March 16, 2006
VON, San Jose

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ENUM provisioning

What is ENUM

ENUM maps a telephone number to another address and protocol

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ENUM is not an application or stand alone product for end-users. It is used in the routing decision by VoIP devices like SIP phones and SIP Proxies. It is an All-Call-Query performed at the origin.

Why ENUM at all

- E.164 numbering plan should work the same on PSTN and IP
- ENUM allows IP end-points to be reachable from the PSTN
- ENUM enables applications beyond voice (Video and IM)
- Number portability must span PSTN and IP worlds

Why ENUM today

*SIP domain-to-numeric Prefix mapping. How can you dial sip:613@fwd.pulver.com from a hardware SIP phone/adapter? It's tough, since phones don't have alphabetic keyboards. SIPbroker makes it easy by mapping 'fwd.pulver.com' to '*393', so you would just dial '*393613'. There are over 500 of these mappings today.*

From http://www.sipbroker.com

ENUM allows VoIP islands to interconnect directly on IP without having to select a “carrier code”

ENUM provisioning principles

ENUM is based on DNS using NAPTR records
ENUM follows the multi-tier DNS model

- Tier 1 is the registry where the delegation occurs
- Tier 2 is where the NAPTR records are managed

Provisioning ENUM is about provisioning DNS.
But ENUM goes beyond DNS.

ENUM provisioning interactions

- Interaction with Tier 1 registry or
  - the central Exchange of a federation
- Interaction with LNP database
- Interaction with the SIP platforms of VoIP service providers
- Interaction with PSTN gateways

Provisioning is critical for proper functioning of applications that query ENUM in the routing process

- Incorrect ENUM records can break applications and wrongly configured DNS information can cause service downtime
- Configuring a list of TLDs to query ENUM is not scalable. Federations provide today an intermediate solution until proper delegations exists to use a unique tree
- There are many possible ENUM mappings defined, but the number of DNS records returned by a DNS query is limited. The best practice is to limit the ENUM mappings to five

It is important to follow both the standards and the best practices for provisioning of ENUM data

ENUM provisioning scenarios

A real world example is: “Create one VoIP account”:

- ENUM mappings in the DNS server
- SIP account on the SIP proxy/registrar
- DDI on the PSTN class 5 switch
- Push numbers into the LNP and local exchange

So creating DNS records is just part of the problem

Privacy issues

- DNS is a public database, content put in DNS is meant to be public
- What is behind the telephone number can however be protected
- Provision anonymous SIP URIs in ENUM and real identities in the SIP Proxy
- SIP provides mechanisms for Identity and Privacy

Privacy is solved starting with provisioning techniques and ending with the applications

Provisioning engine tasks

- Syntax and logical checks
- Validation and locking
- Version control and auditing
- Capacity management
- Push data into the end- systems (SIP/ENUM/LNP/DNS)

Provisioning of User ENUM and Carrier ENUM

- User ENUM can have lots of zones with few records
- Carrier ENUM can have few zones with lots of records

Different provisioning techniques are required for these two models

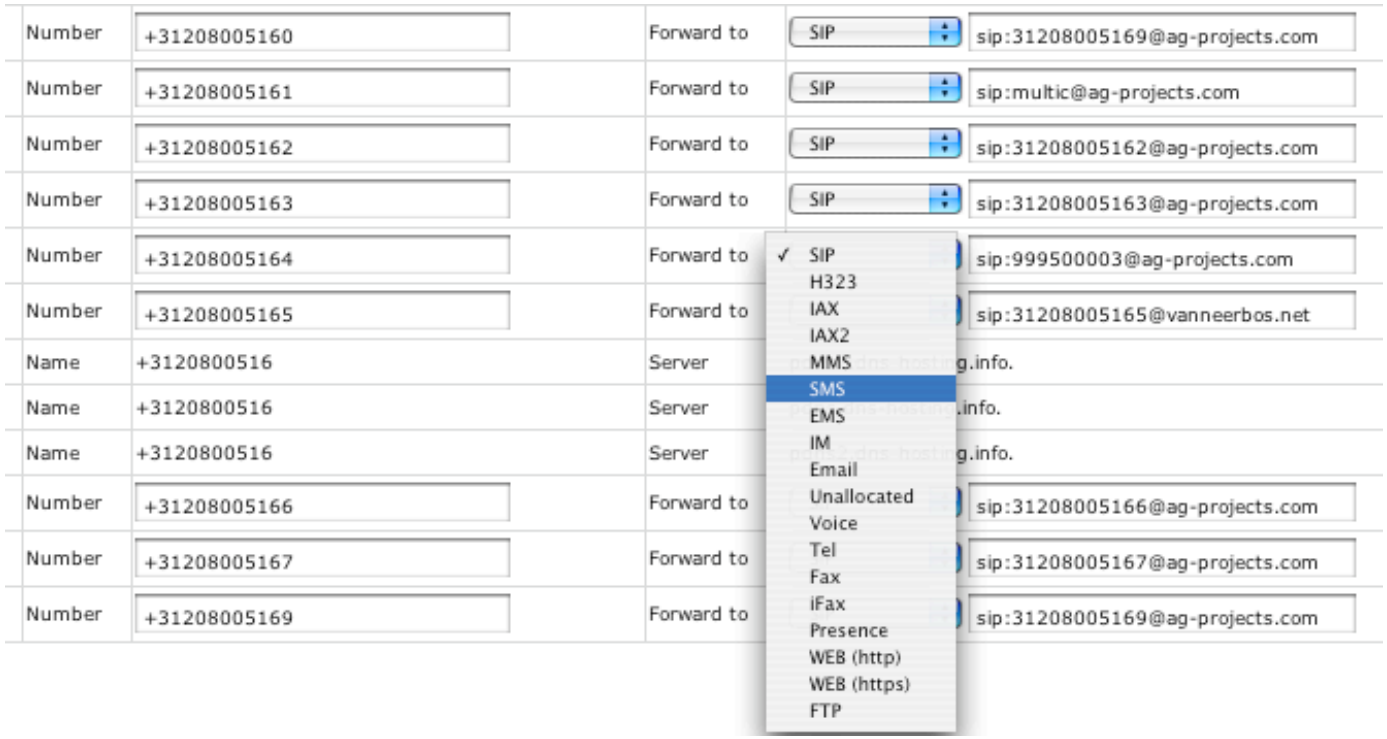
ENUM provisioning engine design

- Concurrent access in a controlled environment
- Combine ENUM and SIP provisioning requests
- DNS server agnostic
- Validation of registrations and transfers
- Dynamic provisioning - translates non-DNS data into NAPTR records

SOAP/XML can be used to expose provisioning interfaces, SOAP is a standard supported by most high-level programming languages (C, C++, Java, Python)

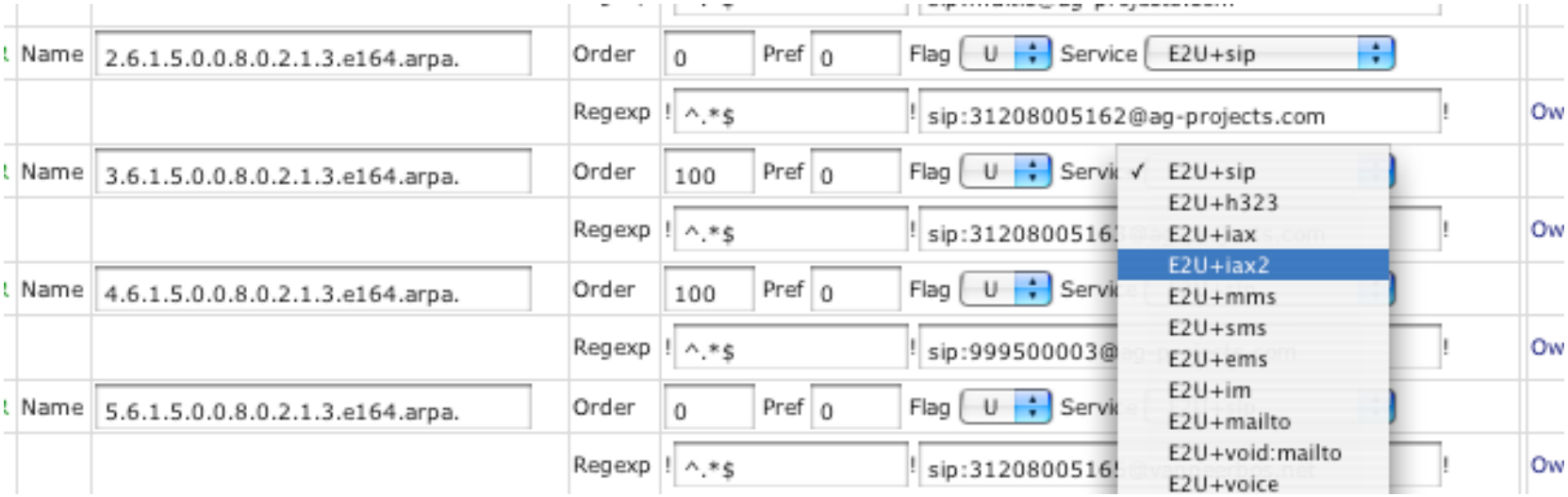
End-user interfaces

End-users are usually unaware of NAPTR records and the fact that ENUM is used for routing of their voice calls, E164 numbering plans and SIP address formats are better known and understood



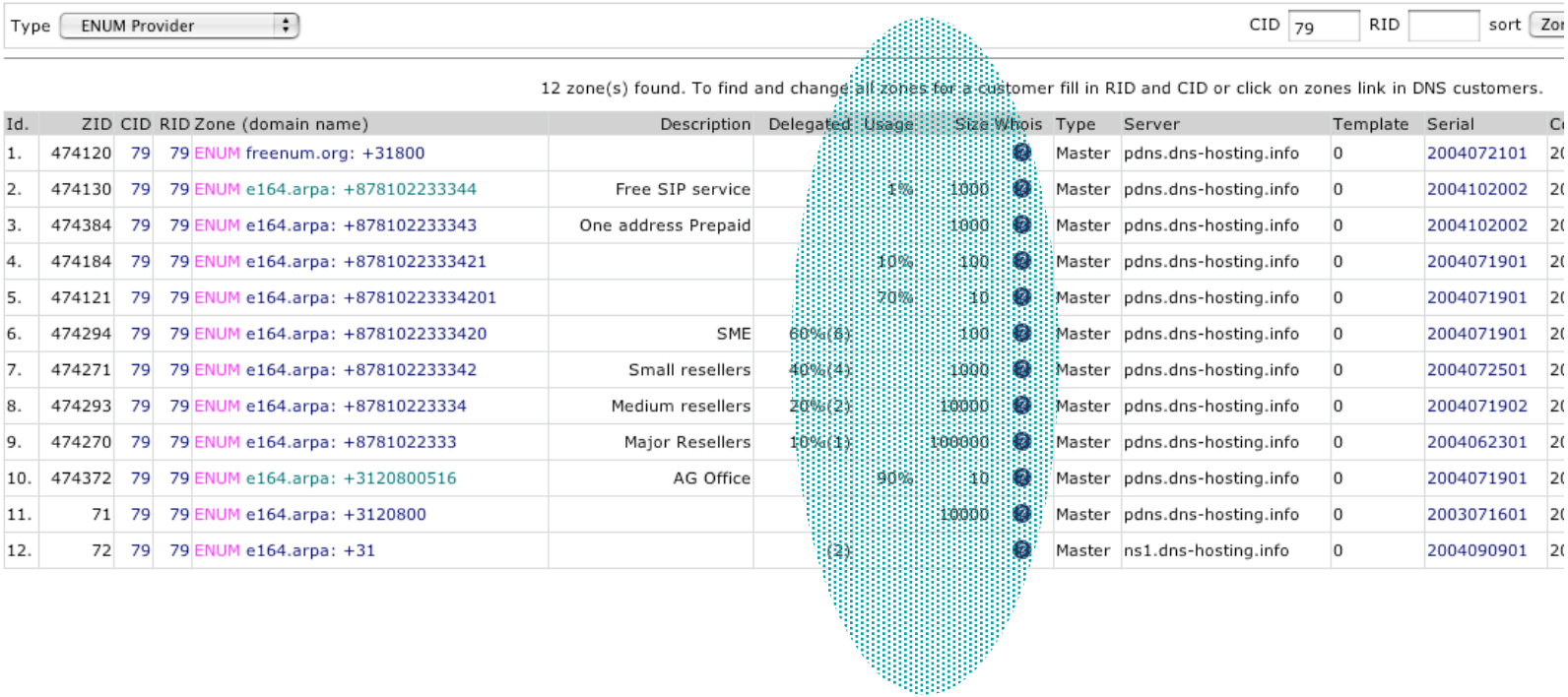
End-user interfaces

Provide finest control for the operator, ENUM regular expression handling while preventing wrong data input, which syntactically or logically does not comply with ENUM specifications.



End-user interfaces

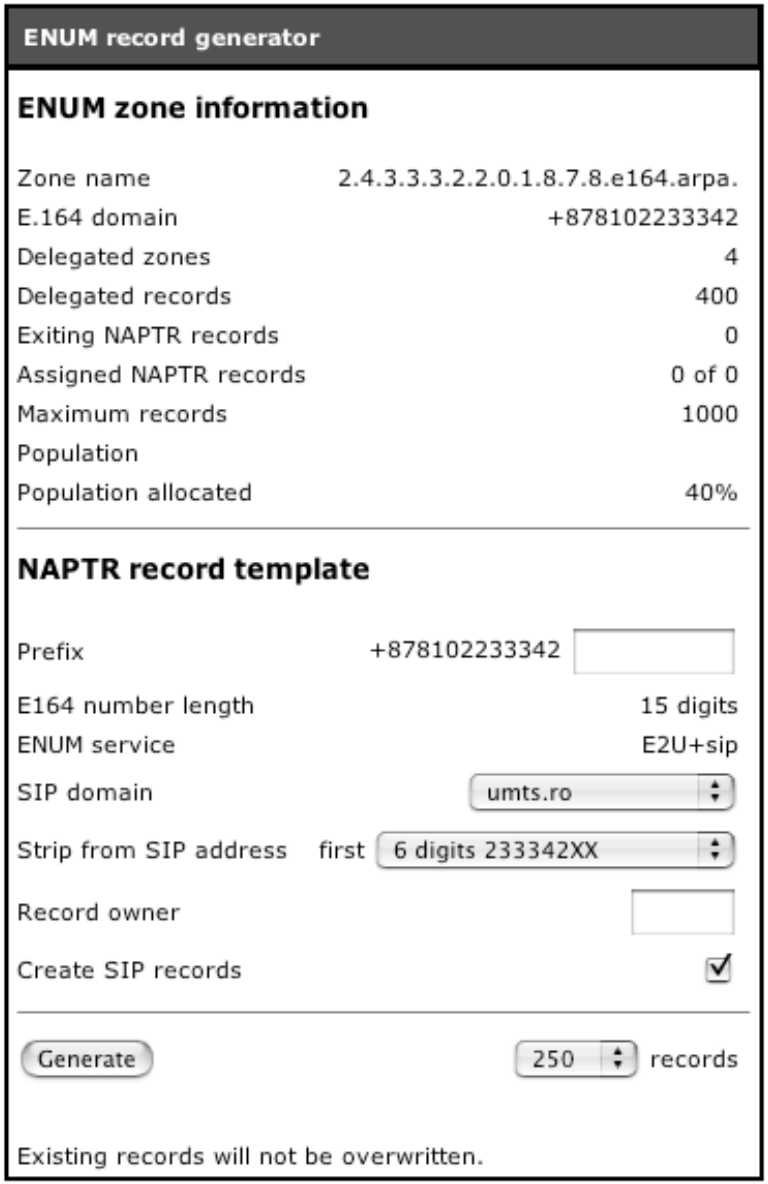
Capacity management is important, allocating and delegating numbers requires skills beyond DNS management. Zone usage, record ownership, current population, percentage of delegation, usage ratio, unallocated or unassigned records are useful values to monitor.



Type ENUM Provider CID 79 RID sort Zo

12 zone(s) found. To find and change all zones for a customer fill in RID and CID or click on zones link in DNS customers.

Id.	ZID	CID	RID	Zone (domain name)	Description	Delegated	Usage	Size	Whois	Type	Server	Template	Serial	C
1.	474120	79	79	ENUM freenum.org: +31800						Master	pdns.dns-hosting.info	0	2004072101	2(
2.	474130	79	79	ENUM e164.arpa: +878102233344	Free SIP service		1%	1000		Master	pdns.dns-hosting.info	0	2004102002	2(
3.	474384	79	79	ENUM e164.arpa: +878102233343	One address Prepaid			1000		Master	pdns.dns-hosting.info	0	2004102002	2(
4.	474184	79	79	ENUM e164.arpa: +8781022333421			10%	100		Master	pdns.dns-hosting.info	0	2004071901	2(
5.	474121	79	79	ENUM e164.arpa: +87810223334201			70%	10		Master	pdns.dns-hosting.info	0	2004071901	2(
6.	474294	79	79	ENUM e164.arpa: +8781022333420	SME	60%(6)		100		Master	pdns.dns-hosting.info	0	2004071901	2(
7.	474271	79	79	ENUM e164.arpa: +878102233342	Small resellers	40%(4)		1000		Master	pdns.dns-hosting.info	0	2004072501	2(
8.	474293	79	79	ENUM e164.arpa: +87810223334	Medium resellers	20%(2)		10000		Master	pdns.dns-hosting.info	0	2004071902	2(
9.	474270	79	79	ENUM e164.arpa: +8781022333	Major Resellers	10%(1)		100000		Master	pdns.dns-hosting.info	0	2004062301	2(
10.	474372	79	79	ENUM e164.arpa: +3120800516	AG Office		90%	10		Master	pdns.dns-hosting.info	0	2004071901	2(
11.	71	79	79	ENUM e164.arpa: +3120800				10000		Master	pdns.dns-hosting.info	0	2003071601	2(
12.	72	79	79	ENUM e164.arpa: +31		(2)				Master	ns1.dns-hosting.info	0	2004090901	2(

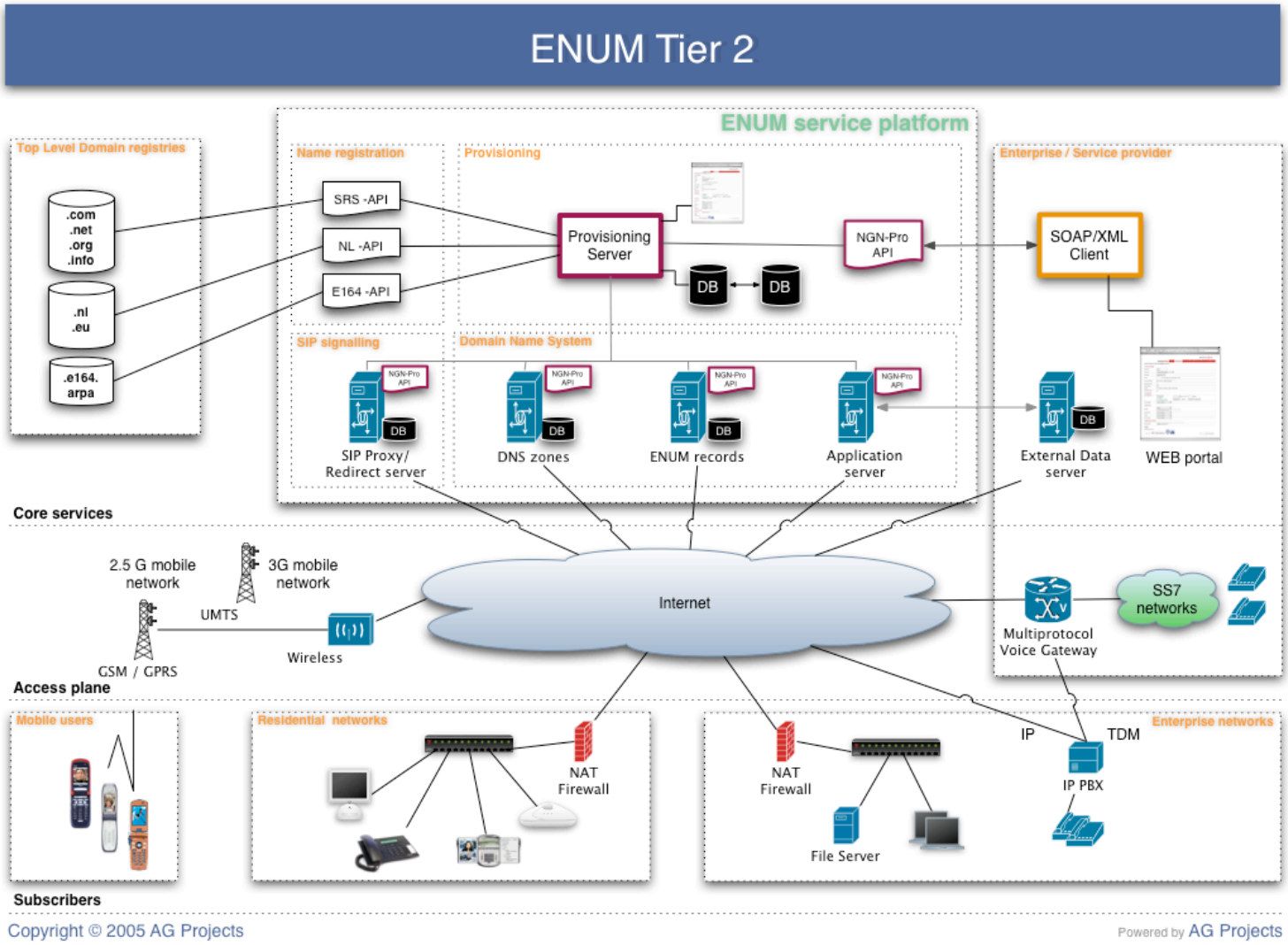


End-user interfaces

Carrier-ENUM zones are often provisioned in bulk. Example:

Generate 10000 SIP records in domain example.com with associated 10000 NAPTR records under private tree 1.3.e164-provider.nl.

ENUM Tier 2 platform blueprint



More information about ENUM provisioning can be found at:

http://ag-projects.com/ENUM/

Thank you,

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