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

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ITU-T

ITU-T TSB evaluates delegation requests.
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.

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.
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.

Source: RIPE.
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

1. Send the request to RIPE.
2. If the request is published and forwarded to ITU-T.
3. ITU-T asks the appropriate Member State.
4. Confirmation to RIPE.
5. Delegation or rejection.
A request for a delegation is to be sent to the RIPE NCC, to an email address that the RIPE NCC will define.

The RIPE NCC will then acknowledge the request to the sender.

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

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.

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.

All communication regarding the application for a specific delegation is to be publicly archived.

Source: RIPE.
ENUM Draft Request Form and Instructions

The instructions regarding operations of the domain e164.arpa 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

ENUM Draft Request Form Template

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

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
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
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.

Source: RIPE.
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.
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.

Source: ETSI.
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.

Source: ETSI.
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

Source: ETSI.
ETSISpan: 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…”

Source: ETSI.
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 20th, 2003
## ENUM requests

<table>
<thead>
<tr>
<th>Zone</th>
<th>Administrative contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>61</td>
<td></td>
</tr>
<tr>
<td>86</td>
<td>China; China Internet Network Information Center</td>
</tr>
<tr>
<td>246</td>
<td>Diego Garcia; Government of British Indian Ocean Territory</td>
</tr>
<tr>
<td>247</td>
<td>Ascension Island; Government of St. Helena and Ascension Island</td>
</tr>
<tr>
<td>262</td>
<td></td>
</tr>
<tr>
<td>290</td>
<td>St. Helena; Government of St. Helena and Ascension Island</td>
</tr>
<tr>
<td>358</td>
<td>Finnland; Finnish Communications Regulatory Authority</td>
</tr>
<tr>
<td>508</td>
<td></td>
</tr>
<tr>
<td>590</td>
<td></td>
</tr>
<tr>
<td>594</td>
<td></td>
</tr>
<tr>
<td>596</td>
<td></td>
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<td>681</td>
<td></td>
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<td>687</td>
<td></td>
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<tr>
<td>689</td>
<td></td>
</tr>
<tr>
<td>886</td>
<td></td>
</tr>
<tr>
<td>971</td>
<td>Emirates; Emirates Telecommunications Corporation</td>
</tr>
<tr>
<td>878 10</td>
<td>VISIONng</td>
</tr>
<tr>
<td>991 001</td>
<td>NeuStar</td>
</tr>
</tbody>
</table>

Data source: RIPE  
March 20th, 2003
## ENUM requests

<table>
<thead>
<tr>
<th>National Zones</th>
<th></th>
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<tbody>
<tr>
<td><strong>Approved &amp; Delegated</strong></td>
<td><strong>15</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Objected</strong></td>
<td><strong>14</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Total Requests</strong></td>
<td><strong>29</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Others</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Approved &amp; Delegated</strong></td>
<td><strong>2</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Objected</strong></td>
<td><strong>1</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Total Requests</strong></td>
<td><strong>3</strong></td>
<td></td>
</tr>
</tbody>
</table>

### Administrative Contact
- Governmental: 8
- Non Governmental: 7

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*ICANN / Rio 2003*
Administration inside national zone
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!

Icann/ Rio 2003
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
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
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).
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.
### URI-examples

<table>
<thead>
<tr>
<th>Protocol</th>
<th>Scheme</th>
<th>RFC</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertext Transfer Protocol</td>
<td>http</td>
<td>RFC 2616</td>
<td></td>
</tr>
<tr>
<td>Hypertext Transfer Protocol Secure</td>
<td>https</td>
<td>RFC 2818</td>
<td></td>
</tr>
<tr>
<td>File Transfer Protocol</td>
<td>ftp</td>
<td>RFC 1738</td>
<td></td>
</tr>
<tr>
<td>E-mail address</td>
<td>mailto</td>
<td>RFC 2368</td>
<td></td>
</tr>
<tr>
<td>Telephone</td>
<td>tel</td>
<td>RFC 2806</td>
<td></td>
</tr>
<tr>
<td>Session Initiation Protocol</td>
<td>sip</td>
<td>RFC 3261</td>
<td></td>
</tr>
<tr>
<td>Lightweight Directory Access Protocol</td>
<td>ldap</td>
<td>RFC 2255</td>
<td></td>
</tr>
</tbody>
</table>
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
Test registrations under 8.4.e164.arpa

0.0.3.1.3.2.5.2.2 Pawel Krzesniak imo@nask.pl
0.7.5.1.4.2.6.0.6 Andrew Bartosiewicz andrzejb@nask.pl
2.5.5.3.1.5.8.0.6 Pawel Krzesniak imo@nask.pl
6.7.7.6.6.4.0.0.6 Tomek Zygmuntowicz tomekz@nask.pl
7.0.1.0.5.6.6.0.6 Krzysztof Olesik kolesik@nask.pl
8.6.3.5.8.2.2.0.5 Rafal Galinski rafal.galinski@nask.pl
0.7.4.0.0.3.8.0.6 Tomek Zygmuntowicz tomekz@nask.pl
8.2.5.5.5.6.6.0.6 Slawek Grzeszczak slawomir.grzeszczak@nask.pl

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user dials telephone number

PSTN 

Gateway

-e164 number->ENUM domain
-looking up hosts

SIP SERVER

CALL IS ROUTED TO USER BY SIP SERVER

IP network

DNS

Returns:
-NAPTR record(s)
-IP of SIP SERVER

PSTN -> IP
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:

Hello,
It's me. I hope you have the e-mail....
End user’s side services

Recipient’s identification by tel. number instead of #ICQ or #Yahoo
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>
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;
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
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]


*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?