

ENUM in China

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Introduction to ENUM

- Naming and Addressing
- About ENUM
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- Why ENUM?
- Why E.164 Telephone Numbers?
- What ENUM is not?
- Major benefits to adopt ENUM
- Examples

Naming and Addressing

- Naming and addressing is the key problem to any network
 - E.164 number in PSTN, defined by ITU
 - Phone number
 - +86-10-58813020
 - Also fax, sms, mms, and etc.
 - Identifier or name in Internet
 - IP address
 - 159.226.1.1
 - Domain name
 - www.asrc.cn
 - URN/URL/URIs
 - <http://www.asrc.cn/~lee>
 - [mailto: lee @ cnnic.cn](mailto:lee@cnnic.cn)

About ENUM

- ENUM(telephone Number Mapping) is defined by Internet Engineering Task Force(IETF) in RFC2916, and then RFC3761
- Translating from Telephone Numbers(TNs) into Uniform Resource Identifiers(URIs) is using the current Domain Name System(DNS) under the domain e164.arpa.
 - The DNS is used to map domain names to IP addresses, it also can be used to map TNs to URIs
- ENUM is the killer technology to enable the convergence between the PSTN and the Internet
 - Bridge the PSTN and Internet

ENUM Query Flow

- Take one E.164 number by user input
 - +86-10-58813020
- Turn it into a FQDN(Full Qualified Domain Name) by applications
 - 0.2.0.3.1.8.8.5.0.1.6.8.e164.arpa.
- Query the DNS
 - By resolver and local DNS server, and co-worked with the global DNS System.
- Get the URIs
 - Sip:3020@sip.asrc.cn
 - http://www.asrc.cn/~lee
 - mailto:lee @ cnnic.cn

Why DNS?

- About twenty years
 - As the fundamental service of Internet
- It's fast, works very well with high reliability
 - Co-worked by over one million DNS servers,
- Global and Scalability
 - The biggest distributed system with high performance
 - Trillions of queries everyday
- Open for anyone with some specific access control

Why E.164 Telephone Numbers?

- Telephone numbers are linguistically neutral, and familiar to consumers
 - International understood
- Billions of devices or so only use numeric key pads, especially wireless devices
- Many Voice over IP consumers use normal phones with terminal adapters or IP phones with only numeric key pads
- URIs is easy to PC users, but difficult to dialed on the PSTN, and it will be co-exist for the indefinite future

What ENUM is not?

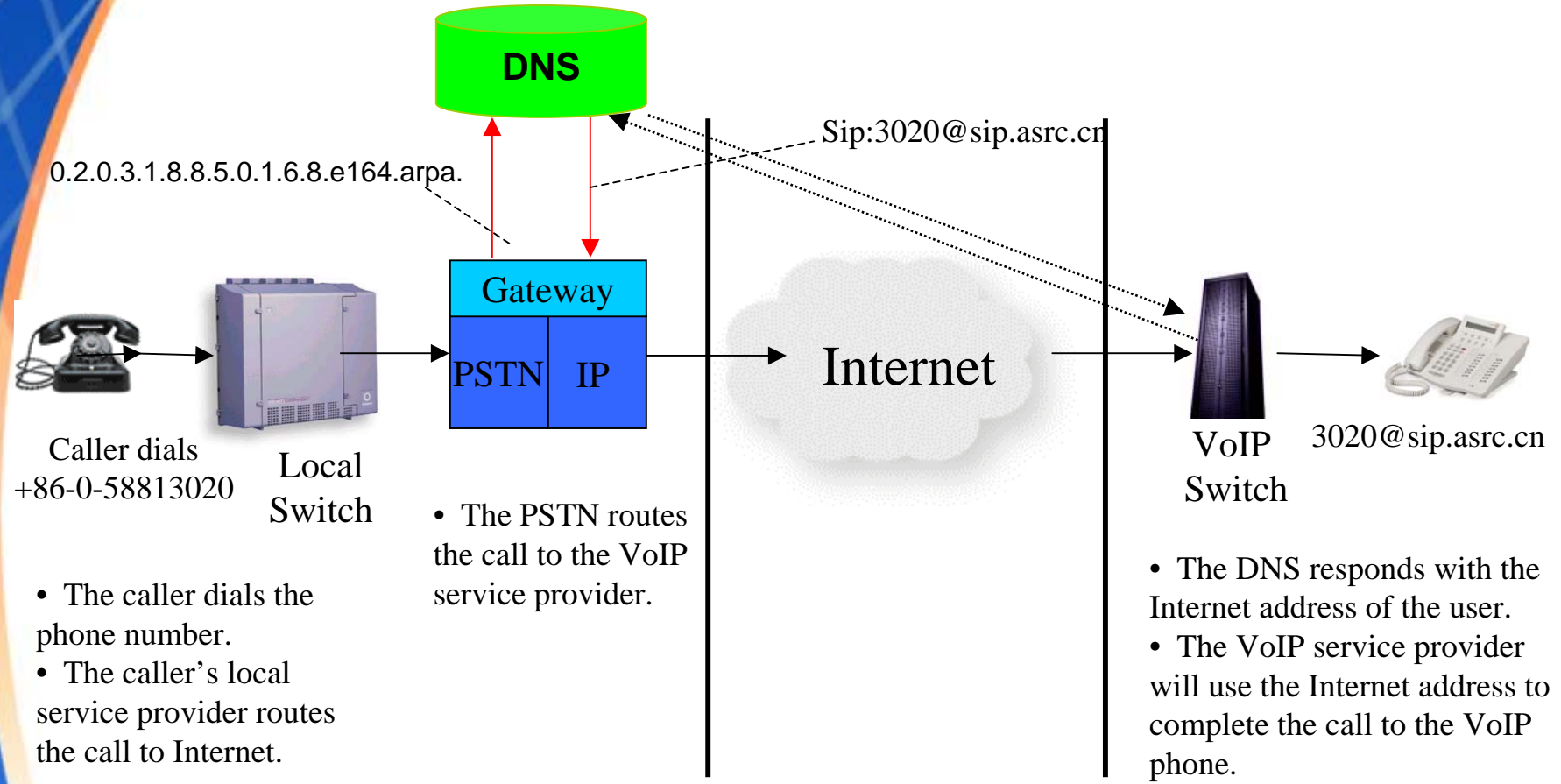
- ENUM is an OPT-IN system, not the unique way for convergence between PSTN and Internet, but it's the best way for inter-working internationally.
- ENUM does not change the numbering plan of ITU E.164, and will not exhaust national number plan, but conserve numbering resource

Major benefits to adopt ENUM

- Linking to together VoIP islands on the Internet, enabling all Internet services
- Allowing terminals on the Internet to be accessed from the PSTN
 - Terminals@PSTN may dial only number and not URIs
 - Simply and reduce the input
- ENUM can be used for any services, because any URIs can be support for ENUM registration and resolution
 - mailto, http, tel, sip, h.323, fax, sms, mms, and etc.
- Easy to implement Number Portability(NP) and Inter-routing among carriers

Call Flow Chart – PSTN to VoIP

0.2.0.3.1.8.8.5.0.1.6.8.e164.arpa.= Sip : 3020@sip.asrc.cn



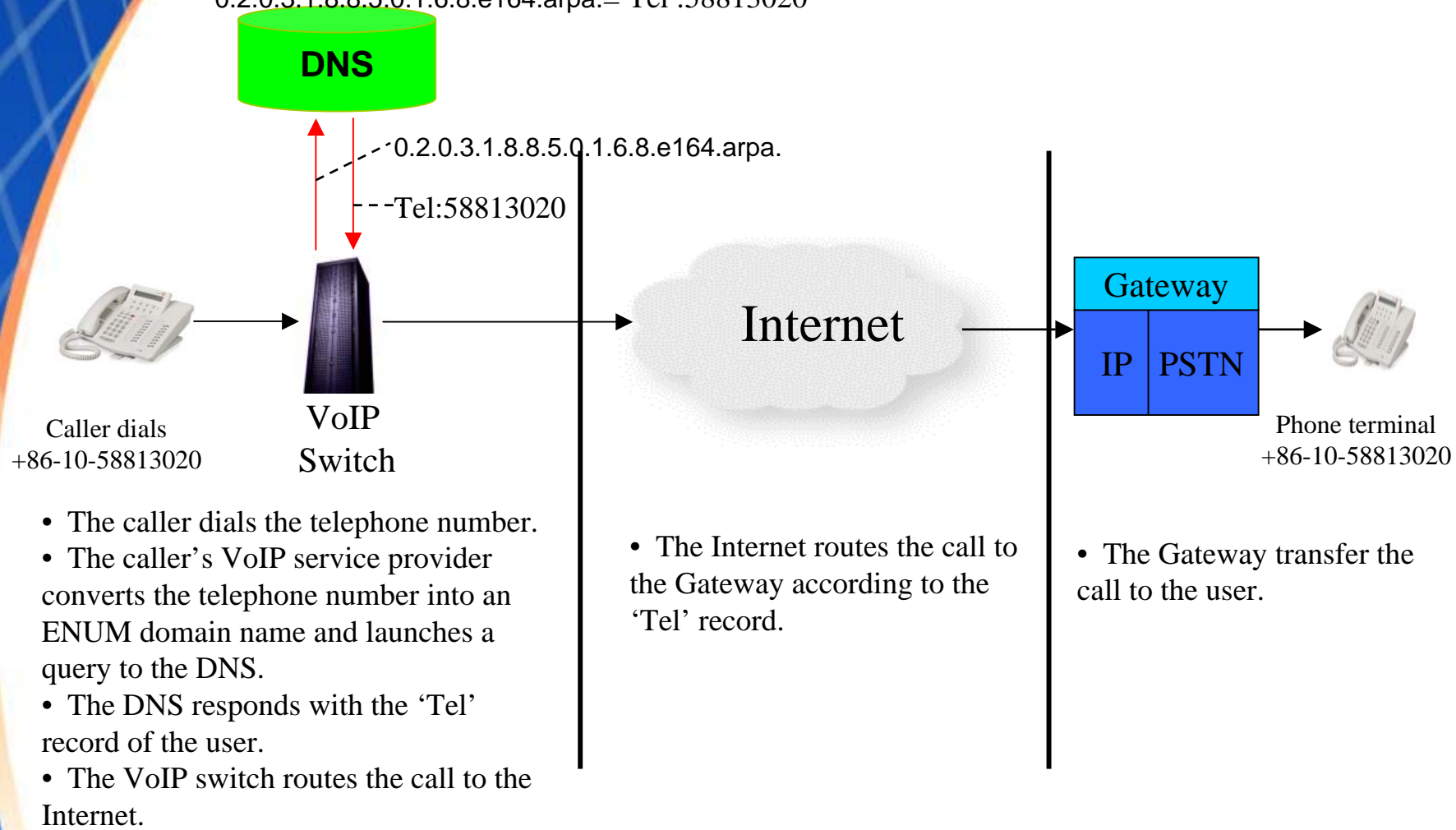
- The caller dials the phone number.
- The caller's local service provider routes the call to Internet.

- The PSTN routes the call to the VoIP service provider.

- The DNS responds with the Internet address of the user.
- The VoIP service provider will use the Internet address to complete the call to the VoIP phone.

Call Flow Chart – VoIP to PSTN

0.2.0.3.1.8.8.5.0.1.6.8.e164.arpa.= Tel :58813020



Caller dials
+86-10-58813020

VoIP
Switch

Internet

Gateway
IP PSTN

Phone terminal
+86-10-58813020

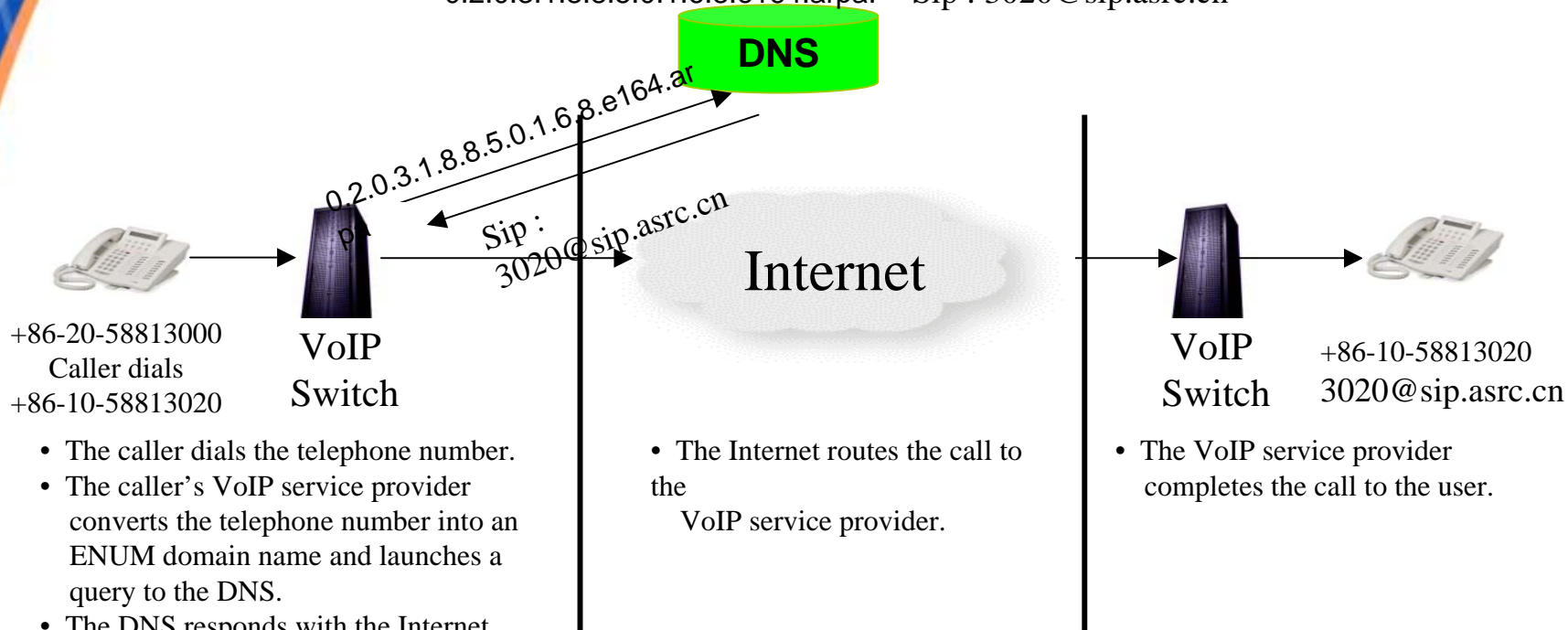
- The caller dials the telephone number.
- The caller's VoIP service provider converts the telephone number into an ENUM domain name and launches a query to the DNS.
- The DNS responds with the 'Tel' record of the user.
- The VoIP switch routes the call to the Internet.

- The Internet routes the call to the Gateway according to the 'Tel' record.

- The Gateway transfer the call to the user.

Call Flow Chart – VoIP to VoIP Totally on the Internet, no PSTN

0.2.0.3.1.8.8.5.0.1.6.8.e164.arpa. = Sip : 3020@sip.asrc.cn



+86-20-58813000
Caller dials
+86-10-58813020

VoIP
Switch

Internet

DNS

VoIP
Switch

+86-10-58813020
3020@sip.asrc.cn

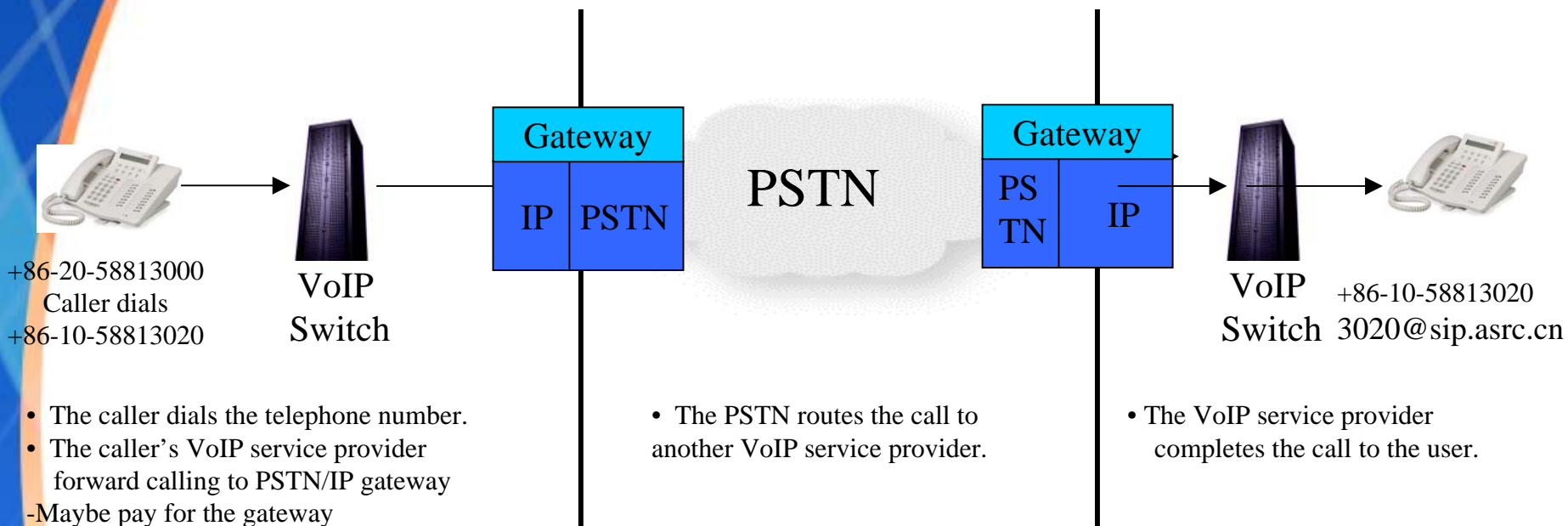
- The caller dials the telephone number.
- The caller's VoIP service provider converts the telephone number into an ENUM domain name and launches a query to the DNS.
- The DNS responds with the Internet address of the user.
- The VoIP switch routes the call to the Internet.

- The Internet routes the call to the VoIP service provider.

- The VoIP service provider completes the call to the user.

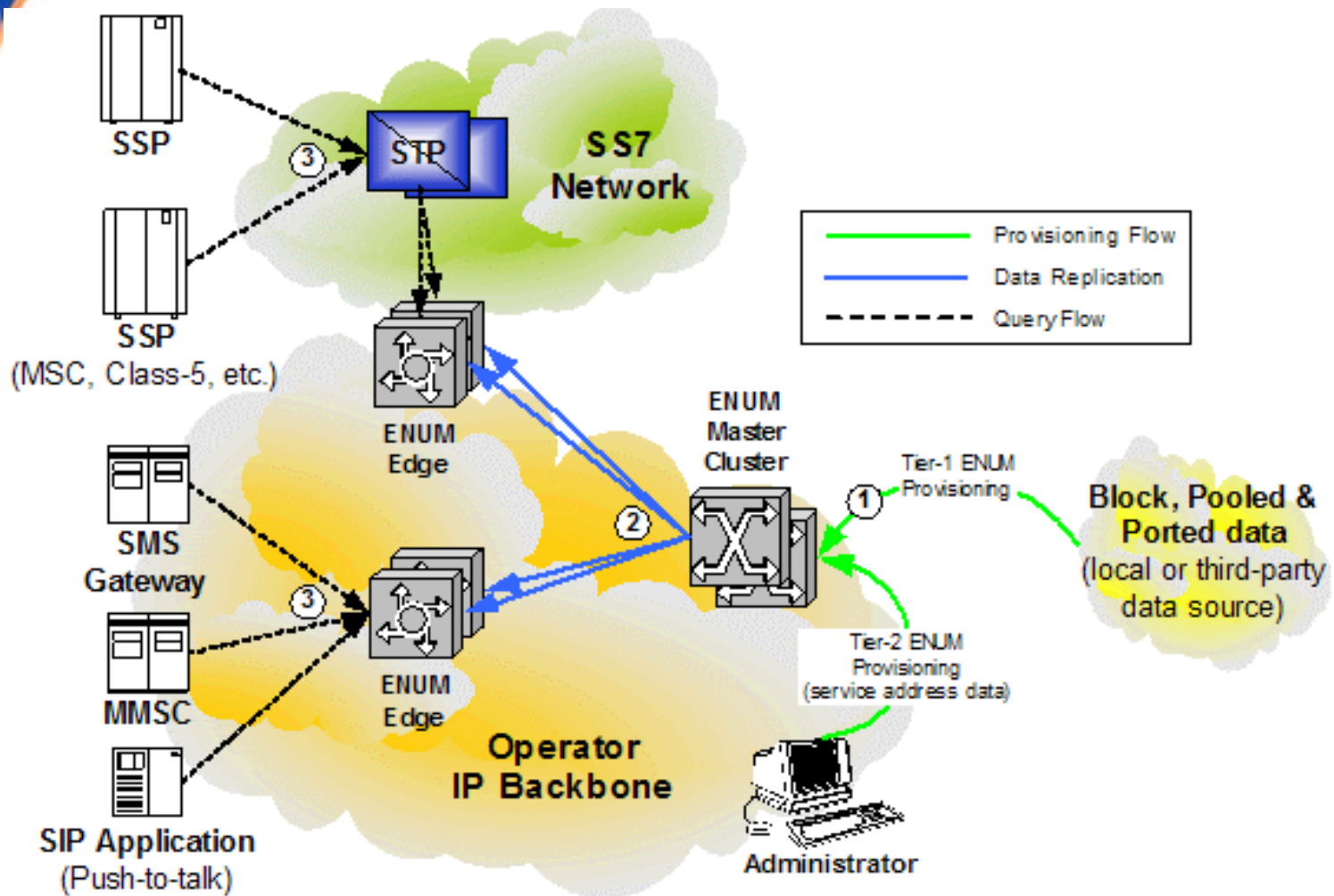
Call Flow Chart – VoIP to VoIP Partly on the Internet, with PSTN

- Different VoIP carriers(Service Provider), connected by PSTN with each other

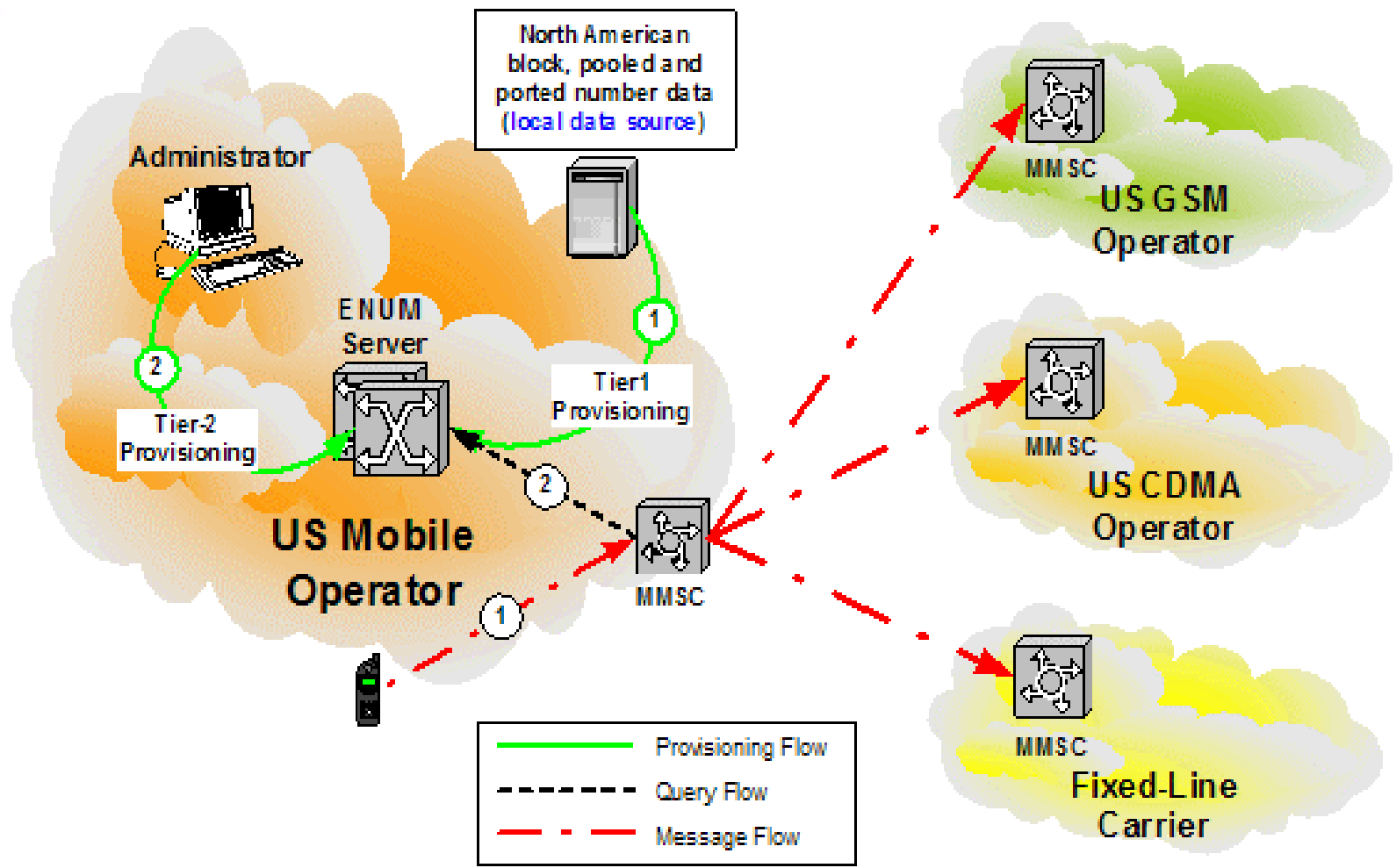


- VoIP carriers should pay for the PSTN, except for IP connection

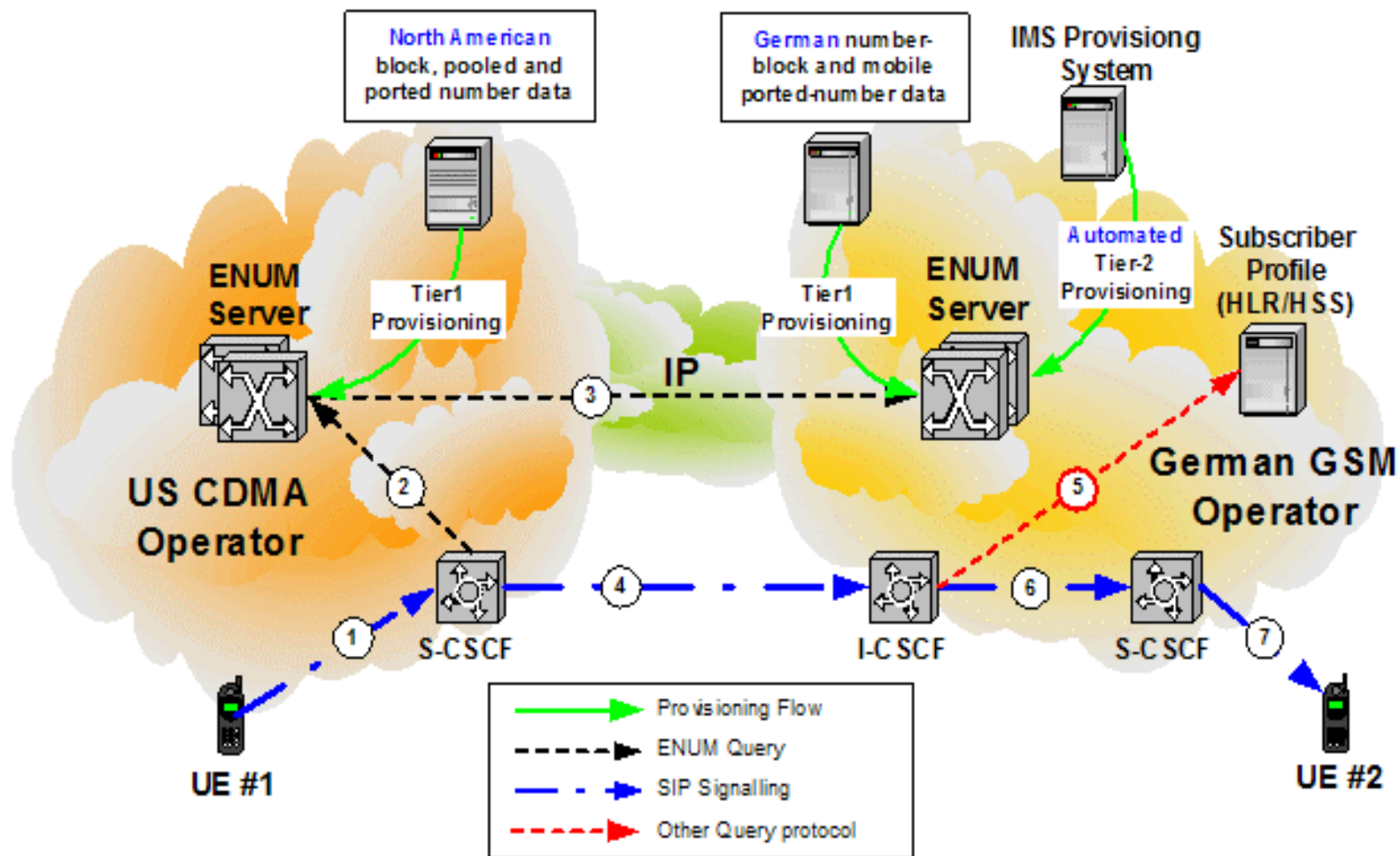
Number Portability



Discovery of MMS



3G core network--IMS



International Activities

- ENUM History
- Delegation in E164.Arpa
- Current Status

ENUM History

- 1999, IETF ENUM WG formed
- 2000, RFC2916 was published by IETF
- 2001, International and national workshops (ITU-T, Europe, US, Asia, ..., including China)
- 2002, ITU -T Interim Procedures (IAB, RIPE-NCC)
 - ITU-TSB presides over administrative aspect of ENUM delegation, and RIPE-NCC takes charge in technical aspect of ENUM delegation
- 2003, more national ENUM–Trials joined
- 2004, IETF new RFC3761
- 2005, So many business services for ENUM, hotter and hotter for VoIP
 - Austria, Germany and etc.

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Delegation in E164.Arpa

- More than 26 countries have gotten the delegation
 - 31 Netherlands
 - 33 France
 - 353 Ireland
 - 358 Finland
 - 36 Hungary
 - 374 Armenia
 - 40 Romania
 - 41 Switzerland
 - 420 Czech Republic
 - 421 Slovakia
 - 423 Liechtenstein
 - 43 Austria
 - 44 UK
 - 46 Sweden
 - 48 Poland
 - 49 Germany
 - 246 Diego Garcia
 - 247 Ascension
 - 290 Saint Helena
 - 55 Brazil
 - 61 Australia
 - 65 Singapore
 - 86 China
 - 88234 Global Networks
 - 87810 VISIONng UPT
 - 971 UAE
 - And etc.

Current Status

- Key software and hardware platforms support ENUM
 - Including Cisco, IPTel, and etc.
- ENUM was adopted by NGN and 3GPP standards
- Many countries are starting commercial services
 - Including Germany, Austria, and etc.
- So many soft-switched platforms are build, the interconnection and interoperability will be the big problem for them

ENUM in China

- Milestones of ENUM in China
- Integrated ENUM Trial Platform(Chart)
 - Portal site
 - ENUM Resolution
 - E164.apra and 6.8.e164.arpa
 - ENUM Registration
 - ENUM Applications
- Service Discovery for Carriers

Milestones of ENUM in China

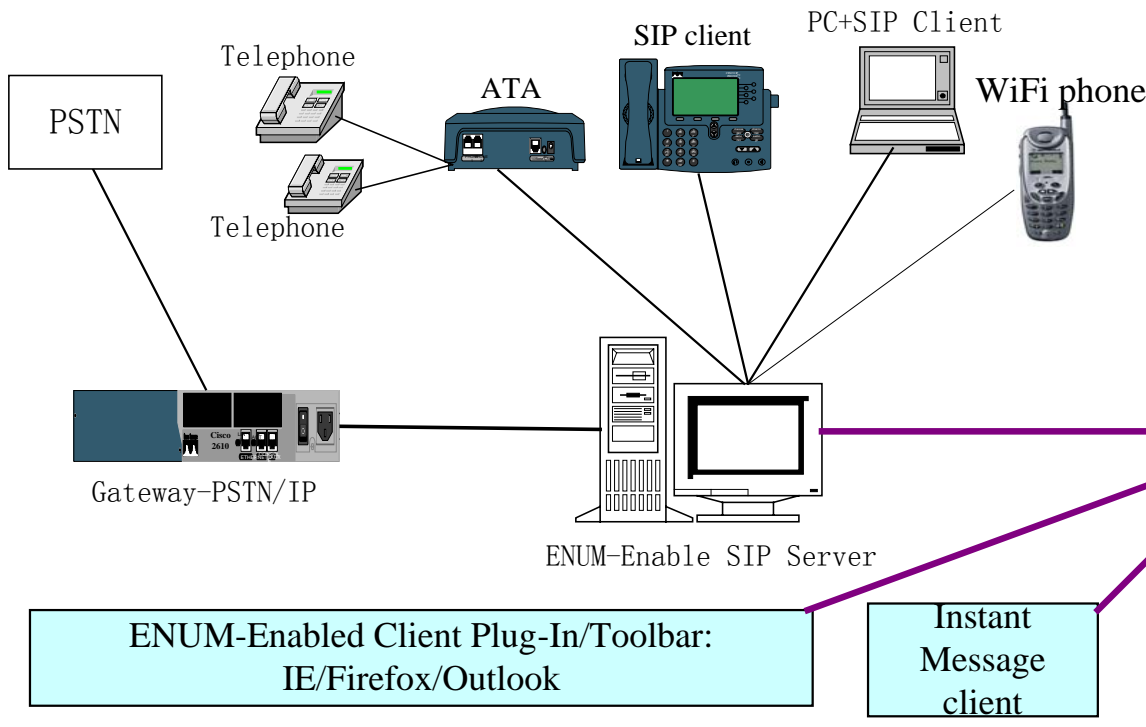
- 2001
 - Define the project plan and objective
 - A very simple prototype ENUM test bed was setup
 - Proposal on national ENUM trial to MII
- 2002
 - ENUM trial was opened by MII, and ENUM study working group for application, provision, security, registration, international cooperation, was formed
 - compare the 6.8.e164.arpa and 6.8.e164.cn for security and performance reason
 - 6.8.e164.arpa was delegated by RIPE-NCC and ITU-TSB, and the servers was run by CNNIC
 - CNNIC starts to run one secondary server of the root servers of ENUM (e164.arpa), only six in the world

Milestones of ENUM in China

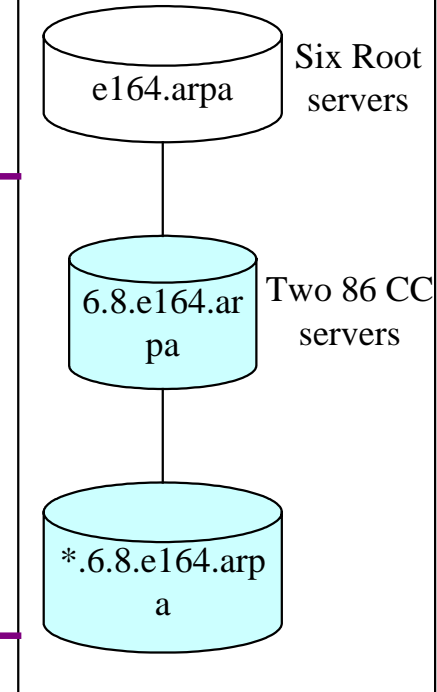
- 2003
 - Study the registration of ENUM and the Query performance
 - The first integrated testing bed which is based on commercial software is opened by CNNIC, and opened for public experience
 - WWW.ENUM.CN
- 2004
 - Introduce ENUM trial status to international community
 - Form APEET(Asia-pacific ENUM Engineering Team), cooperated with CNNIC, JPRS/Japan, NIDA/Korea, TWNIC, SGNIC/Singapore
- 2005
 - Studying the commercial model for ENUM

Integrated ENUM Trial Platform

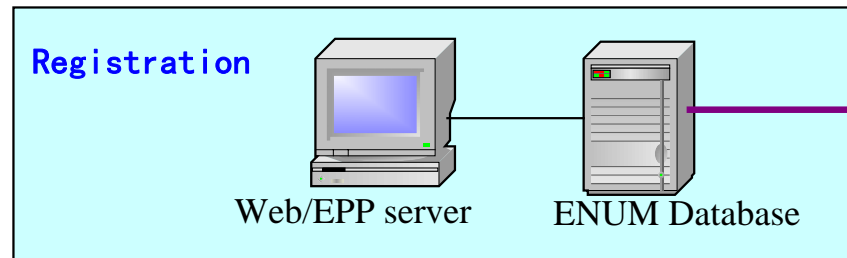
Application



Resolution



Registration



What is ENUM?

ENUM is the Internet Engineering Task Force (IETF) protocol that will assist in the convergence of the Public Switched Telephone Network (PSTN) and the IP network; it is the mapping of a telephone number from the PSTN to Internet services--telephone number in, URL out. ENUM was developed as a solution to the question of how to find services on the Internet using only a telephone number, and how telephones, which have an input mechanism limited to twelve keys on a keypad, can be used to access Internet services. The detail

>>>

Statement

The web site is constructed by CNNIC with the delegation of interrelated government department for evaluating resolution performance of ELD, studying the flow of ENUM resolution and processing ENUM experiment. According to the national regulation, this web site will probably be modified or closed at the end of trial. Consultative document

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ENUM Trial Registration

You can browse web side, send Email, make call by inputting the E.164 number. For example, you can input 62619750 to link www.cnnic.cn by choosing 'browse web side', or send Email to us by choosing 'send Email' and so on. If you want to contact with us, use ENUM searching and you will get the experience. At the same time, you can register your own phone number for tryout.

+ 86 - 10 - Web Site

ENUM Query

ENUM Query + 86 - 10 -

DNS Query + 86 - 10 -

registrant Query

ENUM Registration

[User Registration>>>](#)

[ENUM Registration>>>](#)

[My ENUM>>>](#)

[SIP Account Registration>>>](#)

Links Files



ENUM Resolution

- Tier 0---currenty e164.arpa
 - CNNIC is running one of the six servers of “e164.arpa”
 - Operated as the same condition with ccTLD name servers (monitoring, logging, backup...)
- Tier 1---6.8.e164.arpa
 - for trial only
 - arpa-ns0.enum.net.cn
 - arpa-ns1.enum.net.cn
- Tier 2
 - Store all the NAPTR records

ENUM Registration

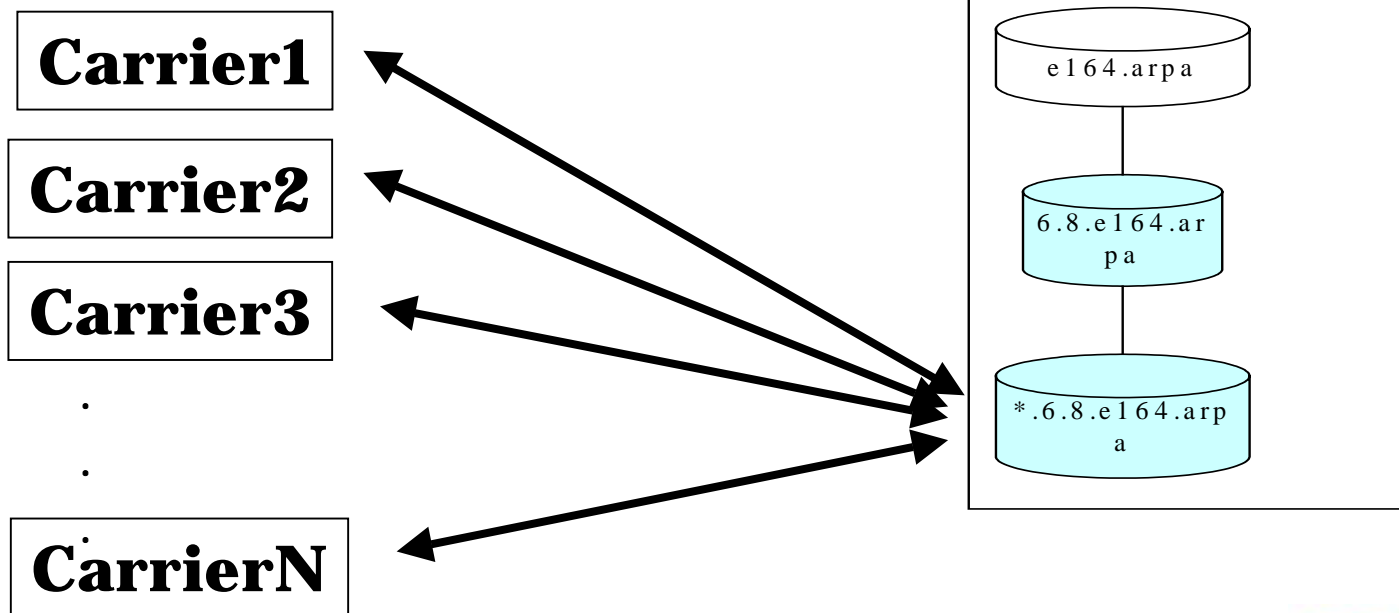
- www.enum.cn provides registration, modification, deletion, query, and etc.
 - User check-up function
 - System manager checks registration information
 - Confirm via E-mails
 - Information updated to “6.8.e164.arpa” zone per 5 seconds
 - ENUM-enabled SIP server for SIP registration

ENUM Applications

- ENUM enabled SIP proxy
- IP/PSTN gateway
- SIP UAs
 - SIP phone(hardware), Cisco analog telephone adapter, soft phone
 - Instant message client
- ENUM enabled client
 - IE toolbar & IE plug-in
 - Firefox toolbar
 - Outlook plug-in
 - Developed by CNNIC

Service Discovery for Carriers

- Carriers register the service locations (VoIP, IMS, SMS, MMS and so on) in ENUM system, and query others, for interoperability and interconnection
- ENUM system can be a neutral service for service discovery



Summary

- ENUM is the killed technology for NGN/NGI, also convergence between PSTN and Internet
- ENUM is based on the globally, reliable and scalable DNS with high performance
- ENUM is available technically and administratively
- ENUM is easy to use and familiar to users
- ENUM is not only used by end users, but also used by carriers for number portability, service discovery and etc..



中国互联网络信息中心
CHINA INTERNET NETWORK INFORMATION CENTER

ENUM is ready, but are you ready?

ENUM@CNNIC.CN