0.6</b>	<b>Slawek Grzeszczak</b>	<a href="mailto:slawomir.grzeszczak@nask.pl"><u>slawomir.grzeszczak@nask.pl</u></a>



# PSTN -> IP

# Solution for end users

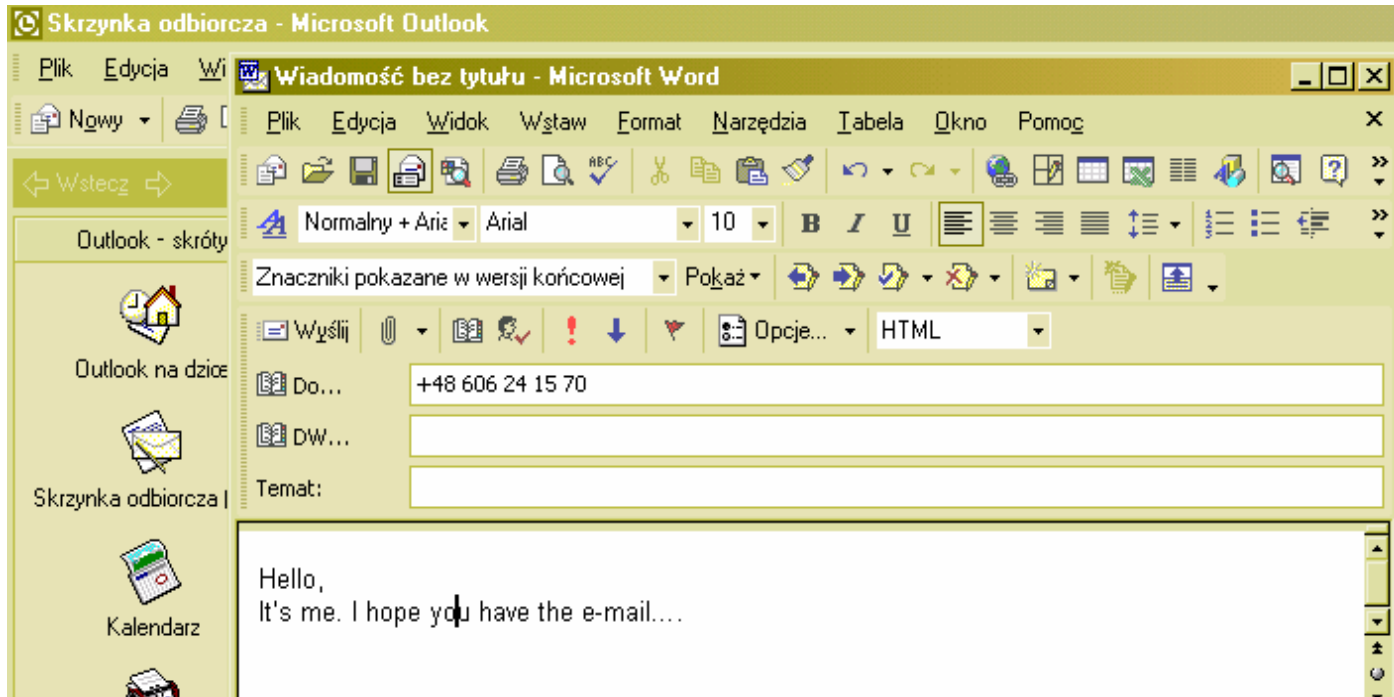


- Service provider/telecom operator adds new services and bind these services with telephone number (new URI in NAPTR records). URIs identify the ways of contacting the holder of a telephone number:
  - phone, mobile phone, fax,
  - SIP, H323
  - voicemail,
  - email address,
  - #ICQ, #Yahoo
  - web 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.

# Sending e-mails



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

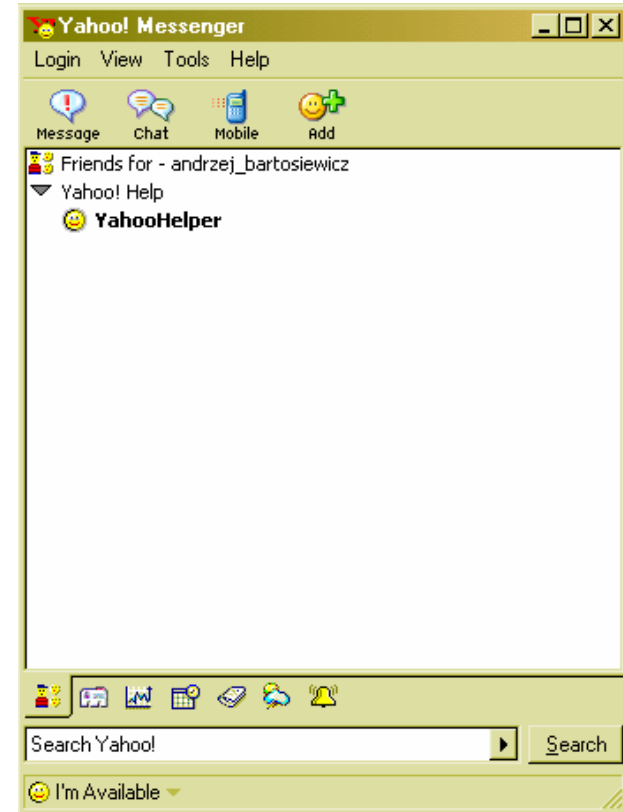


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# End user's side services



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.

# 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>

# 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



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

Internet Engineering Task Force draft written by S. Hollenbeck from VeriSign, Inc:

***Extensible Provisioning Protocol E.164 Number Mapping***

[February 20, 2003]

[www.ietf.org/internet-drafts/draft-ietf-enum-epp-e164-02.txt](http://www.ietf.org/internet-drafts/draft-ietf-enum-epp-e164-02.txt)

*This document describes an Extensible Provisioning Protocol (EPP) extension mapping for the provisioning and management of E.164 numbers representing domain names stored in a shared central repository. Specified in XML, this mapping extends the EPP domain name mapping to provide additional features required for the provisioning of E.164 numbers.*

When?

