

Provisioning the ENUM tree

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## What is ENUM

ENUM maps a telephone number to another address and protocol  
Given an E.164 number, ENUM returns one or more mappings

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## What is ENUM

1. It is used in the routing decision of switching equipments, it requires that the destination network allows incoming calls from the caller network
2. ENUM solves only the addressing and numbering issues. QoS and interconnect policies are not solved by ENUM (these are VoIP peering issues)
3. It performs an All Call Query in the originating network
4. Originally designed as a number portability mechanism, it provides equivalent and replacement for the SS7 TCAP query mechanism

**ENUM is not an application or a stand alone product**

## Why ENUM

- E.164 numbering plan works the same on PSTN and Internet
- ENUM allows Internet devices to be reached from the PSTN
- ENUM allows VoIP islands to interconnect (IMS included)
- ENUM enables applications beyond voice (like Video and IM)
- **ENUM provides an universal number portability solution**

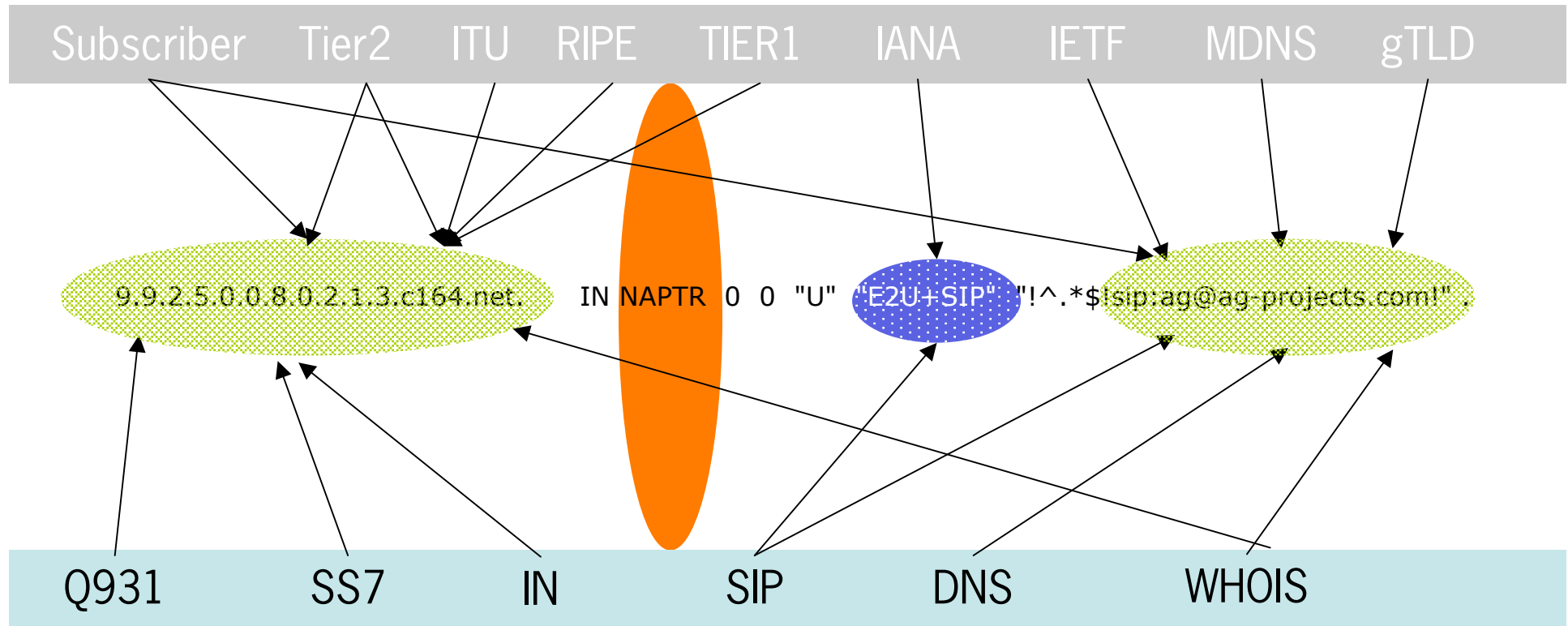
## How ENUM works

1. It uses the standard Internet DNS query/response model
2. NAPTR records have been standardized to convey the information
3. Standard DNS clients available in all IP devices can be used for name resolution

ENUM is very simple in technical terms, its complexity comes from the fact that:

**ENUM provides mapping between name spaces managed by different authorities**

## The anatomy of ENUM NAPTR records



Institutions, Providers, Subscribers, Protocols, Networks, Machines

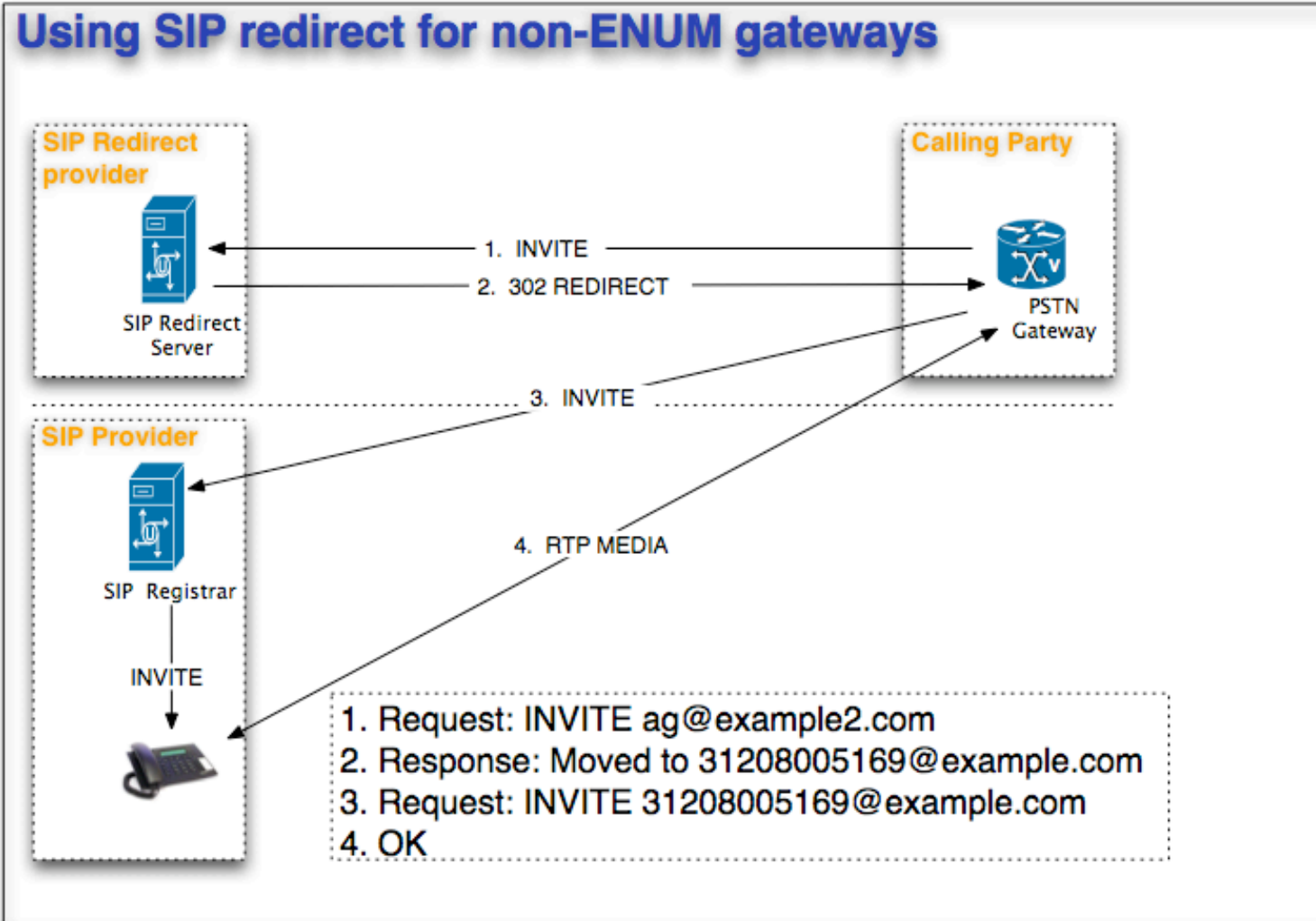
## Interactions between ENUM and other systems

- Interaction with Tier 0/1 registries (country specific)
- Interaction with service providers
- Interaction with connected services (SIP)
- **Interaction with the local number portability database**
- Interaction with DNS servers and clients

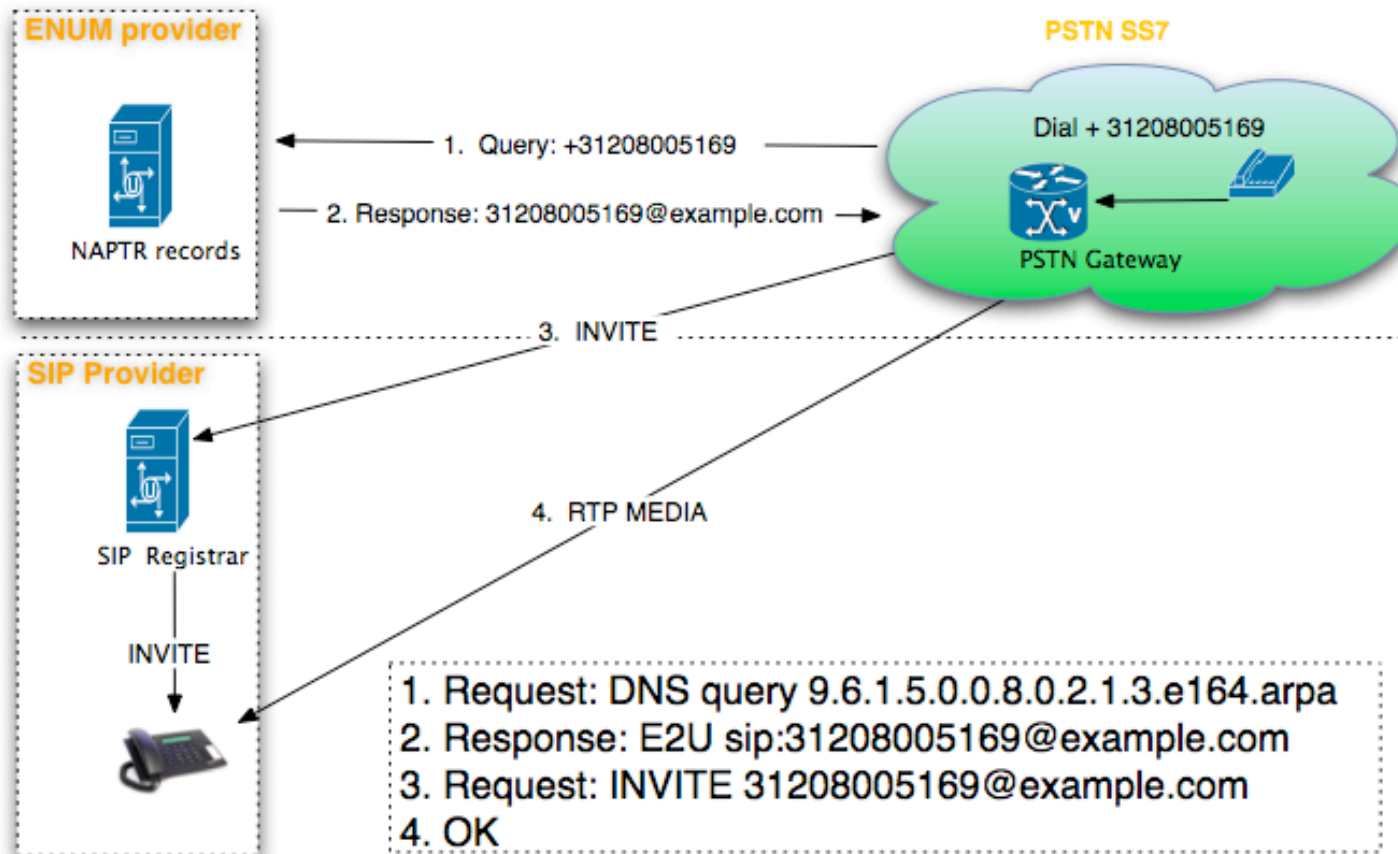


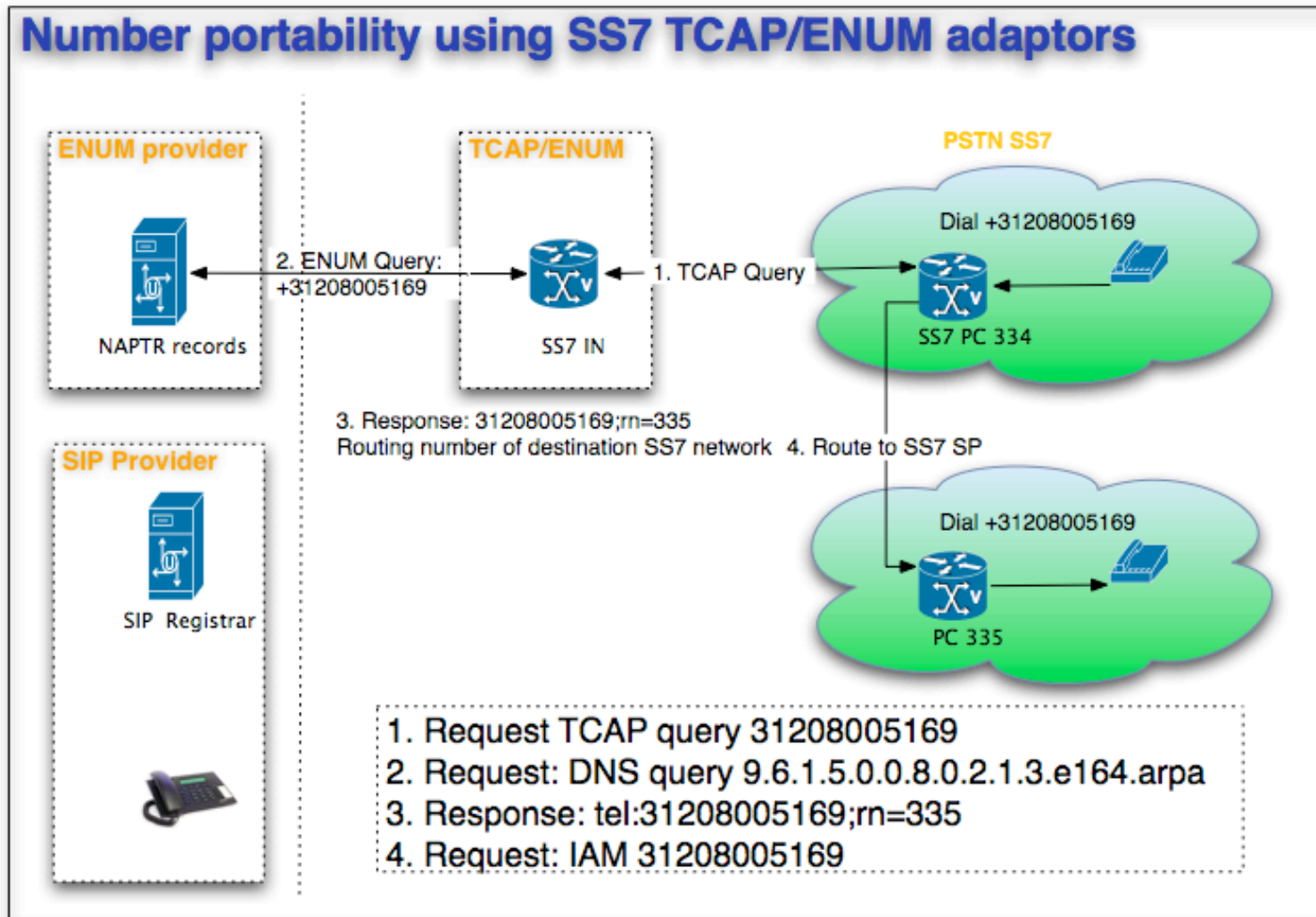
## Enabling ENUM

- Native ENUM applications (OpenSER, Asterisk, Snom phones)
- Legacy gateways can send traffic to ENUM enabled SIP Proxies
- SIP gateways lacking ENUM support query SIP redirect servers
- SS7 SP elements may use TCAP/ENUM adaptor



## Number portability using ENUM enabled SIP gateways





## ENUM provisioning has impact on VoIP

- Incorrect ENUM records or invalid DNS data can break applications  
+33 and +39 prefixes denied access to their DNS ENUM servers  
(problems have been solved in the mean time)
- ETSI and IETF have conflicting notations (example sip: and voice+sip:)
- Too many record types are being standardized beyond what ENUM was initially invented for
- Too many DNS records may not be returned using UDP transport
- **Querying multiple trees introduces call setup delays**

## Which ENUM Tree to use?

- Distributed authorities for ENUM zones do not work well. On internet if your DNS does not work your website is unavailable, if an ENUM zone is not available millions of users may not be able to receive calls, **ENUM cannot be left in the hand of the amateurs**
- Multiple trees do not permit porting numbers between operators
- Federations provide temporary solution, but who will federate the federations?
- A dedicated infrastructure ENUM tree combined with a peering policy publication mechanism can help but only as a temporary solution

## Business cases for ENUM

ENUM is not a standalone product. What is the business case?

- ENUM enables peering between VoIP islands or IMS domains
- Telephone number hosting, decoupling addressing and numbering from the service. Customers may choose a voice service from a service provider but pay for the incoming number at their ENUM provider (similar to domain hosting business)
- **The ultimate Number portability solution**

ENUM is the database where all end-user telephone numbers end, is the final client database with unique identifiers.

More information about ENUM provisioning can be found at:

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



Thank you,

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