

# How to combine ENUM, Number Portability, Caller Location for Emergency Services and Central Database of Telephony Subscribers?

ENUM and NGN seminar  
Malaysia, MYNIC  
November, 2007

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# abbreviations

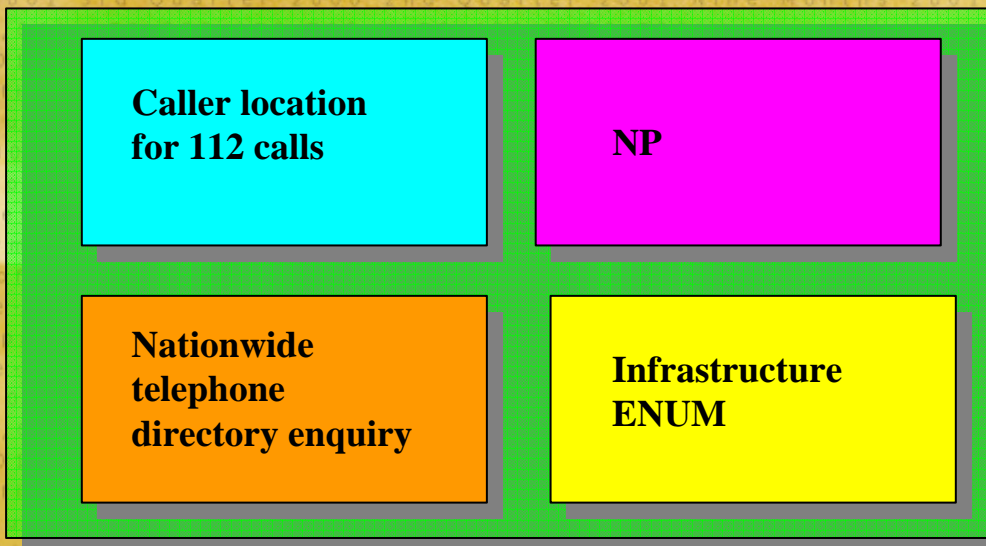
<b>ACN:</b>	<b>Automotive Crash Notification</b>
<b>DDDS:</b>	<b>Dynamic Delegation Discovery System</b>
<b>EBL:</b>	<b>ENUM Branch Location</b>
<b>ECC:</b>	<b>Emergency Control Center</b>
<b>EPP:</b>	<b>Extensible Provisioning Protocol</b>
<b>ETSI:</b>	<b>European Telecommunications Standards Institute</b>
<b>IP:</b>	<b>Internet Protocol</b>
<b>MLP:</b>	<b>Mobile Location Protocol</b>
<b>NAPTR RR:</b>	<b>The Naming Authority Pointer DNS Resource Record</b>
<b>NP:</b>	<b>Number Portability</b>
<b>NPDB:</b>	<b>Number Portability Database</b>
<b>NRA:</b>	<b>National Regulatory Authority</b>
<b>PSAP:</b>	<b>Public Safety Answering Point</b>
<b>PSTN:</b>	<b>Public Switched Telephone Network</b>
<b>URI:</b>	<b>Uniform Resource Identifiers</b>
<b>VPN:</b>	<b>Virtual Private Network</b>
<b>XML:</b>	<b>Extensible Markup Language</b>

# current situation in Poland- as an example

- no central database for Number Portability; no ACQ, QoR implemented
  - expectations to have ACQ for NP,
- no central database for caller location of emergency (112) calls:
  - plans to improve the emergency service (emergency control centers “development” etc),
  - central database for caller location in case of emergency,
- no Infrastructure ENUM implemented,
- problems with existing nationwide telephone directory enquiry.

# idea...

- to implement one **centralized** system to support:
  - Number Portability for ACQ method,
  - caller location service,
  - nationwide telephone directory enquiry,
  - Infrastructure ENUM for Telcos,
  - if possible, facilitate User ENUM.



3rd Quarter 2001 3rd Quarter 2000 2nd Quarter 2001 Nine Months 2001 Nine Months 2000  
 Revenues \$43,641 \$59,338 \$50,789 \$152,499 \$183,706\*  
 Expenses 43,018 55,467 47,979 144,918 166,224\*  
 After-Tax Profit/Loss 405 2,516 1,832 4,927 11,362\*  
 After-Tax Annualized Return on Capital 1.1% 7.3% 5.0% 4.5% 11.4%  
 Assets\*\* 2,680,452 2,342,225 2,562,618 2,680,452\* 2,342,225  
 Capital & Subordinations 150,319\* 139,721 146,179 150,319\* 139,721  
 Commission Revenues 8,062 7,415 6,668 20,215 25,868\*  
 Number of Firms Reporting 261 273 258 272 284  
 Number of Profitable Firms 158 210 171 178 242  
 Aggregate Pre-Tax Earnings of Profitable Firms 2,807 4,300 3,482 10,970 18,470  
 Number of Unprofitable Firms 103 63 87 94 42  
 Aggregate Pre-Tax Earnings of Profitable Firms (2,183) (428) (663) (3,388) (989)

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**caller location (112 calcs)**

# 112: legal side

## Poland (as example of the regulations in EU):

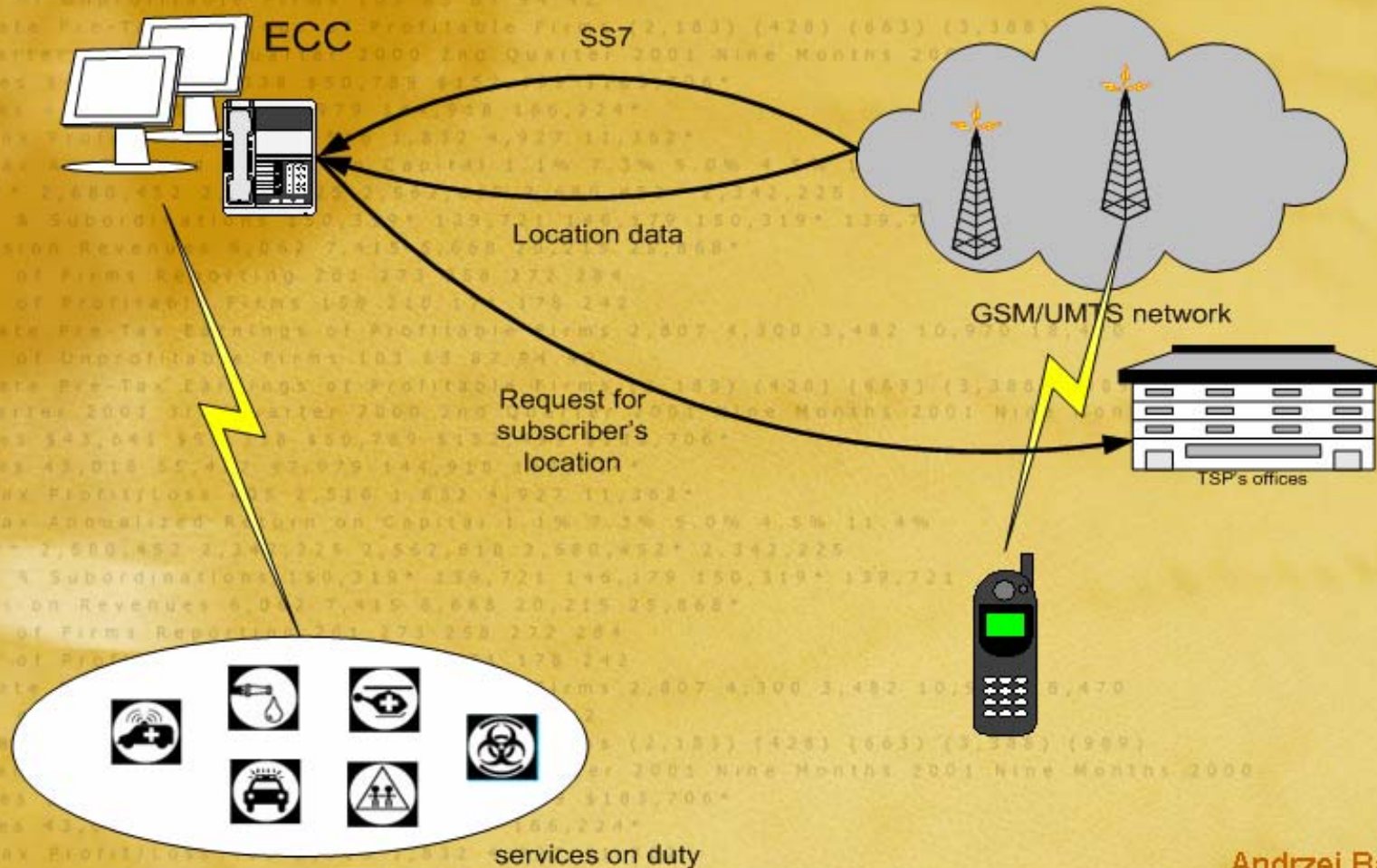
- **Telecommunications Law**  
July 16, 2004 art.78 & 169
- **National Emergency Medical Service (EMS) Law**  
September 8, 2006 art.25 & 28

## EU:

- **Directive 98/10/EC "the application of open network provision (ONP) to voice telephony and on universal service for telecommunications in a competitive environment"**
- **Directive 2002/22/EC "universal service and users' rights relating to electronic communications networks and services"**
- **Commision Paper on the current situation regarding the single European emergency number 112**  
**DG INFSO/B2 COCOM06-31 (October 11, 2006)**

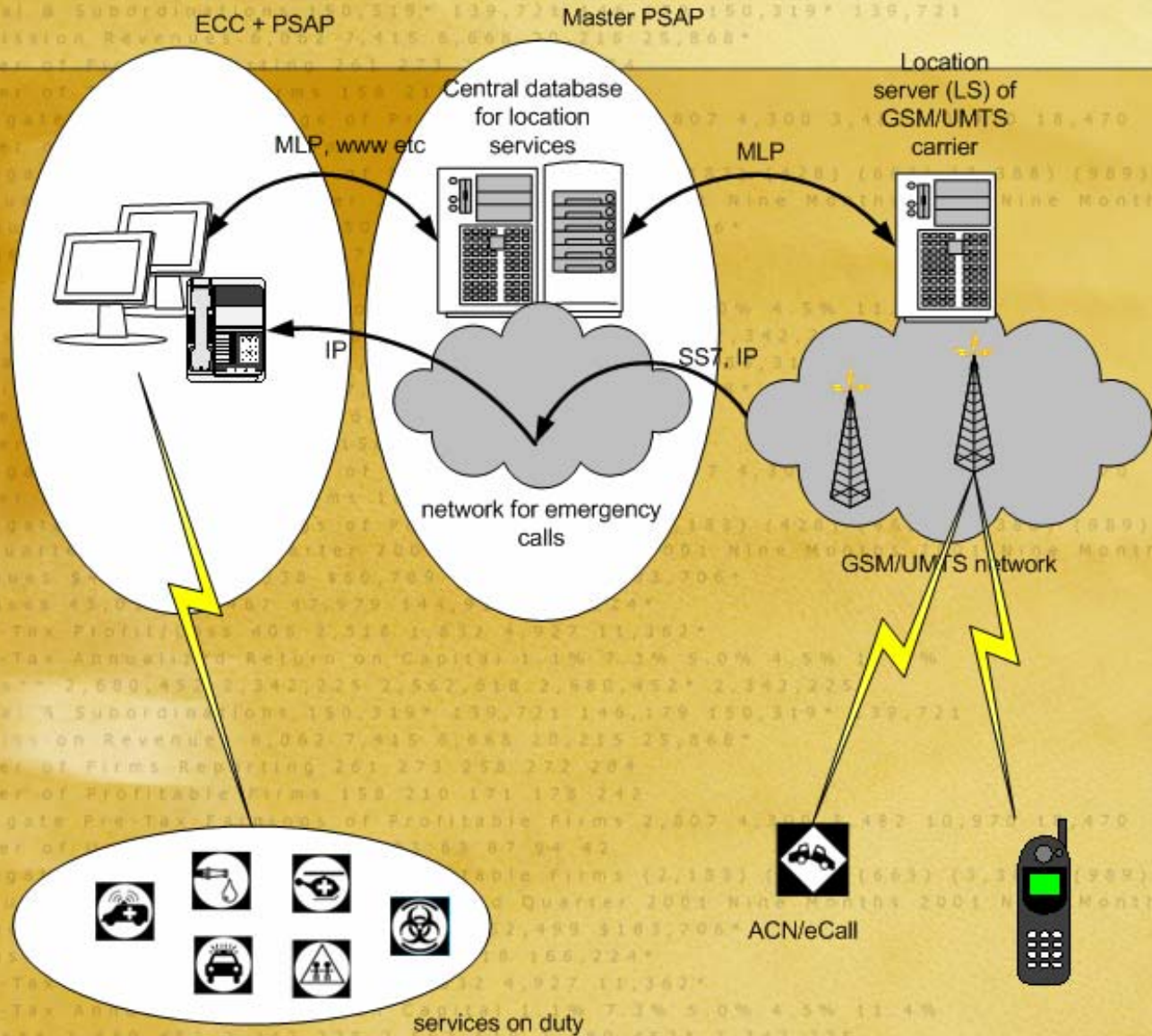
# 112: data flow (existing situation)

112



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# 112: data flow (optimal)



# requirements for the central location system/database (112)

- XML interface to the system:
  - MLP (ETSI TS 102 164) based on XML (for geo-location data and subscribers' postal addresses),
  - EPP or E.115 version 2 (XML) for accessing subscriber's data (postal address for mobile users and network termination point address for PSTN),
- access for actors: carriers + emergency services on duty,
- requirements for security: secure data flow (based on SSL, IPsec), strong authentication (using digital certificates), data accuracy, etc.,
- requirements for reliability and high availability, "always-on" approach: high % of availability (99,999% "five 9s") + (optimal) physical layer based on fiber-optic + backup links,
- application performance and scalability required: in case of increase of subscribers (customers for eCall as example).

# types of data to be stored and managed

- for PSTN subscribers:
  - network termination point (postal address).
- for nomadic users:
  - postal address provided by the user in the end-user panel.
- for mobile subscribers:
  - geographical location of the mobile device (phone),
  - postal address of the subscriber (for post-paid users and registered pre-paid users only).

# methods for data access

- data transfer from PSTN, nomadic operator to centralized system:

	daily update	PUSH method	PULL method
postal address or network termination point address	yes (preferred)	yes	yes

# methods for data access

- data transfer from mobile to centralized system:

	daily update	PUSH method	PULL method
geographical location	no	yes	yes
postal address of the subscriber	yes (preferred)	no not possible for MVNO and in case of internal roaming	yes

# "push" versus "pull"

112

Brussels, 11 October 2003  
DG INFSO/B2

**COCOM06-31**



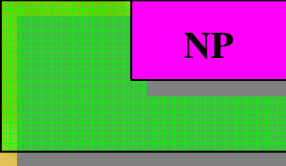
EUROPEAN COMMISSION  
Directorate-General Information Society and Media  
Communications Services  
Implementation/Committees

The Commission believes that best practices and certain more advanced aspects of caller location information should now be discussed. For emergency services, speed and accuracy of caller location information are two very important attributes. Valuable time is saved when the caller location is automatically “pushed” to the emergency centre by the network operator. A less sophisticated method requires the PSAP to ask the network operator for the caller location, which can take several minutes (“pull”).

As use of “pull” technique potentially prolongs the response time and limits the possibilities for introduction of new and innovative solutions, such as eCall, the Commission recommended in July 2003 that Member States should implement the “push” method. Article 4 of the Commission Recommendation states that *“for every emergency call made to the European emergency call number 112, public telephone network operators should, initiated by the network, forward (push) to public safety answering points the best information available as to the location of the caller, to the extent technically feasible. For the intermediate period up to the conclusion of the review as referred to in point 13 below [i.e. Member States are to report to the Commission on the status of implementation by the end of 2004], it is acceptable that operators make available location information on request only (pull).”* It is therefore clear that the “pull” technique is only accepted throughout an interim period following which the availability of “push” technique must be ensured.

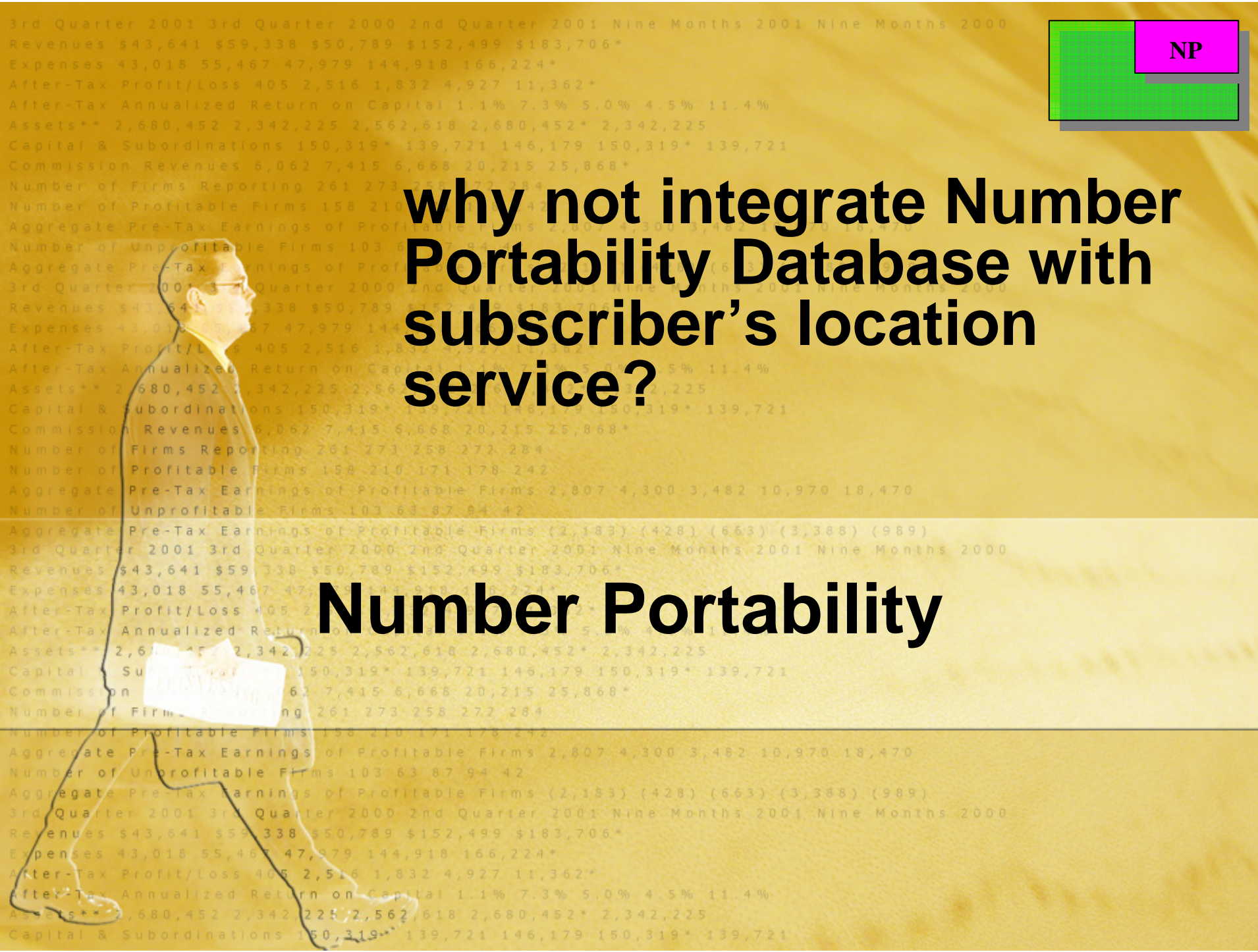
# special cases...

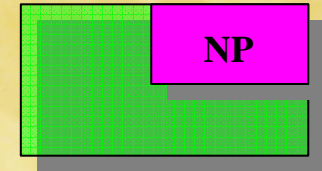
	<b>geographical location</b>	<b>postal address of the subscriber</b>
<b>no SIM card</b>	<b>possible (carrier uses IMEI to combine location &amp; call)</b>	<b>not possible</b>
<b>SIM card is not logged in the network</b>	<b>possible (same situation as without SIM card)</b>	<b>not possible</b>
<b>no SIM and wrong IMEI (like IMEI: "00-000000-00000-0" - typical if mobile phone is stolen)</b>	<b>problems with matching call to emergency center and location of the device (time stamp may be in some cases used)</b>	<b>not possible</b>



why not integrate Number Portability Database with subscriber's location service?

Number Portability





# legal side

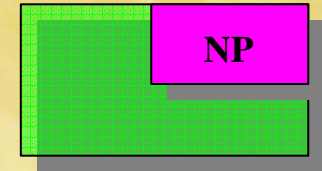
**Poland (as example of the regulations in EU):**

- **Telecommunications Law July 16, 2004 art.78 & 169**
- **"Customer's rights in public telephony" – decree March 1, 2006.**

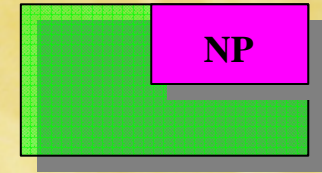
**EU:**

- **Directive 2002/22/EC "universal service and users' rights relating to electronic communications networks and services".**

# requirements for number portability database (NPDB)

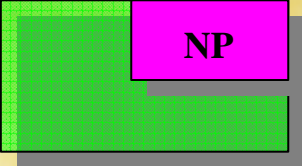


- full support for numbers' porting process (number porting, exceptions handling, timeouts etc.),
- interface to the system: probably based on XML,
- access for actors: carriers + NRA,
- support for ACQ and QoR porting method,
- requirements for security: secure data flow (based on SSL, IPsec), strong authentication (using digital certificates), data accuracy, etc.,
- requirements for reliability and high availability: high % of availability (99,999% in some cases – depends on the national regulations/decisions) ,
- application performance and scalability required: in case of increase of subscribers willing to port the number (see the case in Spain two years ago...), Fix to Mobile portability etc.

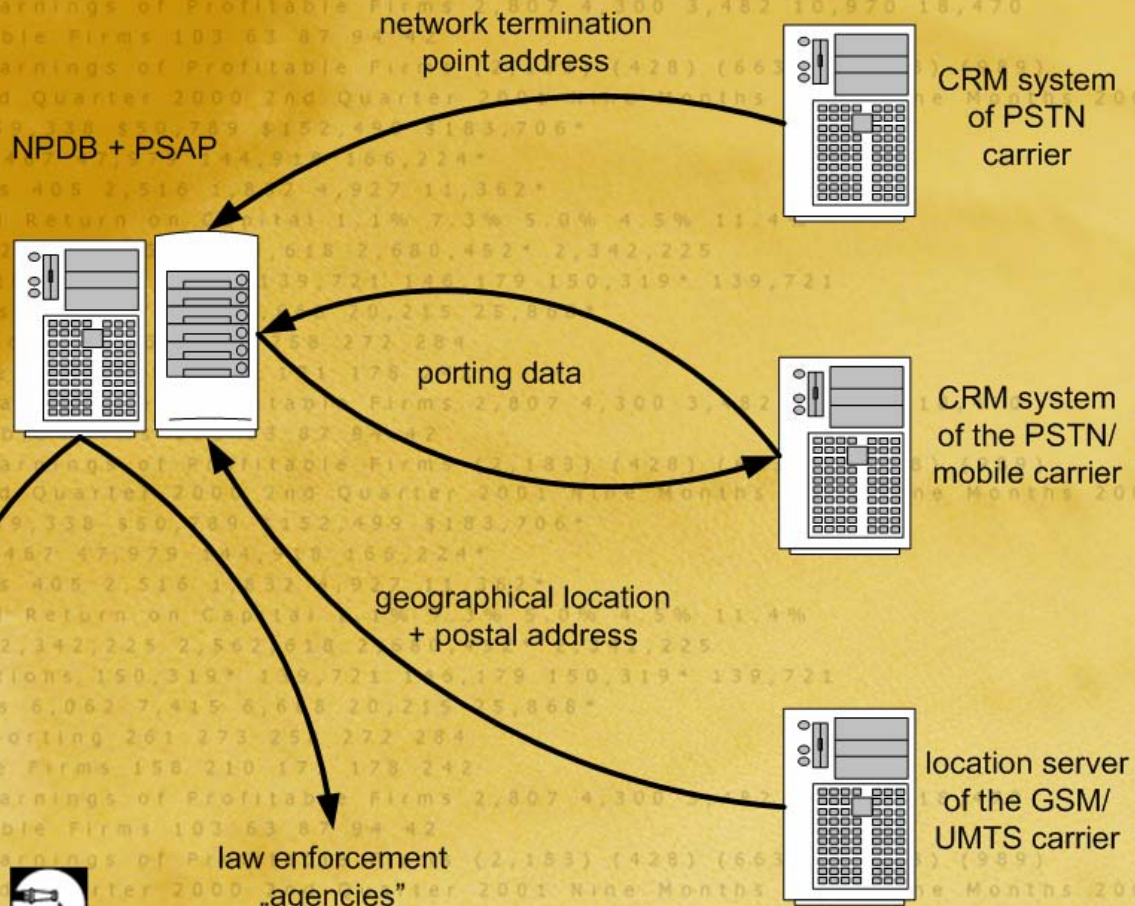


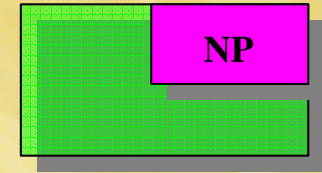
# why not integrate?

- for location services, PSAP/ECC must keep information which carrier is responsible for particular number
- solution for on-line integration of NP and 112 location is (anyway) required...



# NP & 112 integration

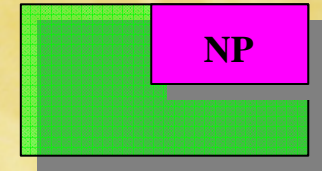




# if integrated, profits:

- the same central system (servers, software, collocation, support) = lower costs – government is 😊
- the same access to the central system (VPN, dedicated optical fibers + backup) = the same cost for access 112 and NPDB systems – carriers are 😊
- XML (why not EPP?) for both MLP and NP creates simplicity – auditors are 😊

# ENUM can support NP – well know idea



**\$ORIGIN 0.7.5.1.4.2.6.0.6.4.8.e164.arpa.**

**NAPTR 10 100 "u" "E2U+pstn:tel"**

**"!^.\*\$!tel:+48606241570;rn=+48223808595;  
npdi!"**

- **npdi ("NP Database Dip Indicator") and rn (routing Number) are used in the example,**
- **the "rn" parameter carries the routing number information. The "rn-context" parameter describes how the "rn" parameter value should be interpreted when the value is not a "global-rn",**
- **the NP database dip indicator is used to inform the downstream servers or switches during call setup that there is no need to perform the NP database dip for a geographical telephone number again. The "npdi" parameter carries such an indicator.**

# XML schema © NASK for NP

NP

```
<?xml version="1.0" encoding="UTF-8" ?>
```

```
<schema targetNamespace="http://www.dns.pl/np-1.0"
```

```
xmlns:np="http://www.dns.pl/np-1.0"
```

```
xmlns:epp="urn:ietf:params:xml:ns:epp-1.0"
```

```
xmlns:eppcom="urn:ietf:params:xml:ns:eppcom-1.0"
```

```
xmlns="http://www.w3.org/2001/XMLSchema" elementFormDefault="qualified">
```

```
<import namespace="urn:ietf:params:xml:ns:eppcom-1.0" schemaLocation="eppcom-1.0.xsd" />
```

```
<import namespace="urn:ietf:params:xml:ns:epp-1.0" schemaLocation="epp-1.0.xsd" />
```

```
<annotation>
```

```
<documentation>Extensible Provisioning Protocol v1.0, Number Portability [np] schema.
```

```
</documentation>
```

```
</annotation>
```

```
<!-- requests -->
```

```
<element name="transfer" type="np:transferType" />
```

```
<element name="info" type="np:sNumberType" />
```

```
<element name="check" type="np:mNumberType" />
```

# cont...

NP

```
<!-- The transfer of object is equivalent to the porting request. -->
<complexType name="transferType">
  <sequence>
    <!-- phone number in E164 format -->
    <element name="number" type="np:e164Type" />
    <!-- routing number, routing prefix? -->
    <element name="routingNumber" type="string" minOccurs="0" />
    <!-- requested porting date -->
    <element name="portingDate" type="dateTime" minOccurs="0" />
    <!-- service type -->
    <element name="service" type="np:serviceType" minOccurs="0" />
    <!-- donor identifier -->
    <element name="donorId" type="string" minOccurs="0" />
    <!-- optional subscriber info -->
    <element name="subscriber" type="np:subscriberType" minOccurs="0" />
    <!-- request identifier -->
    <element name="id" type="np:e164Type" minOccurs="0" />
  </sequence>
</complexType>
<complexType name="serviceType">
  <!-- mobile/fix -->
  <attribute name="type" type="token" use="required" />
  <!-- additional info -->
  <attribute name="subtype" type="token" use="optional" />
</complexType>
```

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# cont...

NP

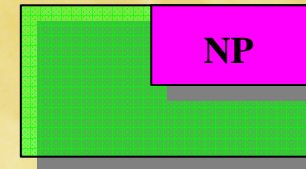
```
<complexType name="sNumberType">
  <sequence>
    <element name="number" type="np:e164Type" />
  </sequence>
</complexType>

<complexType name="mNumberType">
  <sequence>
    <element name="number" type="np:e164Type" maxOccurs="unbounded" />
  </sequence>
</complexType>

<complexType name="subscriberType">
  <sequence>
    <element name="individual" type="np:IndividualType" minOccurs="0" />
    <element name="nonIndividual" type="np:NonIndividualType" minOccurs="0" />
  </sequence>
</complexType>

<complexType name="IndividualType">
  <sequence>
    <element name="nip" type="np:nipType" />
    <element name="idNumber" type="token" />
    <element name="passportNumber" type="token" minOccurs="0" />
    <element name="name" type="np:PersonType" />
    <element name="telephoneNumber" type="np:e164Type" minOccurs="0" />
    <element name="faxNumber" type="np:e164Type" minOccurs="0" />
    <element name="email" type="token" />
    <element name="address" type="np:AddressType" />
    <element name="mailingAddress" type="np:AddressType" />
  </sequence>
</complexType>
```

# cont...



```
<complexType name="PersonType">
```

```
<sequence>
```

```
<element name="firstName" type="token" />
```

```
<element name="lastName" type="token" />
```

```
</sequence>
```

```
</complexType>
```

```
<complexType name="AddressType">
```

```
<sequence>
```

```
<element name="street" type="normalizedString" maxOccurs="unbounded" />
```

```
<element name="city" type="token" />
```

```
<element name="postalCode" type="token" />
```

```
<element name="CountryCode" type="np:ccType" />
```

```
</sequence>
```

```
</complexType>
```

```
<simpleType name="nipType">
```

```
<restriction base="token">
```

```
<pattern value="[0-9]+">
```

```
</restriction>
```

```
</simpleType>
```

```
<simpleType name="ccType">
```

```
<restriction base="token">
```

```
<pattern value="[a-z][a-z]"/>
```

```
</restriction>
```

```
</simpleType>
```

```
<!-- child response elements -->
```

```
<element name="chkData" type="np:chkDataType" />
```

```
<element name="infData" type="np:infDataType" />
```

```
<element name="trnData" type="np:trnDataType" />
```

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# cont...

NP

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```
<complexType name="chkDataType">
  <sequence>
    <element name="cd" type="np:checkType" maxOccurs="unbounded" />
  </sequence>
</complexType>

<complexType name="checkType">
  <sequence>
    <element name="number" type="np:checkNumberType" />
    <element name="reason" type="eppcom:reasonType" minOccurs="0" />
  </sequence>
</complexType>

<complexType name="checkNumberType">
  <simpleContent>
    <extension base="eppcom:labelType">
      <attribute name="avail" type="boolean" use="required" />
    </extension>
  </simpleContent>
</complexType>

<complexType name="infDataType">
  <sequence>
    <!-- phone number -->
    <element name="number" type="np:e164Type" />
    <!-- routing number, routing prefix -->
    <element name="routingNumber" type="string" />
    <!-- current service provider identifier -->
    <element name="splID" type="string" />
    <element name="portingDate" type="dateTime" />
    <!-- service type -->
    <element name="service" type="np:serviceType" minOccurs="0" />
  </sequence>
</complexType>
```

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# cont...

NP

```
<complexType name="panDataType">
  <sequence>
    <element name="number" type="np:paNameType" />
    <element name="paTRID" type="epp:trIDType" />
    <element name="paDate" type="dateTime" />
  </sequence>
</complexType>

<complexType name="paNameType">
  <simpleContent>
    <extension base="eppcom:labelType">
      <attribute name="paResult" type="boolean" use="required" />
    </extension>
  </simpleContent>
</complexType>

<complexType name="trnDataType">
  <sequence>
    <element name="id" type="token" />
    <element name="number" type="np:e164Type" />
    <element name="trStatus" type="eppcom:trStatusType" />
    <element name="reID" type="eppcom:clIDType" />
    <element name="reDate" type="dateTime" />
    <element name="acID" type="eppcom:clIDType" />
    <element name="acDate" type="dateTime" />
  </sequence>
</complexType>

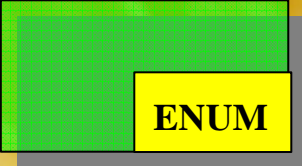
<simpleType name="e164Type">
  <restriction base="token">
    <pattern value="(\\+[0-9]{1,3}\\[0-9]{1,14})?" />
    <maxLength value="17" />
  </restriction>
</simpleType>
</schema>
```

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# other services to be implemented on "CBD"

Discussion on NP brings other ideas what should be supported by the integrated system:

- database storing information on the numbering ranges assigned by NRA (equivalent to numbering plan),
- database storing information on the numbering ranges that were **reassigned** (assigned by NRA to carrier "X" and than carrier "X" has assigned it to carrier "Y") + references to the agreements between carriers,
- support for "Infrastructure ENUM",
- **potential support for data validation** in "User ENUM",
- database for nationwide directory service + "nationwide telephone directory enquiry".

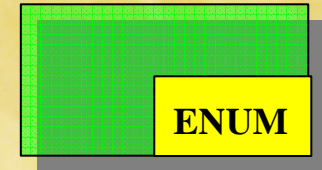


if 112 location service and  
Number Portability are  
integrated, why not use  
"Infrastructure ENUM" as  
the platform?

**Infrastructure ENUM**

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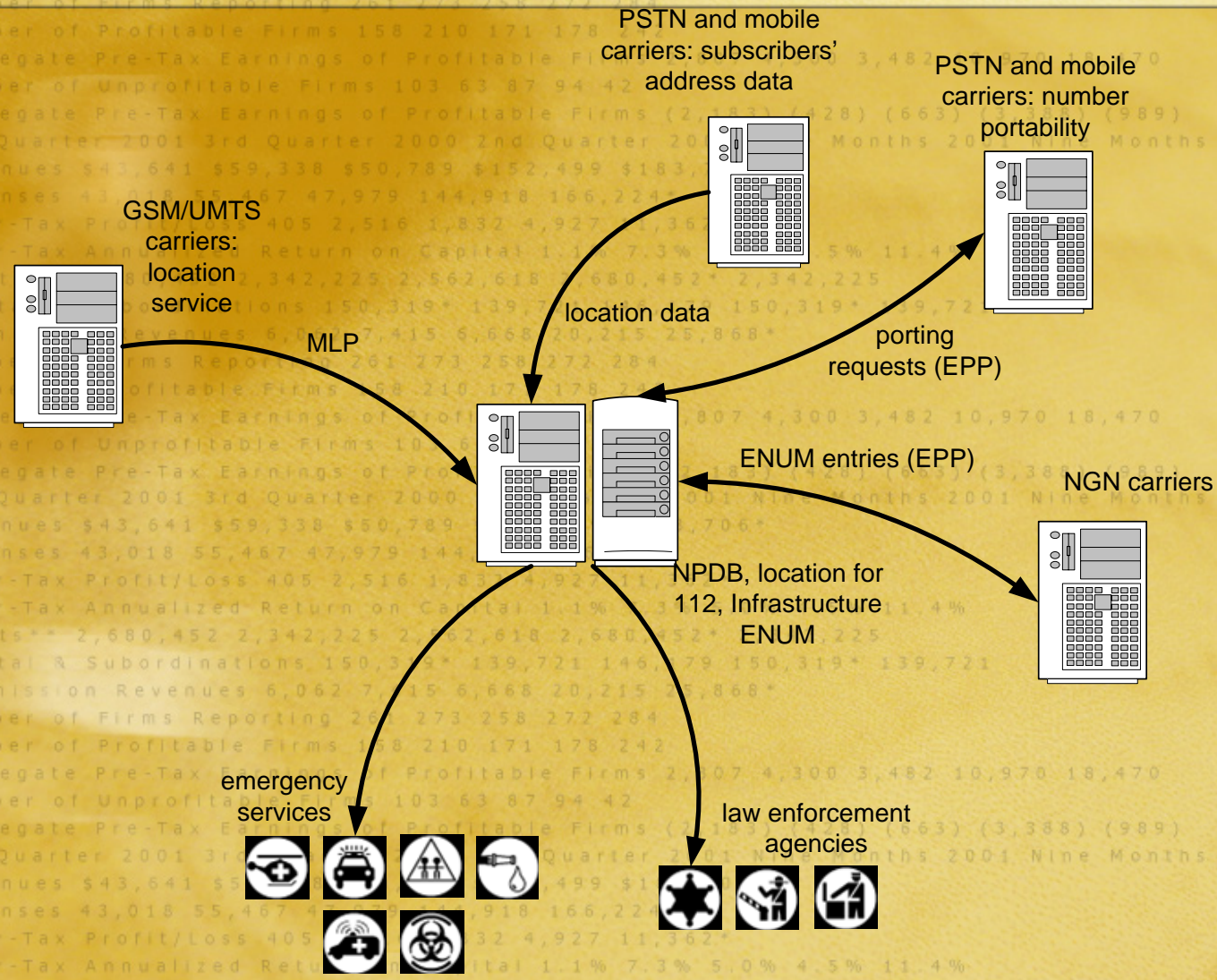
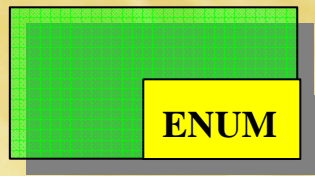




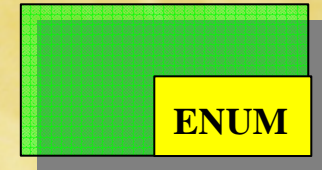
# reasons for integration

- typical interfaces of the ENUM registries are based on XML and EPP,
- NP and 112 should be anyway integrated,
- anyway, carriers move their networks to NGN,
- VoIP carriers will be (probably) finally forced to implement EU regulations on 112 (and Skype with their allergy to emergency calls too...)
- EPP fulfills all requirements for NP protocol,
- all the security, availability, scalability requirements for 112 and NP are applicable for Infrastructure ENUM too,
- carriers play key role in 112, NP and “Infrastructure ENUM”.

# logical structure

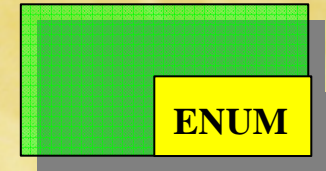


# requirements...



	<b>112</b>	<b>NPDB</b>	<b>Infrastructure ENUM for convergent services</b>
<b>access for carriers</b>	Yes	Yes	Yes
<b>access for emergency services</b>	Yes	Yes	No
<b>access for NRA</b>	Yes	Yes	Yes
<b>access protocol based on XML</b>	Yes (MLP)	Not necessary	Yes (EPP)
<b>special requirements for security</b>	Yes	Yes	Yes
<b>special requirements for reliability and availability</b>	Yes	Yes	Yes
<b>application performance and scalability required</b>	Yes	Yes	Yes
<b>two datacenters (separated)</b>	Yes	Yes	Yes
<b>dedicated reliable links (fiber-optics as example)</b>	Yes	Yes	Yes
<b>24 / 7 / 365 support (call center)</b>	Yes	Yes	Yes

Andrzej Bartosiewicz  
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# should we think about it?

yes, if:

- there is no central database/system for subscribers' location (112/911),

OR

- there is no ACQ, QoR and NPDB,

OR

- NPDB and subscriber's location service are not integrated,

OR

- NPDB doesn't support porting flows (only storing the records containing E.164 numbers + rn).

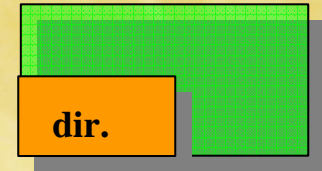
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**if 112 location Number Portability and "Infrastructure ENUM" are integrated, why not use it for Nationwide Telephone Directory Enquiry?**

# Nationwide Telephone Directory Enquiry



# requirements for nationwide telephone directory enquiry



- subscribers' data (name/company name + postal address) to be stored in the system,
- necessary to have access to the NP data,
- interface to the system: probably based on XML,
- access for actors: end users via dedicated call center,
- requirements for security: secure data flow (based on SSL, IPsec), strong authentication (using digital certificates), data accuracy, etc.,
- requirements for reliability and high availability: low % of availability (98% - depends on the national regulations/decisions) ,

# legal side

dir.

## Poland (as example of the regulations in EU):

- Telecommunications Law  
July 16, 2004

art.67

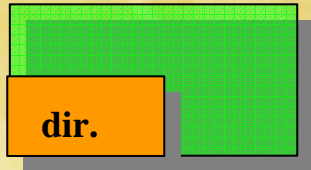
# why not to integrate?



dir.

- telephone directory enquiry requires up-to-date subscribers data (postal address + name/surname or company name) to be on-line accessible – exactly what is stored by the system for location services,
- end users wants to know who is “carrier of record” – to be able to determine the prices when calling the number.

# methods for data access



- data transfer from mobile, PSTN, nomadic carriers to the centralized system:

	daily update	PUSH method	PULL method
subscribers' data including postal address	yes	no	yes

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# Poland as an example of *potential* integration of Infrastructure ENUM, Number Portability database and central database for emergency services (location, calls routing)

## Case study



# background (1)

- 2003 Technical WG (UKE + gov. representatives + carriers) for NP has been created @ UKE (NRA of Poland):

[http://www.uke.gov.pl/uke/index.jsp?place=Menu01&news\\_cat\\_id=289&layout=3](http://www.uke.gov.pl/uke/index.jsp?place=Menu01&news_cat_id=289&layout=3)

- 2004 – new Telco Law implementing NP... theoretically only, no NP in real life...

[http://www.bartosiewicz.pl/Telecommunication\\_Act\\_2004.pdf](http://www.bartosiewicz.pl/Telecommunication_Act_2004.pdf)

- 2005 – all GSM/UMTS carriers working on central database to be maintained by separated entity;

*failure of the project...*

- End of 2006 – "real" NP deployment:

- OR method implemented for PSTN; customers complain on difficult, long and not efficient procedure
- GSM/UMTS - each carrier maintain own NP database of all ported numbers, it's not central database...

# background (2)

- January 2007 – UKE decided to integrate NP and caller location for 112 and create central database

[http://www.uke.gov.pl/uke/index.jsp?place=Lead01&news\\_cat\\_id=259&news\\_id=1732&layout=3&page=text](http://www.uke.gov.pl/uke/index.jsp?place=Lead01&news_cat_id=259&news_id=1732&layout=3&page=text)

- two open sessions dedicated to Central Database ("CBD")

[http://www.uke.gov.pl/uke/index.jsp?place=Lead01&news\\_cat\\_id=259&news\\_id=1969&layout=3&page=text](http://www.uke.gov.pl/uke/index.jsp?place=Lead01&news_cat_id=259&news_id=1969&layout=3&page=text)

- Technical Working Group for "CBD" created (representatives of telco and media Chambers + gov. people)

- All GSM/UMTS carriers + some PSTN supporting the idea of CBD integrating ENUM, NP and subscriber's location service:

[http://www.piiit.org.pl/\\_gAllery/63/78/6378.pdf](http://www.piiit.org.pl/_gAllery/63/78/6378.pdf)

# background (3)

- Parliament working on new Telco law; unfortunately there are "more" important issues for our Parliament now...
- In case of early elections, upgrade of Telco law will be postponed and "CBD" tender will have to wait
- New Telco Law will cover *inter alia*:
  - UKE to maintain (directly or outsourced to 3rd party) "CBD" for subscriber's location + NP,
  - "CBD's" costs to be covered from the charges for assigned numbering ranges.
- UKE & Tech WG view on "CDB":
  - **[portability]**: Support for administrative flows (all porting scenarios / processes); data to be retained during porting process only; possibility to deactivate this function for PSTN carriers on request,
  - **[portability]**: Data necessary for calls' routing (number, routing number, carrier) to be stored in database,

# background (4)

- UKE & tech WG view on "CDB" cont.
  - [portability]: NP data to be distributed once per day (porting window) and on demand [no decision yet],
  - [portability]: Export of the porting data in different formats; ENUM not the only format to be implemented; ENUM as platform for NGN or interested parties,
  - [location]: Support for TS 102 164 standards between „CBD" and carriers for geo-location data,
  - [location]: Support for PUSH method for subscriber's location service [no decision yet],
  - [location]: No direct exchange of information between ECC and carriers.
  - [location]: Support for XML based protokol for data exchange between "CBD" and carriers for subscribers' address data (both for 112 and directory enquiry) – E.115 v2 or EPP [no decision yet],

# background (5)

- Technical WG (112/NP) results to be announced in December 2007 (very optimistic) / February (realistic) 2008,
- As of November 20<sup>th</sup>, 2007, **19 meetings** of “CBD and 112 Tech. WG” took place.
- Next step (probably) is the public tender:
  - UKE will choose the company responsible for “CBD” development,
  - UKE will choose the collocation facilities for “CBD’s” datacenter(s),
  - “CBD” to be implemented and deployed; ACQ or QoR to be chosen,
  - PSAP / ECC will be integrated with “CBD” (for clarification: in Poland ECCs play PSAP role too, no centralised PSAP so far).

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**off-topic... but User ENUM  
Registration system may be  
integrated with Central  
DataBase (“CBD”)....**

**new User ENUM rules**



# old Rules for User ENUM

- valid in: 2004 – 2007
- consent of Carrier required – perfect method to stop registrations... ☹
- cost: 5 EUR / year
- EPP as registration protocol

# new Rules for User ENUM

## ■ September – November 2007:

- public consultations conducted by NRA
- just one comment received from one mobile carrier
- new rules (terms and conditions) awaiting final approval of NRA (expected in December 2007)

# new Rules for User ENUM - cont

- new Rules (if approved by NRA):
  - consent of Carrier not required ☺
  - Registrations by Registrars; contract with NASK must be signed
  - no special requirements to become a Registrar
  - validation to be done by Registrars
  - Validation based on documents provided by Subscriber (agreement with telco + last bill)

# new Rules for User ENUM - cont

- new Rules (if approved by NRA):
  - cost: 1 EUR / year
  - EPP as registration protocol
  - **CRUE** for carriers (free of charge) – we have just stolen ideas from UK colleagues... 😊

# plans...

- to use CBD for subscriber's request validation:
- validation done by the Registry and CBD more reliable than validation done by Registrars
- if subscriber resigns from the number (agreement for is terminated) it can be automatically reflected in User ENUM database

> contact

BARTOSI EWI CZ | andrzej

head of dns di vi si on | NASK

0.7.5.1.4.2.6.0.6.8.4.e164.arpa