



IMPORTANCE OF ENUM IN IMS NETWORKS

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AGENDA

- What is ENUM (for the 10th time today...)
- IMS Call Routing
- ENUM Role in IP Interconnection
- ENUM Role in Number Portability
- Summary
- Q&A

WHAT IS ENUM?

tElephone NUmber Mapping is the process of unifying the telephone number system of the public switched telephone network with the Internet addressing and identification name spaces.

Telephone numbers are systematically organized in the E.164 standard, while the Internet uses the Domain Name System for linking domain names to IP addresses and other resource information.

Telephone number mapping systems provide facilities to determine applicable Internet communications servers responsible for servicing a given telephone number by simple lookups in the Domain Name System.

[source: Wikipedia]

ENUM PROCESS EXPLAINED

RFC 3761 - E.164 NUMBER MAPPING



1. Take a telephone number 214466780
2. Add the country code - this is known as the Application Unique String (AUS) +351214466780
3. Take the AUS, remove the + and put dots between the digits 3.5.1.2.1.4.4.6.6.7.8.0
4. Reverse the order and append to .e164.arpa 0.8.7.6.6.4.4.1.2.1.5.3.e164.arpa
5. Send this Domain Name to a DNS/ENUM Server
6. One or more NAPTR records will be returned NAPTR 10 100 "u" "E2U+sip"
"!^.\$!sip: +351214466780@operator.pt!"
7. Put the domain name part of the SIP URI into the DNS to get the IP address Operator.pt -> 12.34.56.78:5060

WHAT IS CARRIER/INFRASTRUCTURE ENUM?

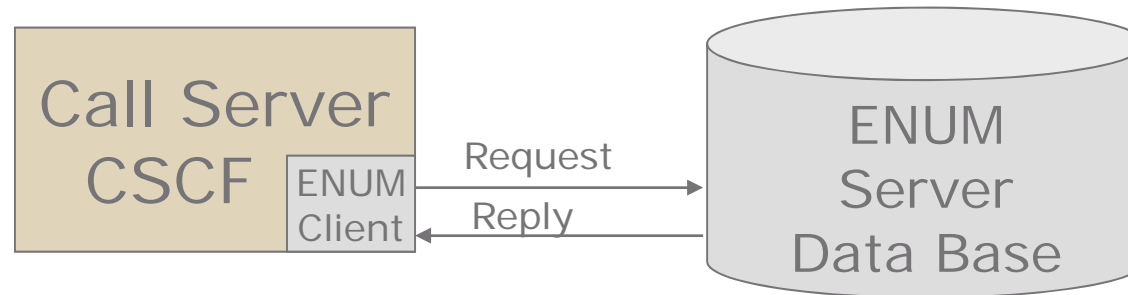
- Carrier/Infrastructure ENUM is a private implementation of ENUM that is managed by Network Operators.
- Promotes Network Cost savings, as it provides a single IP-based routing mechanism, which can support many services, thus taking advantage of the associated synergies
- Provides a Co-Ordinated Data Management framework, where each Operator publishes its own data.

Important factors for a successfully Carrier ENUM deployment:

- Operator Co-Operation
- Proper IP Interconnection between Operators, and a Central High Performance and Scalable Carrier Grade ENUM
- Making it simple, from both a Business and Technical perspectives

ENUM IN IMS

ROUTING ENABLER

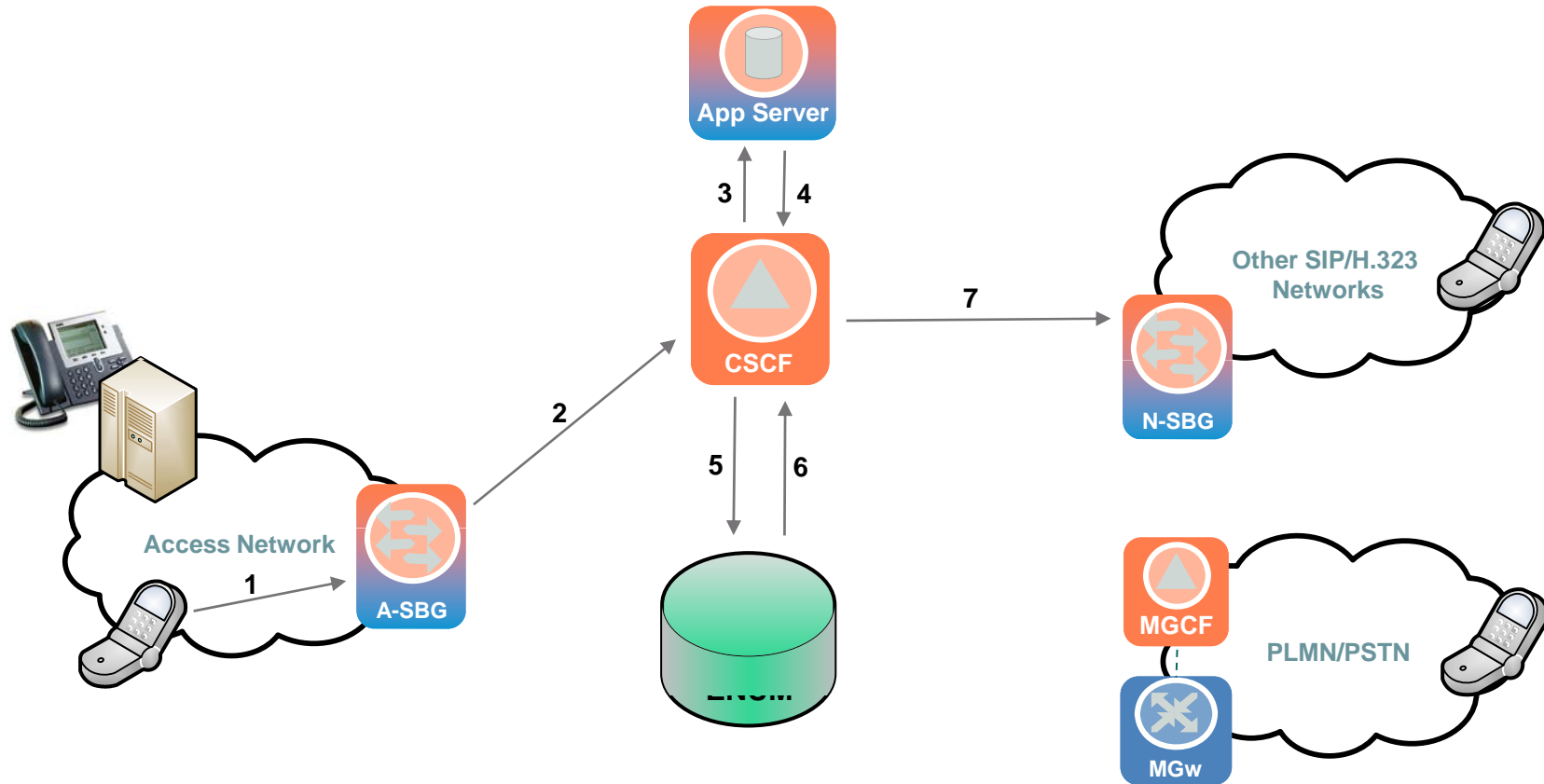


Due to its routing facilitator nature, infrastructure ENUM, is a key enabler in:

- IMS/VoIP Interconnection
- Number Portability
- B-Number manipulation and Toll Free routing scenarios

IMS NETWORKS

SIP ROUTING SIMPLIFIED – EXAMPLE USE CASES - I

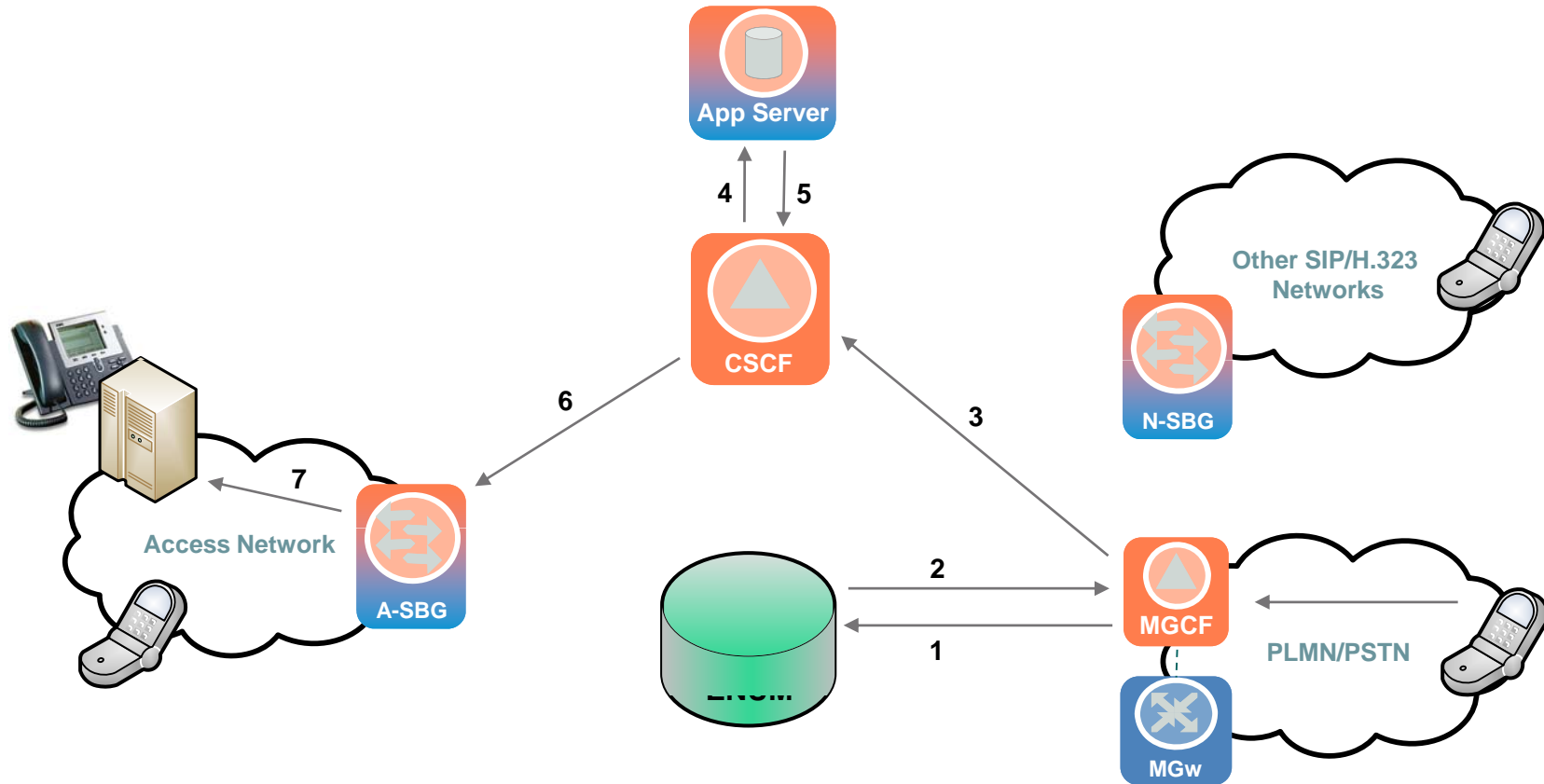


(5) Query: 0.8.7.6.6.4.4.1.2.1.5.3e164.arpa

(6) Answer: sip: +351214466780@other.operator.pt

IMS NETWORKS

SIP ROUTING SIMPLIFIED – EXAMPLE USE CASES - II

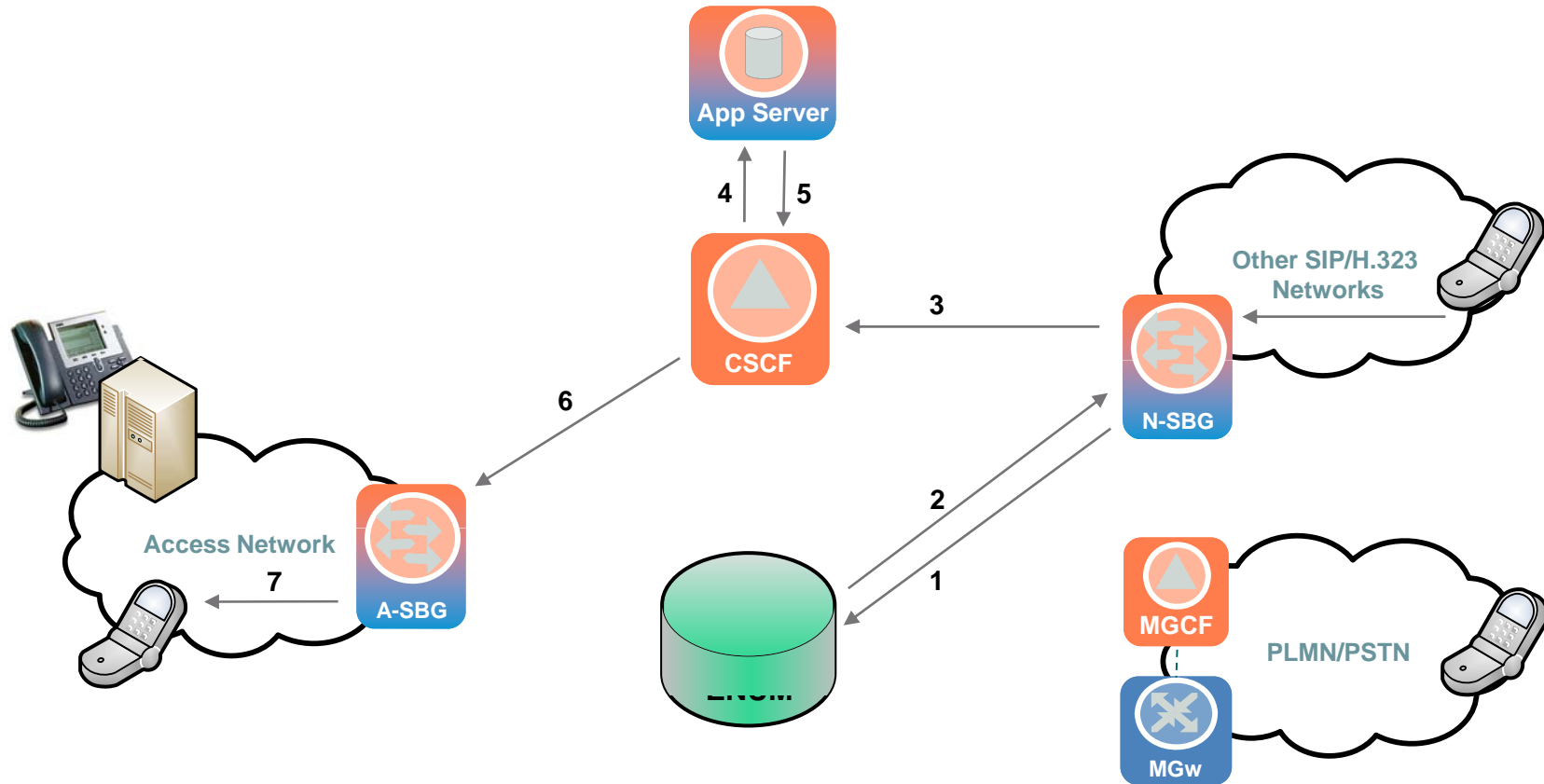


(1) Query: 0.8.7.6.6.4.4.1.2.1.5.3e164.arpa

(2) Answer: sip: +351214466780@domain1.pt

IMS NETWORKS

SIP ROUTING SIMPLIFIED – EXAMPLE USE CASES - III



(1) Query: 2.8.3.5.9.7.2.1.9.1.5.3e164.arpa

(2) Answer: sip: +351912795382@domain2.pt

IP INTERCONNECTION

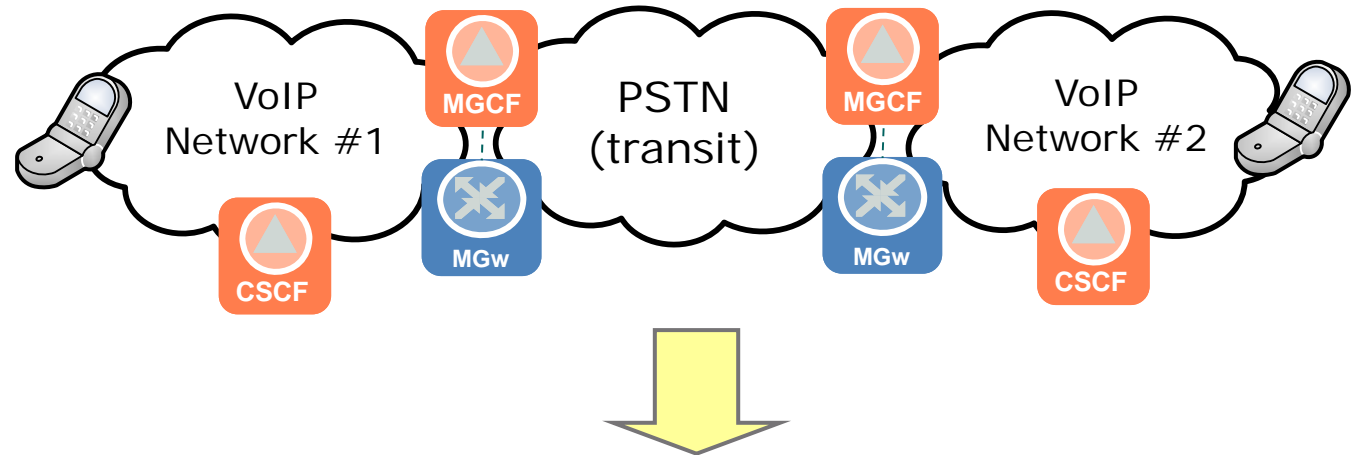


INTERCONNECTION

EVOLUTION TO ALL IP

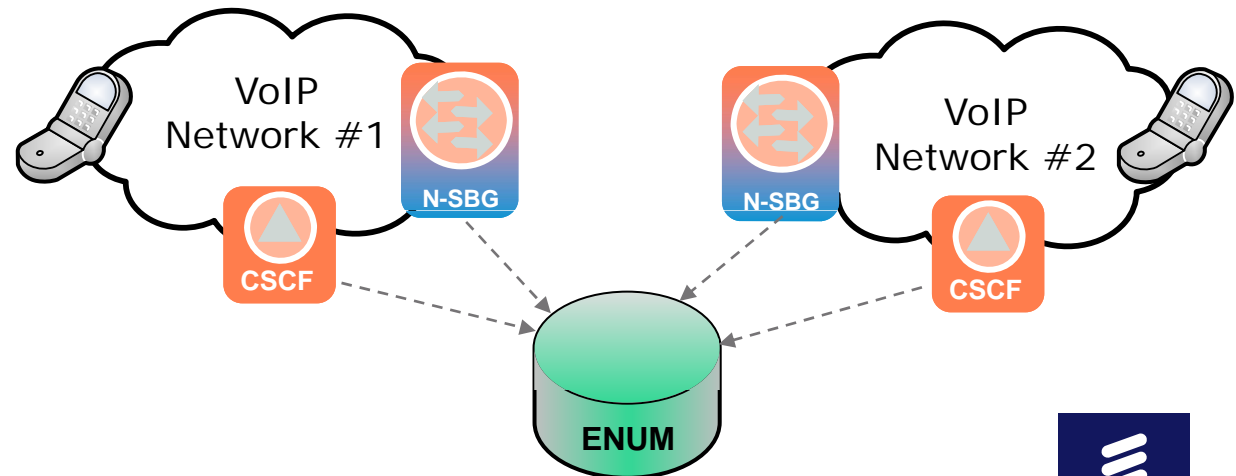
TDM Interconnection:

- Multiple Transcoding
- Costly to maintain
- Service Limited



IP Interconnection:

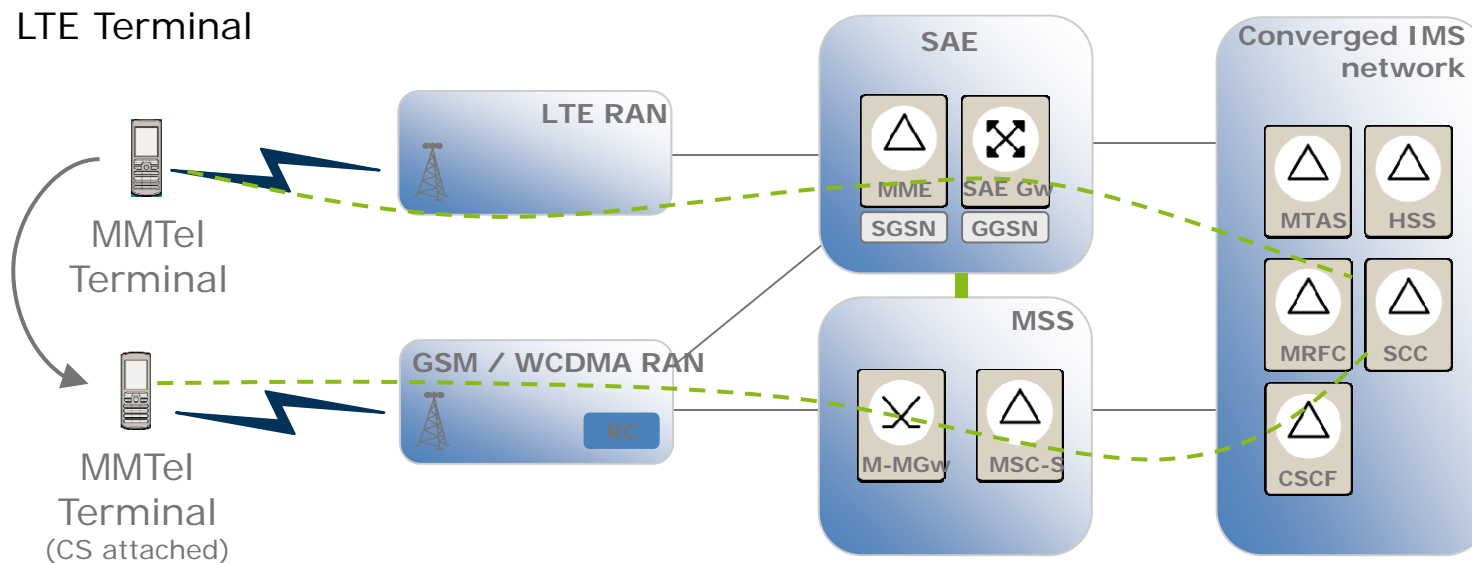
- TrFO
- Reduces OPEX and CAPEX
- Supports Rich MM Services E-2-E (leveraging Interconnection Investment)



3GPP LONG TERM EVOLUTION (LTE)

ALL IP: HOW ABOUT INTERCONNECTION?

All LTE calls switched on All-IP Network



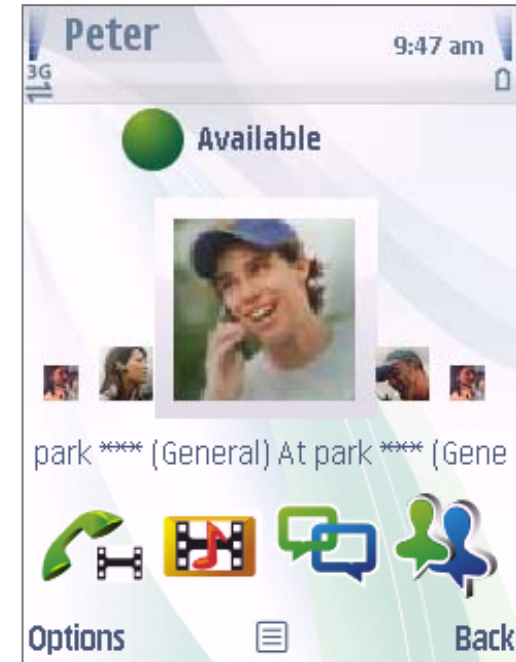
With IP traffic increasing, does it make sense to interconnect Operators with TDM technologies ?

GSMA RICH COMMUNICATION SUITE

LEVERAGING ON IP INTERCONNECT



Multi party chat
(1-1 & 1-n)
Social Presence
Image Share
File Transfer
Video Share
Service Capability
Conversational SMS/MMS
Voice, video telephony
SMS and MMS



Operator Interoperability is key for RCS

With Rich Multimedia traffic increasing, does it make sense to interconnect Operators with TDM technologies ?

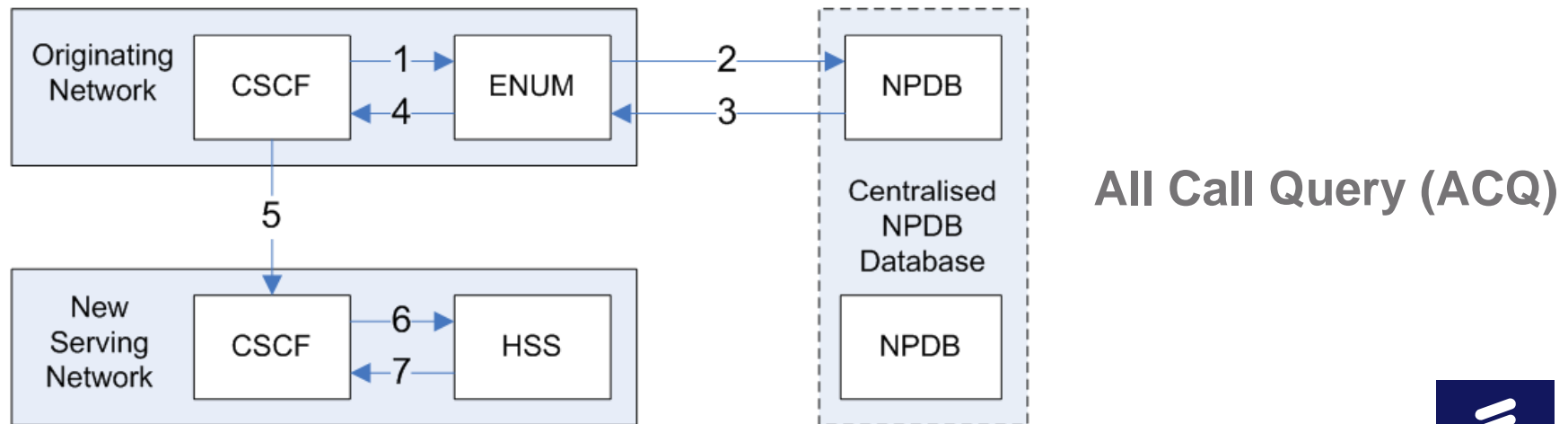
NUMBER PORTABILITY



NUMBER PORTABILITY

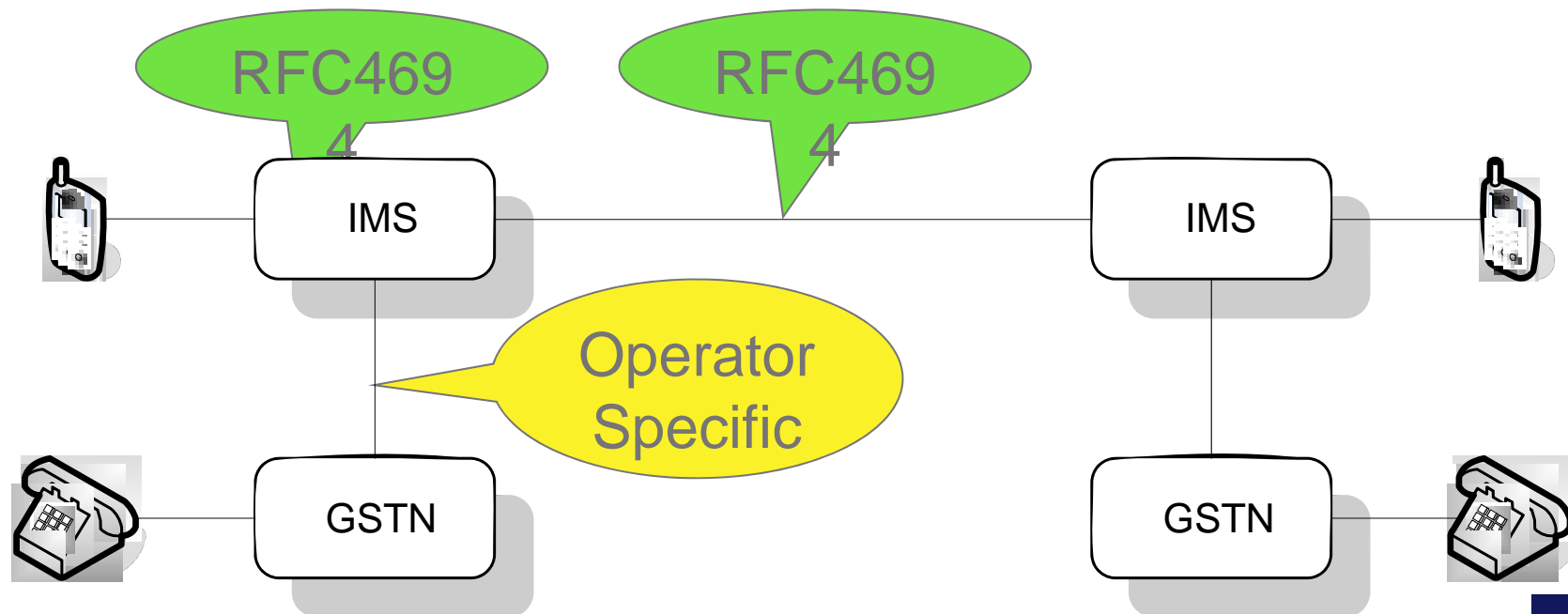
DIFFERENT NP SCHEMES

- › Number Resolution and Forwarding can be broken down into four schemes (RFC 3482)
 - **All Call Query (ACQ)**
 - Onward Routing (OR)
 - Backward 'ported' Indication ("Query on Release", QoR)
 - Backward RN Indication ("Call Dropback")



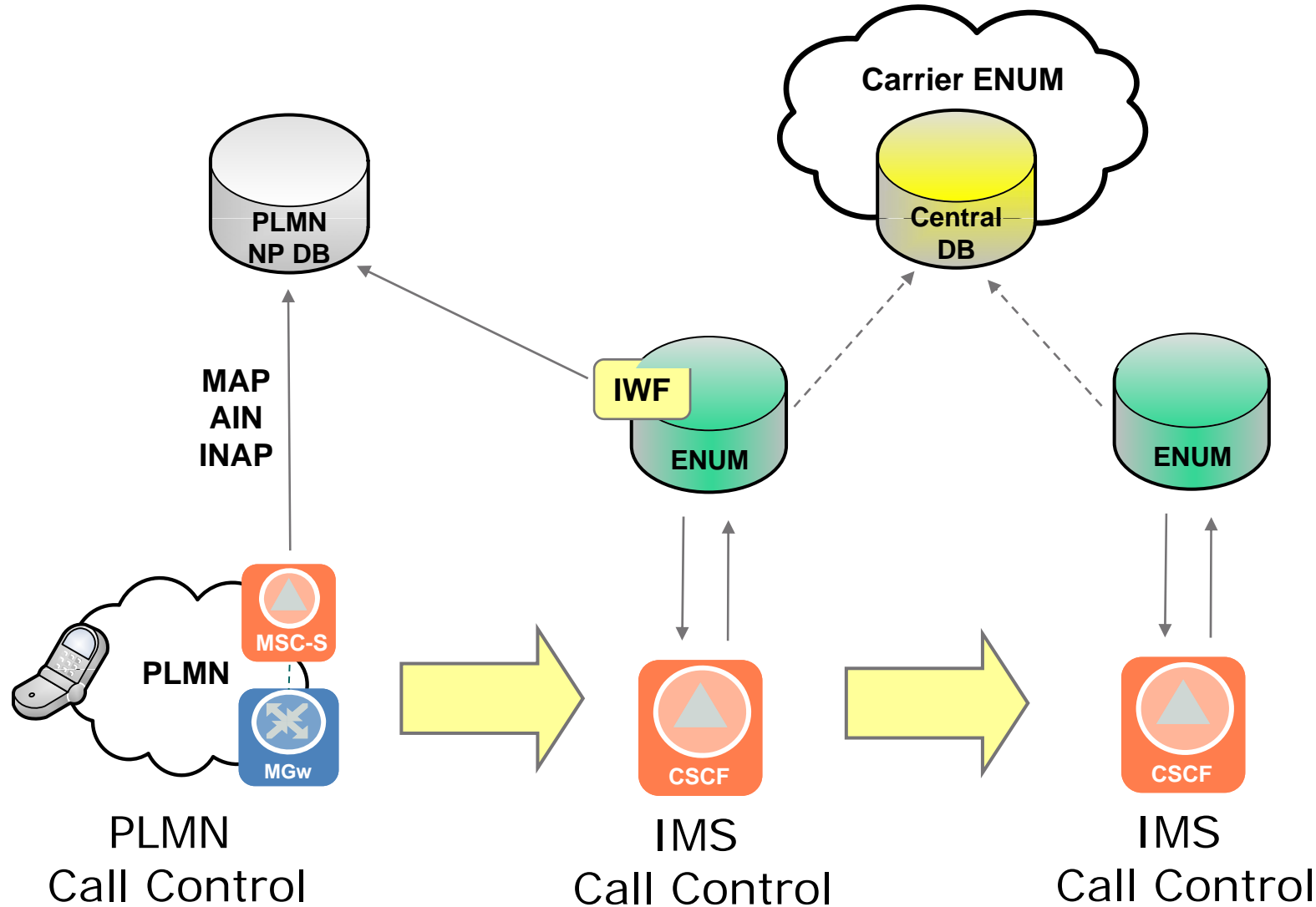
NP PARAMETERS

- › NP Information that has been resolved should be carried forward
- › IMS Format is standardized in RFC 4694
- › GSTN Format (ISUP) is different depending on operator/country



NUMBER PORTABILITY

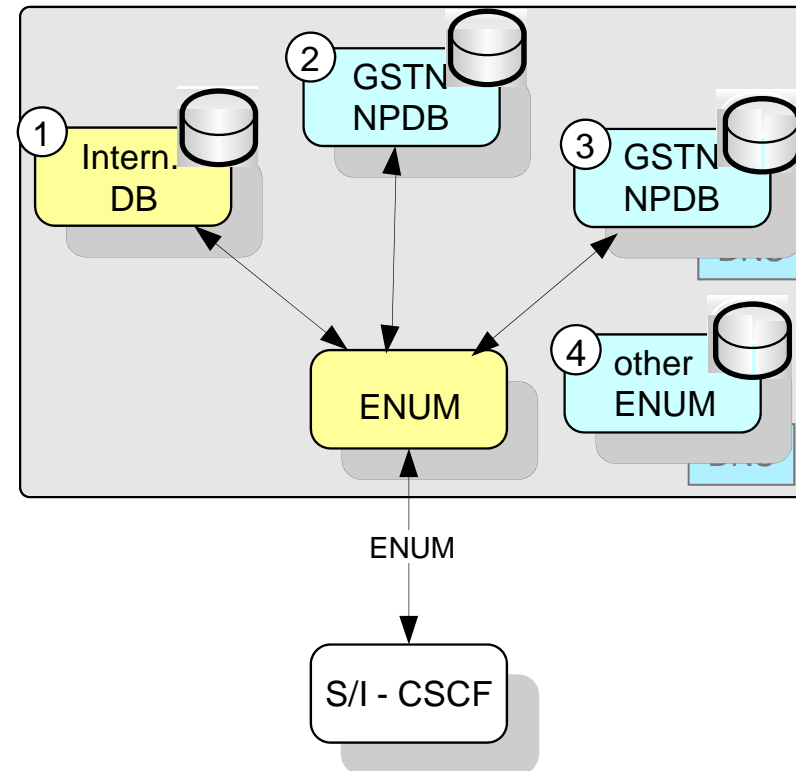
NETWORK EVOLUTION TOWARDS CARRIER ENUM



RESOLVING NP INFORMATION IN IMS

NP information can be found within:

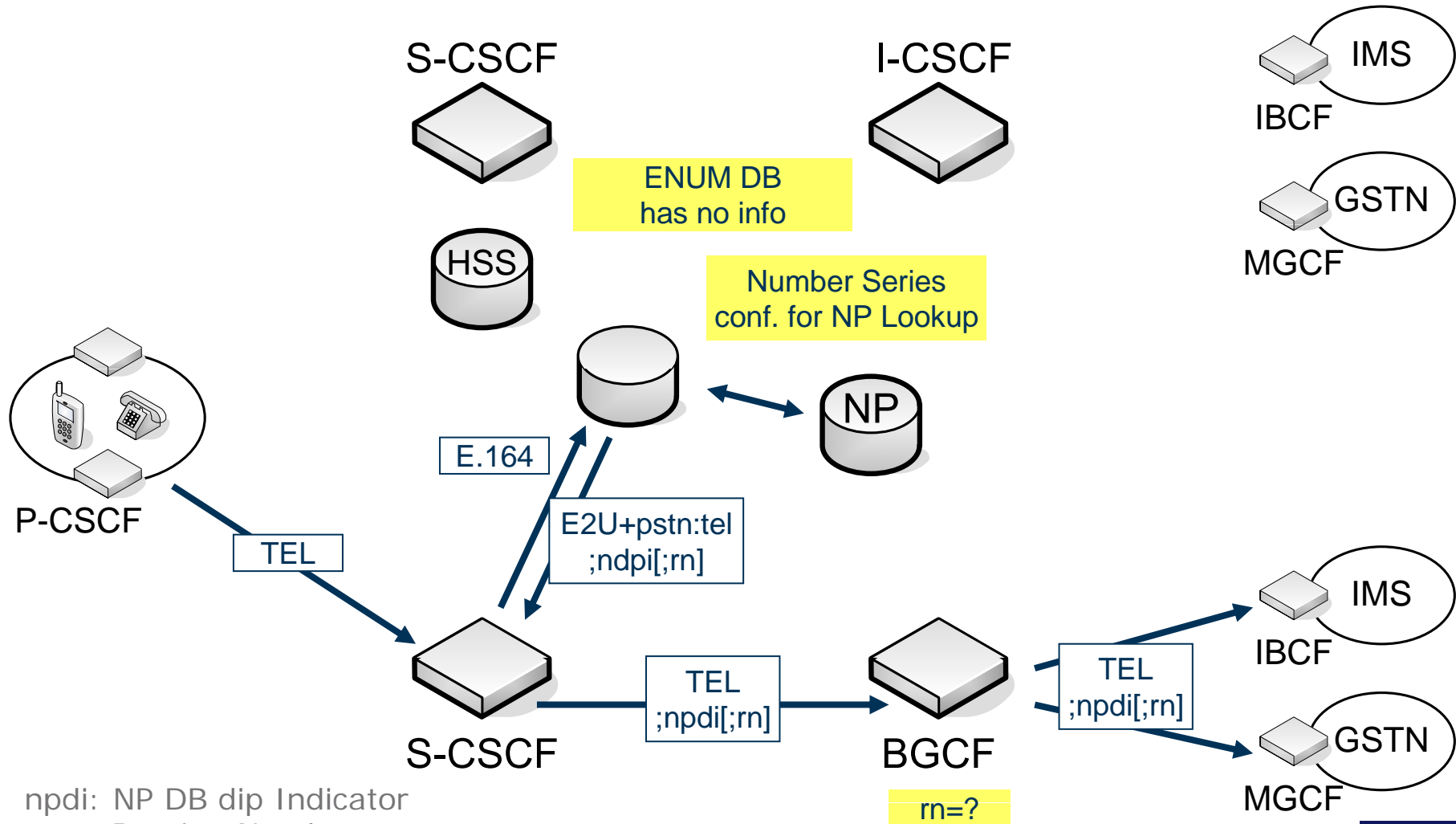
- › Own ENUM DB,
- › Legacy CS (GSTN) Number Portability Databases (e.g. By means of INAP or MAP operations),
- › Potentially also other ENUM servers (in a recursive manner)



This Interworking Function (External Resource Handlers) is critical to facilitate migration to Carrier ENUM based NP

IMS NP EXAMPLE

ORIGINATING ACQ



npdi: NP DB dip Indicator
 rn: Routing Number
 cic: Carrier Identification Code



GSMA PATHFINDER

NUMBER PORTABILITY DISCOVERY



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GSMA Launches World's Most Extensive International Number Portability Registry Service

01 October 2009, London

PathFinder Number Portability Discovery service offers widest global coverage of portability data; Neustar selected to operate database

The GSMA today announced the launch of PathFinder Number Portability Discovery, a GSMA-managed service that will be operated by Neustar, Inc. Designed as a state-of-the-art solution for global number portability, the new service encompasses 2.2 billion telephone numbers that are impacted by number portability worldwide, a figure which is expected to rise rapidly. Number Portability is currently implemented in over 52 countries globally, with many more, including China and India, expected to launch by the end of 2010. The service will also aggregate numbering plan data from virtually every country in the world, including those with high number portability penetration.

"The GSMA's PathFinder Number Portability Discovery service provides critical numbering plan and number portability information that dynamically enables service providers to identify the true destination network for accurate routing," said Alex Sinclair, Chief Technology and Strategy Officer at the GSMA. "The service will help eliminate incremental fees, reduce costs, optimise rates in commercial agreements, improve traffic delivery and pave the way for new feature-rich IP-based services. With their leading credentials in Number Portability, we are pleased to extend our relationship with Neustar, who will operate the service."

PathFinder was created by the GSMA to provide an interoperable, industry-wide solution that enables the routing of global IP service interconnect traffic. The new Number Portability Discovery service will make use of PathFinder's extensive number portability database, which provides access to all national numbering plans and number portability information, where available, throughout the world. With adaptable and extensible interfaces, the service can rapidly incorporate new number portability data for countries coming on line or that plan to implement number portability in the future.

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RELEVANT REFERENCES

ENUM STANDARDIZATION

› IETF ENUM

- E.164 number and DNS (RFC 2916)
- The E.164 to URI DDDS Application (ENUM) (RFC 3761)
- Combined User and Infrastructure ENUM in the e164.arpa tree

› GSMA PRD IR.67

› ETSI TISPAN

- ETSI TR 184 008 ENUM & DNS Guidelines

› ITU-T E.164 Supplement 3:

- Operational and administrative issues associated with national implementations of the ENUM functions

ADVANCED USAGE OF ENUM

ERICSSON IPWORKS ENUM

In addition to the standard features of ENUM, the following are Ericsson IPWorks ENUM Routing Server features that also open new doors to ENUM usage in more complex scenarios:

- Origin Based Routing (Originating Line ID or IP Network Origin) *
- Time of day / week based Routing *
- Digit Manipulation *
- ENUM Server Load Regulation *
- Proportional Distribution over Multiple Routes *
- IN Triggers *
- High Performance: In Memory DB (vs typical BIND Zone files)
- SOAP Interface for Provisioning/Retrieval
- Resource Handler (IWF) for Legacy NPDB interworking

...And deployed in 130+ Customers

SUMMARY

- › Global E.164 addressing is an ASSET, on which Operators should leverage on
- › IP Telephony traffic is increasing
- › End-Users are demanding Innovative, Cheaper and Richer Multimedia Services
- › Current Interconnection mechanisms are not adequate
- › Carrier ENUM is a cost effective enabler for IP Interconnection, and taking advantage of the E.164 addressing asset
- › In NGN Network Transformation, ENUM plays an important role in Number Portability
- › Operator Co-Operation is critical for Carrier ENUM

ERICSSON 

TAKING YOU FORWARD